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Title: SWEIS Yearbook 2011: Comparison of 2011 Data to Projections of the 2008 Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory

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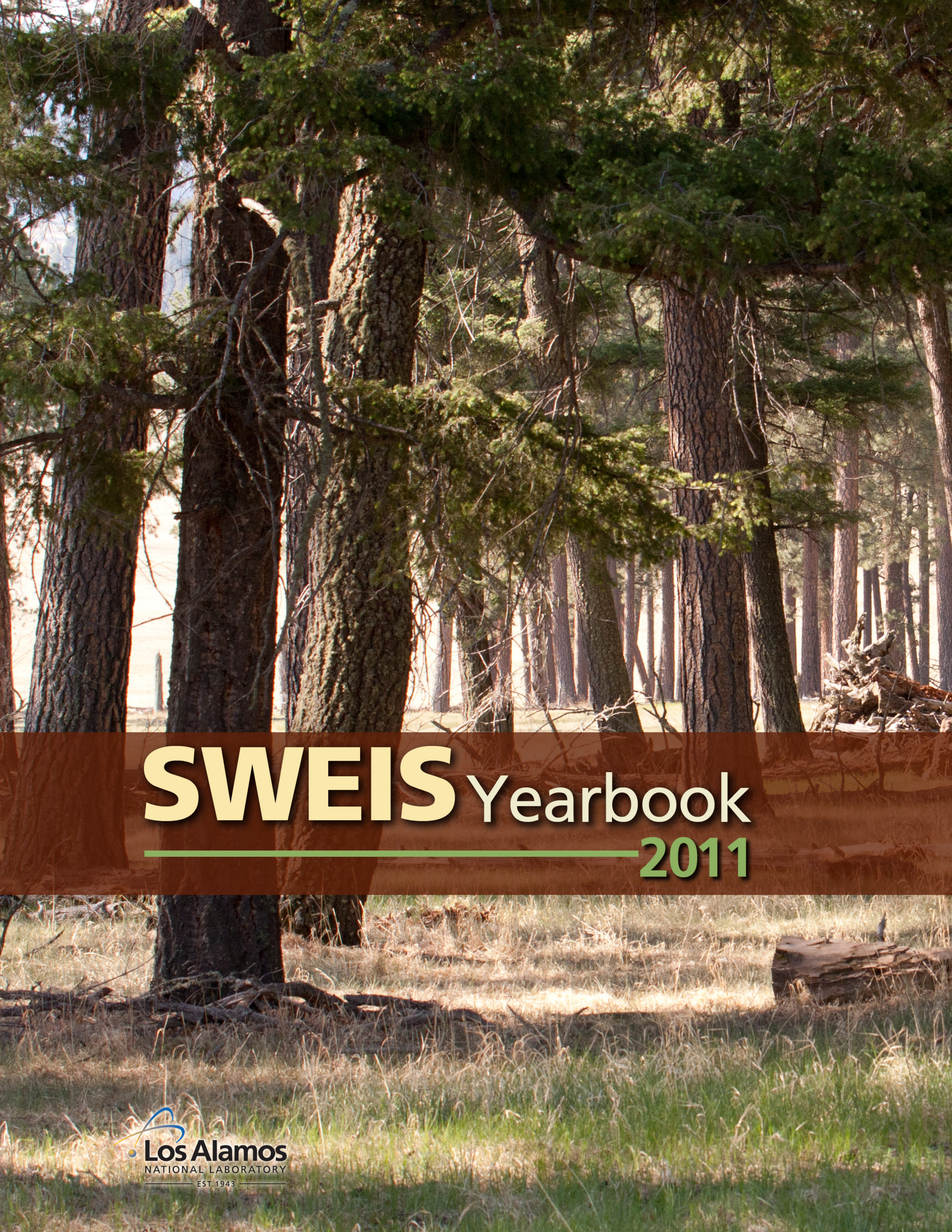

Los Alamos
NATIONAL LABORATORY
EST. 1943

Cover photo: A ponderosa pine stand at Los Alamos National Laboratory.
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Title

SWEIS Yearbook—2011

Comparison of 2011 Data to Projections of the 2008 Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory

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Preface

The Site-wide Environmental Impact Statement (SWEIS) for Continued Operation of Los Alamos National Laboratory (LANL or the Laboratory) was issued in May 2008 (DOE 2008a). In September 2008, the United States (US) Department of Energy/National Nuclear Security Administration (DOE/NNSA) issued the first Record of Decision (ROD) for the 2008 SWEIS (DOE 2008b). DOE/NNSA issued the second ROD for the 2008 SWEIS in July 2009 (DOE 2009a).

Five years after issuance of a SWEIS, DOE performs a formal analysis of the adequacy of the SWEIS to characterize the environmental envelope for continuing operations at LANL. The Annual SWEIS Yearbook was designed to assist DOE in this analysis by comparing operational data with projections contained in the 2008 SWEIS for the level of operations selected by the SWEIS. Yearbook publications to date are available online in LANL's Electronic Public Reading Room.

The 2011 Yearbook is the fourth compilation of annual data since the first ROD for the 2008 LANL SWEIS was issued and the second compilation of annual data since the second ROD was issued. The 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 (NEPA) analysis is necessary. This edition of the Yearbook summarizes the data from Calendar Year (CY) 2011 and includes a special five-year trend analysis covering CY 2007–2011.

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Executive Summary

Los Alamos National Laboratory (LANL) operations data for CY 2011 mostly fell within the 2008 SWEIS projections. Operation levels for four LANL facilities exceeded the 2008 SWEIS capability projections – Los Alamos Neutron Science Center (LANSCE), Solid Radioactive and Chemical Waste (SRCW), Materials Science Laboratory (MSL) and Radiochemistry Facilities. However, none of these capability increases caused exceedances in waste generation, radioactive air emissions, or NPDES discharge. Several facilities exceeded the SWEIS levels for waste generation quantities; however, all were one-time, non-routine events that do not reflect the day-to-day operations of the Laboratory. In addition, total site-wide waste generation quantities were below SWEIS projections for all waste types, reflecting the overall levels of operations at both the Key and Non-Key Facilities. Although gas and electricity consumption have remained within the 2008 SWEIS limits for utilities, water consumption exceeded the 2008 SWEIS projections by 10 million gallons in CY 2011.

Background

In 1999, the United States Department of Energy (DOE) published a SWEIS for the continued operation of LANL. DOE issued a Record of Decision (ROD) for this document in September 1999. DOE announced in its ROD that it would operate LANL at an expanded level and that the environmental consequences of that level of operations were acceptable.

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

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

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

DOE/NNSA chose to implement the No Action Alternative with some additional elements of the Expanded Operations Alternative.

Current Results

This Yearbook represents data collected for CY 2011. The selected levels of operation from the RODs and the SWEIS provided projections for these operations. This Yearbook compares data from CY 2011 to the 2008 SWEIS projections where appropriate.

The 2011 Yearbook addresses capabilities and operations using the concept of "Key Facilities" as presented in the 2008 SWEIS. It also discusses the "Non-Key Facilities," which include all buildings and structures not part of a Key Facility, (i.e. the balance of LANL).

The 2011 Yearbook contains 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 (NEPA) analysis is necessary. This edition of the Yearbook includes a special five-year trend analysis covering CY 2007–2011.

Operation Levels

The 2008 SWEIS No Action Alternative and approved elements of the Expanded Operations Alternative projected a total of 15 facility construction and modification projects within the Key Facilities. During 2011, six construction/modification projects were undertaken:

- Electrical and mechanical systems were expanded to meet new computer requirements at the Nicholas C. Metropolis Center (Metropolis Center);
- Construction of the Radiological Laboratory/Utility/Office Building (RLUOB) continued at TA-55;
- The Nuclear Materials Safeguards and Security Upgrades Project (NMSSUP) continued at TA-55;
- The TA-55 Reinvestment Project (TRP) construction continued;
- Construction of evaporation tanks at TA-52 for the Radioactive Liquid Waste Treatment Facility (RLWTF) was started; and
- Construction of the LANSCE Weapons Neutron Research (WNR) National Security Nuclear Science Facility (NS2) began.

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

- Construction of the Photovoltaic Array Reuse of Los Alamos County Landfill began in December;

- Construction of the Sanitary Effluent Reclamation Facility Expansion (SERF-E) began in May; and
- Construction of the Indoor Firing Range began in September.

During CY 2011, 79 capabilities were active and 11 capabilities were inactive at LANL's Key and Non-Key Facilities. At the Chemistry and Metallurgy Research (CMR) Key Facility, Destructive and Nondestructive Analysis, Nonproliferation Training, and Large Vessel Handling capabilities were not active. No High-Pressure Gas Fills and Processing, Diffusion and Membrane Purification, Hydrogen Isotopic Separation, or Radioactive Liquid Waste Treatment took place at the Tritium Facilities. Materials Test Station (MTS) equipment was not installed at LANSCE. No Waste Retrieval, Waste Treatment, or Decontamination Operations took place at SRCW Facilities.

During CY 2011, operation levels for four LANL facilities exceeded the 2008 SWEIS capability projections – LANSCE, MSL, Radiochemistry, and SRCW.

LANSCE exceeded SWEIS projection levels for the capability of treatment of radioactive liquid waste due to contributions of radioactive liquid waste received from RLWTF and from the TA-21 remediation work. MSL exceeded operation level projections in the SWEIS for the capability of Mechanical Behavior in Extreme Environments. Although both facilities also exceeded chemical waste generation quantities, this was due to one-time, non-routine events that were not associated with the increases in operation levels noted above.

Radiochemistry Facilities conducted radionuclide transport studies at levels twice the number projected in the 2008 SWEIS and increased isotope off-site shipments by 20 percent compared to levels projected in the 2008 SWEIS. However, radioactive air emissions, outfall discharge, and waste quantities were well below SWEIS projections for both of these Key Facilities.

The SRCW Facility exceeded operation level projections in the SWEIS for the capability of Waste Transport, Receipt, and Acceptance. Mixed low-level radioactive waste (MLLW) shipped for off-site treatment and disposal exceeded the 2008 SWEIS projections by 5 cubic meters. This was due to the unexpected receipt of 37 cubic meters of MLLW from the TA-21 decontamination, decommissioning, and demolition (DD&D)/Remediation project.

In CY 2011, several facilities exceeded their chemical waste projections in the 2008 SWEIS due to one-time, non-routine events; however the total LANL site-wide chemical waste generation for CY 2011 was below the 2008 SWEIS projection:

- LANSCE – disposal of asphalt contaminated by a diesel leak (98 percent of total chemical waste generated at LANSCE);

- MSL – disposal of asbestos generated in a re-roofing project of TA-03-1698 (70 percent of total chemical waste generated at MSL);
- Plutonium Complex – disposal of unused/unspent Portland Cement (50 percent of total chemical waste generated at Plutonium Complex);
- Sigma Complex – disposal of contaminated soil generated during the automated gate installation project (96 percent of total chemical waste generated at Sigma Complex); and
- SRCW Facilities – clean out and disposal of a number of old source test drums from the Radioassay and Nondestructive Testing (RANT) Facility that were no longer in use (47 percent of total chemical waste generated at SRCW Facilities).

The SRCW Facilities also exceeded the low-level radioactive waste (LLW) projection in the 2008 SWEIS due to the cleanout of approximately 5,000 empty LLW drums before the end of Fiscal Year (FY) 2011 to allow for construction of a Permacon (modular containment enclosure). The empty LLW drums were shipped via sealand containers. This accounted for about 66 percent of total LLW generated at SRCW. This was a one-time, non-routine event and LANL site-wide LLW generation for CY 2011 remained below the 2008 SWEIS projection.

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

Environmental Effects of Operations

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

Radioactive emissions have decreased significantly since 2007, after an emission control system at LANSCE was repaired. Radioactive airborne emissions from point sources (i.e., stacks) during 2011 totaled approximately 328 curies, less than 1 percent of the annual projected radiological air emissions of 34,000 curies[1] in the 2008 SWEIS.

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

During CY 2011, emissions of criteria pollutants were well below 2008 SWEIS projections, except in the case of sulfur oxides (SOx). SOx emissions exceeded SWEIS projections due primarily to the operations of a generator at TA-33 for longer than usual in order to complete a project involving national security. All emissions of criteria pollutants were well below the New Mexico Administrative Code (NMAC), Title 20, Chapter 2, Part 73 limits.

In response to DOE Executive Order 13514, Los Alamos National Security, LLC (LANS) reported its greenhouse gas emissions from stationary combustion sources to the United States (US) Environmental Protection Agency (EPA) for the second time in CY 2011. These stationary combustion sources emitted 59,308 metric tons of carbon dioxide equivalents (CO_2e) in CY 2011.

Since 1999, the total number of permitted outfalls was reduced from 55 identified in the 1999 SWEIS to 15 that were renewed in the August 2007 National Pollutant Discharge Elimination System (NPDES) permit No. NM0028355 to 11 in October 2011. In CY 2011, four industrial outfalls were deleted from the permit. As a result of these closures, there has been a significant decrease in flow over the past five years. In 2011, eight outfalls flowed. Calculated NPDES discharges totaled 164.1 million gallons in CY 2011, approximately 2.2 million gallons more than the CY 2010 total of 141.8 million gallons. However, this is still well under the 2008 SWEIS projected volume of 279.5 million gallons per year.

Water levels in wells penetrating into the regional aquifer continue to decline in response to pumping, typically by several feet each year. In areas where pumping has been reduced, water levels show some recovery. In CY 2011, LANL installed one monitoring well in the perched/intermediate groundwater and five monitoring wells (with six screens) in the regional aquifer.

Total waste generation quantities were below quantities projected in the SWEIS. The 2008 SWEIS combines transuranic (TRU) and mixed TRU waste into one waste category since they are both managed for disposal at the Waste Isolation Pilot Plant (WIPP). In CY 2011, total waste quantities from LANL operations were below SWEIS projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities. Waste quantities at Key and Non-Key Facilities that exceeded the SWEIS levels were one-time, non-routine events.

In CY 2011, DOE/NNSA removed 61 structures at LANL. Of these structures, 50 were demolished, nine were salvaged, and two were transferred to Santa Clara Pueblo. This eliminated a total of 425,343 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 seven previous years. For example, the 1999 SWEIS projection for annual water consumption was 759 million gallons compared to the greatly reduced 2008 SWEIS projection of 417.8 million gallons. Water consumption for CY 2011 was 427.8 million gallons. The 10 million gallon water consumption exceedance represents the first time LANL has exceeded utility projections from either the 1999 or the 2008 SWEIS. Electricity consumption for CY 2011 was 449 gigawatt-hours compared to the 2008 SWEIS projection of 582 gigawatt-hours. Gas consumption for CY 2011 was 1.08 million decatherms compared to the SWEIS projection of 1.20 million decatherms. The Laboratory is committed to increasing energy efficiency and will continue to make improvements towards that goal in the future.

Radiological exposures to LANL workers were well within the levels projected in the SWEIS. The total effective dose (TED) equivalent for the LANL workforce was 127.4 person-rem in 2011, which is much lower than the 280 person-rem workforce dose projected in the 2008 SWEIS. In 2011, there were approximately 164 recordable cases of occupation injury and illness; this represents a 13 percent increase from CY 2010. Also, approximately 43 cases resulted in days away, restricted or transferred (DART) duties per year, representing a 2 percent reduction in cases from CY 2010. 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 11,672 employees at the end of CY 2011 represent no significant change compared with the 11,609 total employees reported in the 2010 Yearbook. The total number of employees in CY 2011 is 14 percent lower than 2008 SWEIS projections.

Measured parameters for ecological resources and groundwater were similar to SWEIS projections, and measured parameters for cultural resources and land resources were below SWEIS projections. For land use, the 2008 SWEIS projected the disturbance of 41 acres of new land at TA-54 because of the need for additional disposal cells for LLW. (The 1999 SWEIS projected that 15 prehistoric sites would be affected by the expansion of Area G into Zones 4 and 6 at TA-54.) As of 2011, this expansion had not become necessary. From 2001 to 2011, approximately 2,440 acres of land were transferred to the Department of Interior 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 2011.

Ecological and cultural resources remained protected in CY 2011. Ecological resources include biological resources such as protected sensitive species, ecological processes, and biodiversity. No excavation occurred of sites at TA-54 or anywhere else on LANL. Twenty historic buildings were demolished in fiscal year (FY) 2011.

Data collected for 2011 indicate that LANL operations remained bounded by the 2008 SWEIS environmental envelope. DOE/NNSA is committed to reducing energy and water consumption and will continue to make improvements towards that goal in the future.

Five-Year Trend Analysis

LANL operations over the past five years have generally remained below the 1999 and 2008 SWEIS projections. Environmental effects of operations levels that exceeded the 2008 SWEIS projections, with the exception of utilities, were one-time, non-routine events that do not represent the day-to-day operations of the Laboratory.

Utility consumption over the past five years has been trending upward. Although gas and electricity consumption have remained within the lowered 2008 SWEIS projections for utilities, water consumption exceeded the 2008 SWEIS projections by 10 million gallons in CY 2011. DOE/NNSA will continue to make improvements towards reducing energy and water consumption in the future. Energy reduction initiatives like night setbacks, lighting retrofits, heating, ventilation, and air conditioning (HVAC) upgrades and High Performance Sustainable Buildings (HPSB) are being implemented. In addition, improvements to the SERF-E in CY 2012 are expected to lead to increased use of recycled effluent in the cooling towers in CY 2013, thereby significantly reducing the amount of potable water consumed. Details can be found in LANL's Site Sustainability Plan (LANL 2011a).

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

Area of Contribution	Contributor
Air Emissions	David Fuehne
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Air Emissions	Sonja Salzman
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Bioscience	Leonard Romero
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Decontamination, Decommissioning, and Demolition	Darrik Stafford
Decontamination, Decommissioning, and Demolition	Duane Parsons
Decontamination, Decommissioning, and Demolition	Ian Albright
Decontamination, Decommissioning, and Demolition	Mona Valencia
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Land Resources	Jennifer Payne

Area of Contribution	Contributor
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Liquid Effluents	Steve Veenis
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Machine Shops	Darrik Stafford
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Materials Science Laboratory	Dee Hoisington
Nicholas C. Metropolis Center	Phil Sena
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Non-Key Facilities: Sanitary Effluent Recycling Facility	Terry J. Singell
Non-Key Facilities: Tactical Training Facility	Jeff Tucker
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Pollution Prevention Program	Sonja Salzman
Radioactive Liquid Waste Treatment Facility	Chris Del Signore
Radiochemistry Facility	Marc Gallegos
Sanitary Waste/Recycling	Sonja Salzman
Sigma Complex	Marc Gallegos
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Solid Radioactive and Chemical Wastes	Liz English
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Target Fabrication Facility	Ross Muenchausen
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Utilities	Maura Miller
Worker Safety/Doses	Jim Stein
Worker Safety/Doses	Paul Hoover

Acronyms

ACL	Advanced Computing Laboratory
AIRNET	air monitoring network
ALARA	as low as reasonably achievable
AOC	area of concern
ARRA	American Reinvestment and Recovery Act
ARTIC	Actinide Research and Technology Instruction Center
ASCP	Advanced Simulation and Computing Program
BA	biological assessment
BGS	below ground surface
BIO	Basis for Interim Operation
BMP	best management practice
BRMP	Biological Resources Management Plan
BSL	Biosafety Level
BTF	Beryllium Technology Facility
BTU	british thermal unit
BV	background values
CAS	central alarm station
CCF	Central Computing Facility
CD	Critical Decision
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CGP	Construction General Permit
CGTG	Combustion Gas Turbine Generator
Ci/yr	curies per year
CLEAR	Chloride Extraction and Actinide Recovery (line)
CME	Corrective Measure Evaluation
CMI	Corrective Measure Implementation (Plan)
CMR	Chemical and Metallurgy Research (Building)
CMRR NF	CMR Replacement Nuclear Facility
CO	carbon monoxide
CO2e	carbon dioxide equivalent

Consent Order	NMED Compliance Order on Consent
COPC	chemical of potential concern
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
DE-1	High Explosive Science and Technology (group)
DNA	Deoxyribonucleic acid
DOE	US Department of Energy
DSA	Documented Safety Analysis
DVRS	Decontamination and Volume Reduction System
EIS	Environmental Impact Statement
ELG	effluent limitation guideline
EMS	Environmental Management System
ENV-ES	Environmental Stewardship Group
EP	Environmental Programs
EPA	US Environmental Protection Agency
ER	Environmental Restoration (Project)
Ex-ID	excavation permit review
FEL	Free Electron Laser
FOD	Facility Operations Director
FONSI	Finding of No Significant Impact
FTE	full-time equivalent
FY	fiscal year
GAC	granular activated carbon
GIS	geographic information system
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
HMP	Habitat Management Plan
HPI	Human Performance Improvement
HPSB	High Performance Sustainable Building
HRL	Health Research Laboratory
HVAC	heating, ventilation, and air conditioning
IP	Individual Permit
IPF	Isotope Production Facility
ISMS	Integrated Safety Management System
ITSR	Interim Technical Safety Requirement
IVML	*In Vivo* Measurements Laboratory
IWSST	Institutional Worker Safety and Security Team
kg	kilograms
kg/yr	kilogram per year
klb	thousands of pounds
KSL	KBR/Shaw/LATA
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LANSCE	Los Alamos Neutron Science Center
LASO	Los Alamos Site Office
LDCC	Laboratory Data Communication Center
linac	linear accelerator
LLW	low-level radioactive waste
m^3	cubic meter
m^3/yr	cubic meters per year
MAPAR	Mitigation Action Plan Annual Report
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCL	maximum contaminant level
MDA	Material Disposal Area
MeV	million electron volts
MGY	million gallons per year
MLLW	mixed low-level radioactive waste
MOUT	Military Operations in Urban Terrain

MOX	mixed oxide (fuel)
MSGP	Multi-Sector General Permit
MSL	Materials Science Laboratory
MTS	Materials Test Station
MVA	megavolt ampere
MW	megawatt
MWh	megawatt-hour
NCO	Nuclear Component Operations (Division)
NAABB	National Alliance for Advanced Biofuels and Bioproducts
NEPA	National Environmental Policy Act
NFA	no further action
NHC	Nuclear Hazard Classification
NIH	National Institutes of Health
NISC	Nonproliferation and International Security Center
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMGCO	New Mexico Gas Company
NMSA	New Mexico Solid Waste Act
NMSSUP	Nuclear Materials Safeguards and Security Upgrades Project
NNSA	National Nuclear Security Administration
NOI	Notice of Intent
NOx	nitrous oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NS2	National Security Nuclear Science
NSSB	National Security Sciences Building
OSRP	Offsite Source Recovery Project
P2	Pollution Prevention
PAH	Polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PETN	Pentaerythritol tetranitrate
PHERMEX	pulsed high-energy radiographic machine emitting x-rays (facility)
PM	particular matter

PNM	Public Service Company of New Mexico
POC	point of contact
PRad	proton radiography
PRB	permeable reactive barrier
PRID	permit and requirements identification
PRS	potential release site
PV	photovoltaic
Qbt	Quaternary Tshirge Member
RAMP	Roof Asset Management Program
RANT	Radioassay and Nondestructive Testing (facility)
RCRA	Resource Conservation and Recovery Act
RDX	research department explosive
RLUOB	Radiological Laboratory/Utility/ Office Building
RLWTF	Radioactive Liquid Waste Treatment Facility
RNA	Ribonucleic acid
ROD	Record of Decision
RSL	Radiographic Support Laboratory
SA	Supplement Analysis
SAD	Safety Assessment Document
SAL	screening action level
SCC	Strategic Computing Complex
SEIS	Supplemental Environmental Impact Statement
SERF	Sanitary Effluent Reclamation Facility
SERF-E	Sanitary Effluent Reclamation Facility Expansion
SHPO	State Historic Preservation Office
SMA	Site Monitoring Area
SNM	special nuclear material
SOC	Securing Our Country (LANL Protective Force)
SOx	sulfur oxides
SPEIS	Supplemental Programmatic Environmental Impact Statement
SRCW	Solid Radioactive and Chemical Waste
SSL	soil screening level
SWEIS	Site-Wide Environmental Impact Statement

SWMU	solid waste management unit
SWPPP	Storm Water Pollution Prevention Plan
SWWS	Sanitary Wastewater Systems
TA	Technical Area
TAIZ	technical area isolation zone
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
TSS	total suspended solids
TSTA	Tritium Systems Test Assembly (facility)
TWISP	transuranic waste inspectable storage project
UC	University of California
US	United States
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
UV	ultraviolet
VOC	volatile organic compound
VPP	Voluntary Protection Program
VSP	voluntary separation program
WCRR	Waste Characterization, Reduction, and Repackaging (Facility)
WETF	Weapons Engineering Tritium Facility
WFO	work for others
WIPP	Waste Isolation Pilot Plant
WMin	Waste Minimization
WNR	Weapons Neutron Research (facility)
WSST	Worker Safety and Security Team
ZVI	zero-valent iron

1.0 Introduction

1.1 The Site-Wide Environmental Impact Statement

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

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

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

The second ROD for the 2008 SWEIS was issued in June 2009 (DOE 2009a). The ROD was based on the information and analyses contained in the SWEIS and other factors, including comments received on the SWEIS, costs, technical and security considerations, and the missions of NNSA. Again, DOE/NNSA chose the No Action Alternative with the addition of some elements of the Expanded Operations Alternative in this ROD.

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2 Congress established the National Nuclear Security Administration (NNSA) within the DOE to manage the nuclear weapons program for the United States. Los Alamos National Laboratory is one of the facilities now managed by the NNSA. The NNSA officially began operations on March 1, 2000. Its mission is to carry out the national security responsibilities of the DOE, including maintenance of a safe, secure, and reliable stockpile of nuclear weapons and associated materials capabilities and technologies; promotion of international nuclear safety and nonproliferation; and administration and management of the naval nuclear propulsion program.

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 off-site transportation of low-specific-activity, low-level radioactive waste (LLW) by a combination of truck and rail to EnergySolutions in Clive, Utah. DOE/NNSA concluded that the proposed shipment of waste to EnergySolutions by truck and rail is bounded by the 2008 SWEIS transportation analysis.

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

1.2 Annual Yearbook

To enhance the usefulness of the SWEIS, DOE/NNSA and LANL implemented a program in which annual comparisons would be made between SWEIS projections and actual operations via an annual Yearbook. The Yearbook's purpose is not to present environmental impacts or environmental consequences but rather to provide data that could be used to develop an impact analysis.

The Yearbook addresses capabilities and operations using the concept of "Key Facilities" as presented in the SWEIS. The definition of each Key Facility hinges upon operations (research, production, services, and environmental impacts) and capabilities and is not necessarily confined to a single structure, building, or technical area (TA). The Yearbook also discusses the "Non-Key Facilities," which include all buildings and structures not part of a Key Facility (i.e., the balance of LANL).

The Yearbook focuses on the following information:

- *Facility and process modifications or additions.* These include projected activities for which NEPA coverage was provided by the SWEIS and some post-SWEIS activities for which environmental coverage was not provided. In the latter case, the Yearbook identifies the additional NEPA analyses (i.e., categorical exclusions, environmental assessments, or environmental impact statements) that were prepared.
- *The types and levels of operations during the calendar year (CY).* Types of operations are described using capabilities defined in the 2008 SWEIS. Levels of operations are expressed in units of production, numbers of researchers, numbers of experiments, hours of operation, and other descriptive units (Appendix A).
- *Operations data for the Key and Non-Key Facilities, comparable to data projected in the SWEIS.* Data for each facility include waste generated, air emissions, and liquid effluents (Appendix A).

- *Site-wide effects of operations for the CY.* These include measurements of site-wide effects such as number of workers, radiation doses, workplace incidents, utility requirements, air emissions, liquid effluents, and solid wastes. These effects also include changes in the regional aquifer, ecological resources, and other resources for which the DOE has long-term stewardship responsibilities as an administrator of federal lands.
- *Trend analysis.* A trend analysis, Chapter 4, is included in the Yearbook every five years and includes analyses on air emissions, quantities of waste generated, utility consumption, and other long-term trends in LANL operations.
- *Summary and conclusion.* Chapter 5 summarizes CY 2011 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 2011.
- *Pollution Prevention (P2) Awards (Appendix D)*. This appendix provides a summary of the DOE 2011 P2 Awards for LANL.
- *Actions taken in response to the Las Conchas fire (Appendix E)*. This appendix is included as a special section of the CY 2011 Yearbook. It provides a summary of the Las Conchas fire and actions that were taken by LANL during 2011 in response to the fire. It was published as part of the fiscal year (FY 2011) SWEIS Mitigation Action Plan Annual Report (MAPAR).

Data for comparison come from a variety of sources, including facility records, operations reports, facility personnel, and the annual Environmental Report (previously

[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 on-site consequences. DOE-STD-1027-92 (DOE 1992b) provides the resulting threshold quantities for radioactive materials that define Category 2 facilities.
- Category 3 Nuclear Hazard – has the potential for only significant localized consequences. Category 3 is designed to capture those facilities such as laboratory operations, LLW handling operations, and research operations that possess less than Category 2 quantities of material. DOE-STD-1027-92 (DOE 1992b) provides the Category 3 thresholds for radionuclides.

the Environmental Surveillance Report). The focus on operations, rather than on programs, missions, or funding sources, is consistent with the approach of the SWEIS.

The annual Yearbook provides DOE/NNSA with information needed to evaluate the adequacy of the SWEIS and enable them to make decisions on when and if a new SWEIS is needed. The Yearbook also provides Los Alamos National Security, LLC (LANS) managers with a guide to determine whether activities are within the SWEIS operating envelope. The Yearbook serves as a summary of environmental information collected and reported by the various groups at LANL.

1.3 CY 2011 Yearbook

The 2011 Yearbook represents the fifth full year of operations data reported since LANL management transitioned from the University of California (UC) to LANS. LANS consists of UC, Bechtel, BWX Technologies, and Washington Group International, and currently operates LANL for DOE/NNSA. In addition to the change in management, a major reorganization occurred during CY 2006, resulting in the formation, renaming, and/or dissolution of various LANL groups, divisions, and directorates.

This Yearbook represents data collected for CY 2011. This Yearbook compares data from CY 2011 to the 2008 SWEIS projections. The collection of data on facility operations is a unique effort. The type of information developed for the SWEIS is not routinely collected at LANL. Nevertheless, this information is the heart of the SWEIS and the Yearbook, and the description of current operations and indications of future changes in operations are believed to be sufficiently important to warrant this effort.

1.4 The Las Conchas Fire

The Las Conchas fire began June 26, 2011. The fire spread quickly, driven by strong winds and extremely dry conditions, burning 43,000 acres (17,401 ha) on the first day. By the time it was fully contained on August 1, 2011, the Las Conchas fire had burned 156,593 acres (63,371 ha), making it the largest wildfire in New Mexico history. Fortunately, no lives were lost due to the Las Conchas fire. The fire burned around LANL's western boundary and partially on its southern boundary. Approximately 133 acres (52 ha) of the Laboratory and DOE/NNSA property were burned by the Las Conchas fire and related back burns. Approximately 131 acres were intentionally back burned to help limit the spread of the wild fire, a small spot fire in TA-49 burned about one acre, and a small wildlife-related fire in TA-53 burned another acre. Between 2000 and 2011, LANL and the DOE Los Alamos Site Office (LASO) worked together to complete many fire/fuels mitigation projects, which limited the ability of the Las Conchas fire to cross onto LANL property. Although the fire burned only a small area of LANL, it affected areas above (west of) the Laboratory, which created areas with little or no vegetation, increasing the risk of flooding and erosion at the Laboratory and surrounding communities.

The majority of the actions taken in response to the Las Conchas fire were related to erosion control, fuel mitigation, and fire suppression. These activities and the associated NEPA coverage for them are explained in detail in Appendix E.

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2.0 Facilities and Operations

LANL consists of approximately 1,100 structures with eight million square feet under roof, spread over an area of 36 square miles of land owned by the US government and administered by DOE/NNSA. Much of LANL is undeveloped to provide a buffer for security, safety, and expansion possibilities for future use. Approximately 40 percent of the square footage at the site is considered laboratory or production space; the remaining square footage is considered administrative, storage, service, and other space. While the number of DOE-owned structures changes with time (there is frequent addition or removal of temporary structures and miscellaneous buildings), the breakdown at the end of CY 2011 was 824 permanent buildings and 236 temporary structures (trailers and transportables). According to the Laboratory's Infrastructure Planning Division, in CY 2011 LANS leased 44 buildings within the Los Alamos town site.

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 (technical areas [TAs]) and the impacts related to specific programmatic operations (Key Facilities and capabilities). Taken together, the 15 Key Facilities represent the majority of environmental risks associated with LANL operations. The 15 Key Facilities identified were both critical to meeting mission assignments and

- Housed operations that have the potential to cause significant environmental impacts,
- Were of most interest or concern to the public (based on comments in the 1999 and 2008 SWEIS public hearings), or
- Would be subject to change because of DOE/NNSA programmatic decisions.

In 2008, Pajarito Site (TA-18) was placed into Surveillance and Maintenance mode. All operations ceased and the facility was downgraded to a Less-than-HazCat 3 Nuclear Facility (DOE 2011c). For the purpose of the 2008-2011 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 utilizes. The remainder of LANL capabilities was called "Non-Key," not to imply that these facilities were any less important to the accomplishment of critical research and development, but because they did not fit the above criteria for "Key" Facilities.

The Key Facilities comprise 42 of the 48 HazCat 2 and HazCat 3 Nuclear Structures at LANL. Since the issuance of the 2008 SWEIS, DOE/NNSA and LANS have published 12 lists identifying nuclear facilities at LANL that significantly changed the classification of some buildings. Appendix C provides a summary of the current nuclear facilities; a table has been added to each section of Chapter 2 to explain the differences and identify the 19 nuclear facilities currently listed by DOE/NNSA. Of these 19 facilities, all but nine reside within a Key Facility. Beginning in CY 2010, the Safety Basis Division at LANL was no longer required to publish a list of facilities identified as Less-than-HazCat 3 Nuclear Facilities; therefore that information will no longer be included in the SWEIS Yearbooks.

The definition of each Key Facility hinges upon operations,[4] capabilities, and location and is not necessarily confined to a single structure, building, or TA. In fact, the number of structures comprising a Key Facility ranges from one (e.g., the Target Fabrication Facility [TFF]) to more than 400 structures comprising the Los Alamos Neutron Science Center (LANSCE) Key Facility. Key Facilities can also exist in more than a single TA, as is the case with the High Explosives Testing (HET) and High Explosives Processing (HEP) Key Facilities, which exist in all or part of five and six TAs, respectively.

This chapter discusses each of the 15 Key Facilities from three aspects: significant facility construction and modifications, types and levels of operations, and environmental effects of operations that have occurred during CY 2011. Each of these three aspects is given perspective by comparing them to projections made by the 2008 SWEIS. This comparison provides an evaluation of whether or not data resulting from LANL operations continue to fall within the environmental envelope established in the 2008 SWEIS. It should be noted that modifications and construction activities that were completed prior to CY 2011 are summarized in previous Yearbooks.

This chapter also discusses Non-Key Facilities, which include buildings and structures not part of a Key Facility, or the balance of LANL facilities. The Non-Key Facilities represent a significant fraction of LANL and comprise all or the majority of 30 of 49 TAs, including TA-00, which comprises leased space within the Los Alamos town site and TA-57 at Fenton Hill, and approximately 14,224 of LANL's 26,058 acres. The Non-

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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.

Key Facilities include such important buildings and operations as the Nonproliferation and International Security Center (NISC); the National Security Sciences Building (NSSB), the main administration building; and the TA-46 Sanitary Wastewater System (SWWS). Table 2-1 identifies and compares the acreage of the 15 Key Facilities and the Non-Key Facilities. Figure 2-1 shows the location of LANL within northern New Mexico, while Figure 2-2 illustrates the locations of the TAs and the Key Facilities.

Table 2-1. Key and Non-Key Facilities

Facility	Technical Areas	~Size (acres)
Key Facilities		
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)	TAs 08, 09, 11, 16, 22, 37	1,115
High Explosives Testing (HET)	TAs 15, 36, 39, 40	8,691
Tritium Facility	TA-16	18
Target Fabrication Facility (TFF)	TA-35	3
Bioscience Facilities	TAs 43, 03, 16, 35, 46	4
Radiochemistry Facility	TA-48	116
Radioactive Liquid Waste Treatment Facility (RLWTF)	TA-50	62
Los Alamos Neutron Science Center (LANSCE)	TA-53	751
Solid Radioactive and Chemical Waste (SRCW) Facilities	TA-50 & TA-54	943
Plutonium 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

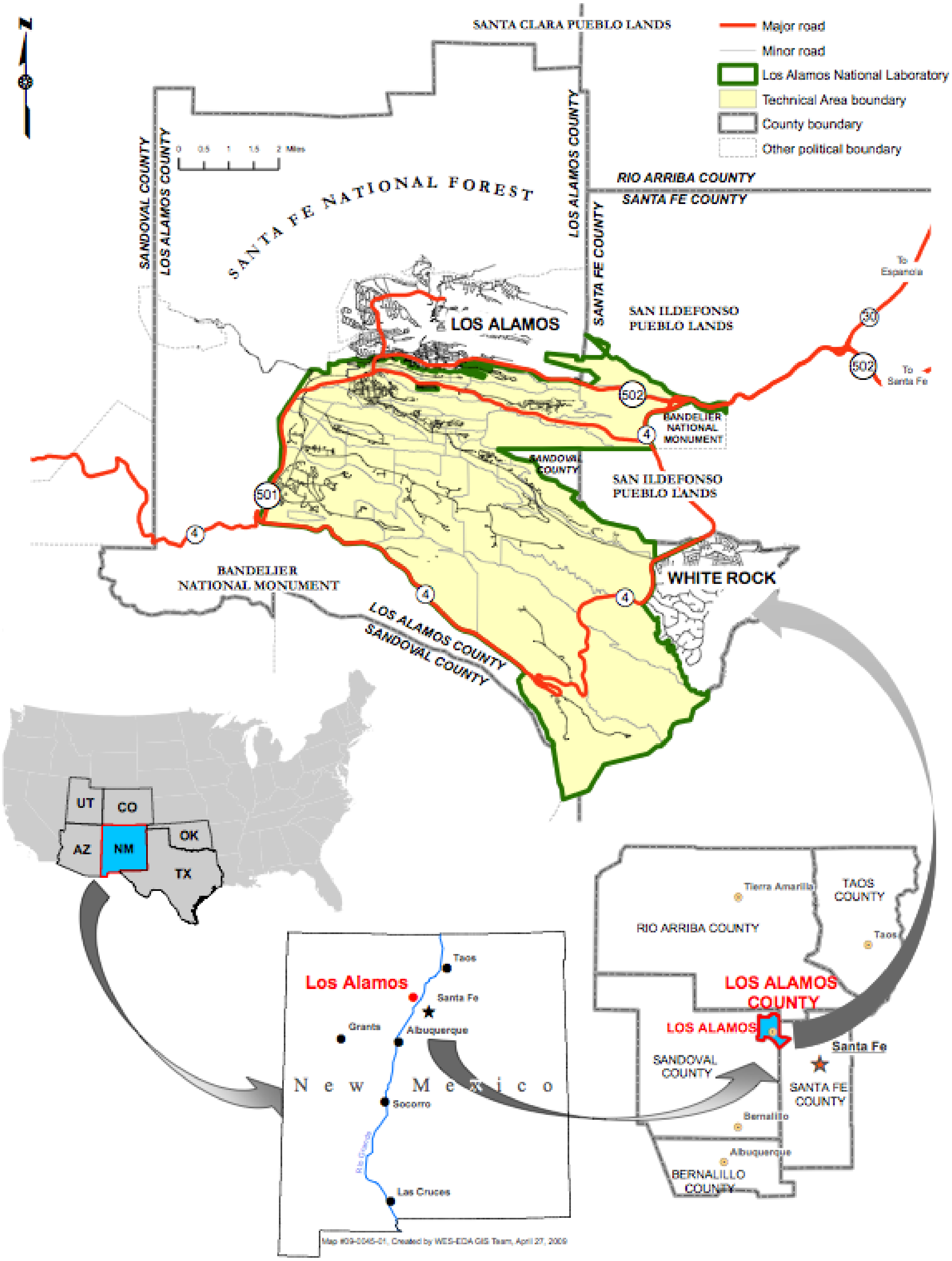

Figure 2-1. Location of LANL

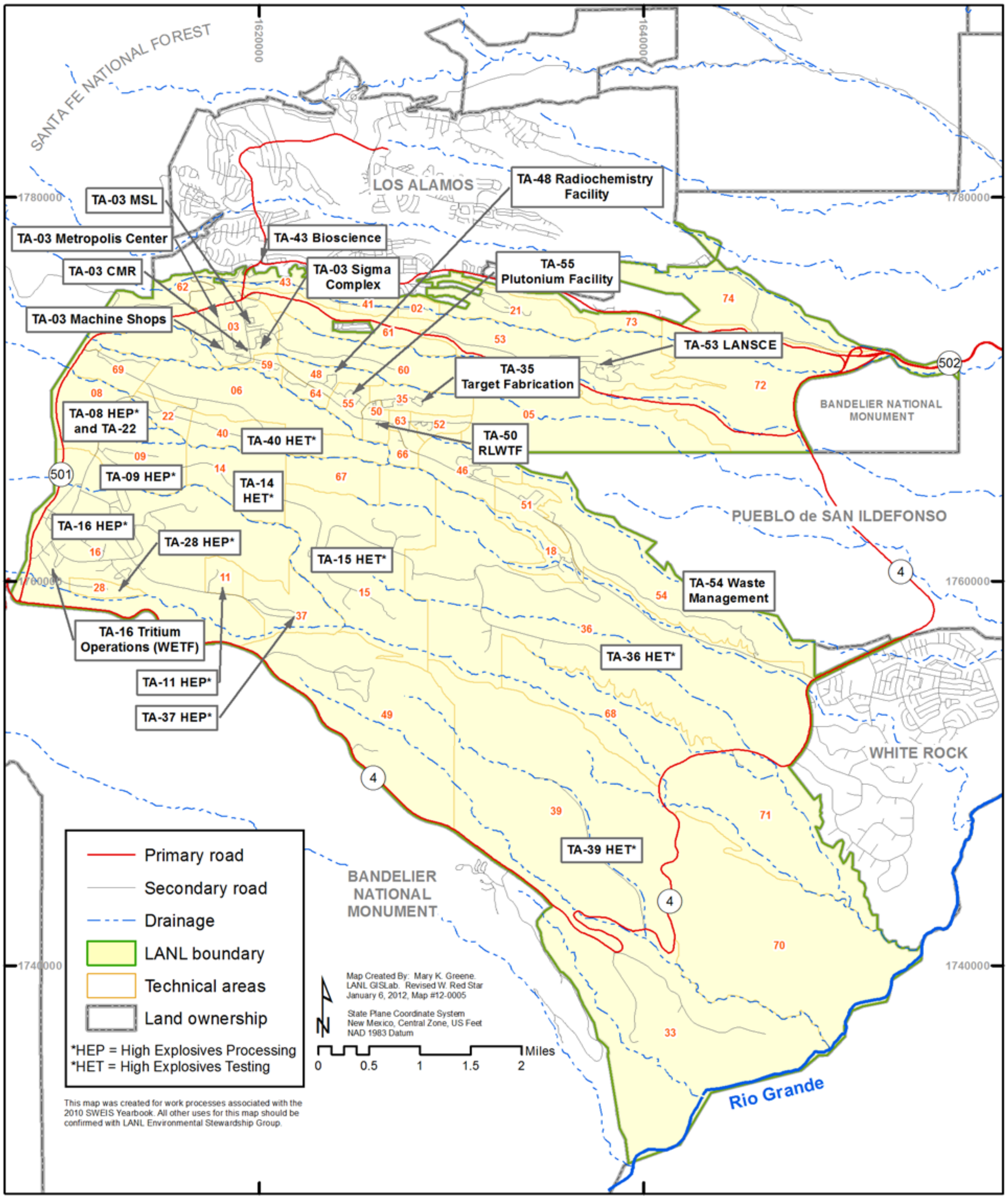

Figure 2-2. Location of Technical Areas and Key Facilities

2.1 CMR Facility (TA-03)

The CMR Building was designed and constructed to the 1949 Uniform Building Code and occupied in 1952 to house analytical chemistry, plutonium metallurgy, uranium chemistry, and engineering design and drafting activity. At the time the 1999 SWEIS was issued, the CMR Building was described as a "production, research, and support center for actinide chemistry and metallurgy research and analysis, uranium processing, and fabrication of weapon components."

The CMR Facility is 550,000 square feet, which consists of a main building (TA-03-0029) and a LLW Storage and Transfer Facility (TA-03-0154) that is no longer operational. The CMR Building consists of three floors: basement, first floor, and attic. It has seven independent wings connected by a common corridor.

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

Table 2-2 and the Nuclear Hazard Classification (NHC) tables in the other sections of this Yearbook reflect the data in the published DOE listings of LANL Nuclear Facilities applied during the CY under review, in this case 2011. 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.

Table 2-2. CMR Buildings with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2011*
TA-03-0029	CMR	2	2

* DOE List of Los Alamos National Laboratory 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 Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project (CMRR EIS; DOE 2003a), which evaluated the potential environmental impacts resulting from activities associated with consolidating and relocating the mission-critical CMR Building capabilities at LANL and replacement of the CMR Building. In its ROD issued in February 2004, the DOE/NNSA decided to replace the CMR Building with a new CMRR NF at TA-55 and to completely vacate and demolish the CMR Building (DOE 2004). The

ROD stated that the new facility would be established as a HazCat 2 Nuclear Facility. In January 2005, a SA (DOE 2005) to the CMRR EIS was written to determine if the environmental impacts of proposed changes to the location of the CMRR NF components were adequately addressed in the CMRR EIS. DOE/NNSA determined that the proposed actions were adequately bounded by the analyses of impacts projected by the 2003 CMRR EIS, and at the time no Supplemental CMRR EIS was required. The CMRR NF would replace the CMR Building as the Key Facility.

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

An amended ROD was issued on October 12, 2011 (DOE 2011b). Construction of the CMRR NF did not begin in CY 2011. However, several projects related to the CMRR were on-going in 2011. These projects are listed below:

- CMRR Project DOE Pre-conceptual Design (LANL 2001a), ongoing in CY 2011.
- In CY 2007, construction of the Radiological Laboratory/Utility/Office Building (RLUOB) began. Construction was ongoing in CY 2011.

During CY 2003, modifications to Wing 9 were started in support of the Containment Vessel Disposition (CVD) Project (previously known as the Bolas Grande Project), which would provide for the disposition of large vessels previously used to contain experimental explosive shots involving various actinides. NEPA coverage for this project was provided by a SA to the 1999 Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory for the Proposed Disposition of Certain Large Containment Vessels, DOE/EIS-0238-SA-03 (DOE 2003b). The project was placed on hold in 2004 based on a decision by DOE/NNSA that the project was a major modification. This decision was later rescinded and the project moved forward in 2009. In 2010, installation of the CVD enclosure and glovebox began. In 2011, the work to complete the CVD enclosure continued. Startup activities were expected to begin in 2012.

CMR Safety Basis. The CMR Facility Safety Basis documentation currently consists of the 1998 Basis for Interim Operations (BIO) 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 Documented

Safety Analysis (DSA) was approved and became the documented Safety Basis for the facility.

While the CMR Building continued to maintain normal operations in 2011 in support of the Pit Manufacturing and Surveillance missions, an effort to reduce the overall risk of the facility was begun in 2006. The scope of the CMR Facility Risk Reduction Project includes relocating hazardous activities from Wings 2 and 4 that were considered particularly vulnerable to seismic activity to other areas of the facility or to another site. In 2008, Wing 3 was vacated and the Risk Reduction Project started relocating hazards to Wings 5 and 7 and to other facilities at LANL. Work continued on the Risk Reduction Project in CY 2011.

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 2011, and all were below operational levels projected in the 2008 SWEIS (Table A-1).

2.1.3 Operations Data for the CMR Building

Operations data from research, services, and production activities at the CMR Building were well below those projected in the 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), the Forming Building (previously referred to as the Thorium Storage Building; TA-03-0159), and several support and storage facilities. Building TA-03-2519, an ion exchange building, was added to the Sigma Complex in 2010 to reduce copper concentrations in order to meet new effluent discharge limits established in the new National Pollutant Discharge Elimination System (NPDES) permit. Primary activities at the Sigma Complex are the fabrication of metallic and ceramic items, characterization of materials, and process research and development.

2.2.1 Construction and Modifications at the Sigma Complex

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

2.2.2 Operations at the Sigma Complex

The 2008 SWEIS identified three capabilities for the Sigma Complex. All three of the capabilities were active in CY 2011, and all were below operational levels projected in the 2008 SWEIS (Table A-3).

2.2.3 Operations Data for the Sigma Complex

In CY 2011, operations levels were less than those projected in the 2008 SWEIS, with one exception. Chemical waste generation exceeded SWEIS projections due to disposal of contaminated soil from an automated gate installation construction project that took place at Sigma Complex. Table A-4 provides operations data details.

2.3 Machine Shops (TA-03)

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

2.3.1 Construction and Modifications at the Machine Shops

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

2.3.2 Operations at the Machine Shops

The 2008 SWEIS identified three capabilities at the Machine Shops. All three of the capabilities were active in CY 2011, 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 for CY 2011 were well below 2008 SWEIS. Table A-6 provides operations data details.

2.4 Materials Science Laboratory (TA-03)

The Materials Science Laboratory (MSL) Key Facility consists of two buildings: a laboratory building (TA-03-1698) containing 27 labs, 60 offices, 21 materials research areas, and support rooms and the Material Science and Technology Office Building (TA-03-1415), which was completed in CY 2004.

2.4.1 Construction and Modifications at the Materials Science Laboratory

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

2.4.2 Operations at the Materials Science Laboratory

The 2008 SWEIS identified four capabilities at MSL. All four of the capabilities were active in CY 2011, and all were below operational levels projected in the 2008 SWEIS, with one exception (Table A-3). The materials processing capability was expanded in CY 2011.

2.4.3 Operations Data for the Materials Science Laboratory

Operations data levels remained below levels projected in the SWEIS with the exception of one. Chemical waste generation exceeded SWEIS projections due to the disposal of material produced from a roofing project at TA-03-1698. 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 in 2011), 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 (ASCP). The Metropolis Center, together with the Laboratory Data Communication Center (LDCC), the Central Computing Facility (CCF), and the Advanced Computing Laboratory (ACL), forms the center for high-performance computing at LANL.

The impacts associated with operating the Metropolis Center at an initial capacity of a 50-teraflop platform were analyzed in the Environmental Assessment for the Proposed Strategic Computing Complex, Los Alamos National Laboratory, Los Alamos, New Mexico (DOE/EA-1250; DOE 1998) and its associated Finding of No Significant Impact (FONSI). The 2008 SWEIS analyzed the proposed increase in the operating platform beyond 50 teraflops to support approximately 1,000 teraflops (1 petaflop). The exact level of operations supported cannot be directly correlated to a set amount of water or electrical power consumption. Each new generation of computing capability machinery continues to be designed with enhanced efficiency in terms of both electrical consumption and cooling requirements. The computing level that can be supported by about 15 megawatts (MW) of electrical usage and 51 million gallons per year (193 million liters) of potable water has been used as an upper limit for computer acquisition at the Metropolis Center.

2.5.1 Construction and Modifications at the Metropolis Center

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

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

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

Since that time, there have been several "supercomputers" housed in the Metropolis Center, including Lightning, Bolt, Redtail, Hurricane, Roadrunner and Cielo. In preparation for these machines, the electrical and mechanical systems in the Key Facility were expanded to meet the new computers' requirements. During 2010, both Lightning and Bolt were decommissioned, and Roadrunner became the primary computer resource for LANL's weapons workload. A new computer, Cielo, arrived in the beginning of CY 2011. It was integrated into the stable of computers at the Metropolis Center and began production work in October 2011. Cielo alone consumes approximately 3 MW of power.

To prepare the Metropolis Center for the arrival of Trinity in 2015, an upgrade to the power and cooling systems at the site would be required. Four 1,200-ton chillers would need to be installed in addition to four 3-MW heat exchangers. Two electrical substations would need to be installed and power distribution would be reconfigured to maximize power efficiency. This reconfiguration would maintain power redundancy and reliability to vital components of computing systems on the computer floor.

2.5.2 Operations at the Metropolis Center

The 2008 SWEIS identified one capability at the Metropolis Center. This capability was active in CY 2011, 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 in support of the Roadrunner supercomputer. Computer operations are performed 24 hours a day, with personnel occupying the control room to support computer operation activities around the clock. Operations consist of office-type activities, light laboratory work such as computer and support equipment assembly and disassembly, and computer operations and maintenance. The Metropolis Center has capabilities to enable remote-site user access to the computing platform, and its co-laboratories and theatres are equipped for distance operations to allow collaboration between weapons designers and engineers across the DOE weapons complex.

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

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 potable water. The Metropolis Center water consumption is currently metered. Water usage is monitored daily and reported monthly. In CY 2011, outfall discharge amounts slightly exceeded 2008 SWEIS projections. The Sanitary Effluent Recycling Facility Expansion (SERF-E) is expected to greatly reduce discharge amounts at the Metropolis Center by using recycled water rather than potable water. The SERF-E facility is expected to be operating by the end of CY 2012. Table A-10 provides operations data details.

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

The HEP Key Facility is located in all or parts of six TAs. Building types include production and assembly facilities, analytical and synthesis laboratories, test facilities, explosives storage magazines, 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 high explosives components for nuclear weapons, 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 radiography 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 on- and off-site for use in experiments and open detonations. Personnel at TA-09 produce a small quantity of high explosives during the year from basic chemistry and lab-scale synthesis operations. Other groups use small quantities of explosives for manufacturing and testing of detonators and initiating devices. Detonable explosives waste from pressing and machining operations and excess explosives are treated by open burning or open detonation. Non-detonable high explosive contaminated wastes are sent to off-site 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 High Explosives Processing

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 put on hold.
- Removal or demolition of vacated structures that are no longer needed.

All high explosives burning operations have been consolidated at TA-16-0388 and TA-16-0399. Burning operations are generally limited to TA-16-0388, although TA-16-0399 is still available for burning of bulk high explosives and high explosive components.

In CY 2010 and CY 2011, 21 portable storage units, structure numbers TA-16-948 through 968 were removed. The High Explosive Packaging and Transportation group vacated the 280 line and consolidated its operations in TA-16-0305 and TA-16-0307. Plastics development is no longer conducted at TA-16. The historic restoration of the TA-08 Gun Site was initiated in CY 2008 with Phase 1 completed in 2009 (DOE 1996a). Planning for Phase II started in CY 2010. Field work for Phase II (i.e., structural repairs) began in CY 2011.

Heavy equipment maintenance operations were relocated from TA-15-0185 to TA-09-0028. TA-09-0028 formerly housed a machine shop (DOE 1996b). The DD&D of structures TA-09-0272 and -0273 was accomplished in CY 2010 and CY 2011. Refurbishment of laboratories and electrical infrastructure safety upgrades progressed at TA-09-0021 (DOE 1996c, 1996d).

In CY 2011, partial demolition of TA-22-0001 was accomplished as part of the Manhattan Project Historical Preservation efforts; post-war additions on both ends of the original structure were removed.

Structural modifications to TA-16-0200 to incorporate an exterior fire egress stairway began in 2010, with completion scheduled for January 2012.

2.6.2 Operations at High Explosives Processing

The 2008 SWEIS identified six capabilities at this Key Facility. All of the six capabilities were active in CY 2011, and all were below operational levels projected in the 2008 SWEIS (Table A-11). High explosives and characterization operations remained below levels projected in the SWEIS. Plastics research and development is currently being performed in other facilities.

The total amount of explosives and mock explosives used across all activities is an indicator of overall activity levels for this Key Facility. Amounts projected in the 2008 SWEIS were 82,700 pounds of explosives and 2,910 pounds of mock explosives. In CY 2011, less than 2,400 pounds of high explosives and less than 600 pounds of mock explosives material were used in the fabrication of test components for internal and external customers. The LANL High Explosive Science and Technology group (DE-1, now WX-7) synthesized and/or formulated less than 100 pounds of explosives. Materials testing at TA-09 expended less than 10 pounds of these explosives. Materials testing at TA-22 expended less than 1 pound of Pentaerythritol tetranitrate (PETN)-based detonators.

During CY 2011, approximately 1,175 pounds of water-saturated explosive scrap were generated from machining operations at TA-16 and treated by open burning at the TA-16 burn ground. High explosives processing and high explosives laboratory operations generated approximately 16,000 gallons of explosive-contaminated water, which was treated at the High Explosives Wastewater Treatment Facility (HEWTF) using an evaporator system that resulted in zero liquid discharge. Explosive waste treated by open burning at the TA-16 Burn Ground in CY 2011 included 1,175 pounds of water-saturated scrap, less than 125 pounds of detonable explosives-contaminated filters, and approximately 1,800 pounds of excess solid high explosives. No explosives-contaminated sand or solvents were treated. Approximately 1,400 gallons of propane and 10 gallons of kerosene were expended to treat these materials. Non-detonable explosive-contaminated equipment was steam cleaned in the 260 facility and salvaged or sent for recycling.

Efforts continued in CY 2011 to develop protocols for obtaining stockpile-returned materials, develop new test methods, and procure new equipment to support requirements for science-based studies on stockpile and energetic materials.

2.6.3 Operations Data for High Explosives Processing

In CY 2011, operations levels were below projections made by the 2008 SWEIS. One outfall remains on the NPDES permit: outfall 05A-055 (HEWTF). However, there have been no discharges through the 05A-055 outfall at HEWTF since the evaporator system was installed in this facility. Table A-12 provides operations data details.

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

The HET Key Facility, which is located in all or parts of five TAs, comprises more than one half (22 square miles) of the land area occupied by LANL, and has 16 associated firing sites. All firing sites are situated in remote locations and/or within canyons. Major buildings are located at TA-15 and include the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility (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 High Explosives Testing

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

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

These projected modifications were not fully realized, and the construction of new facilities within the Two-Mile Mesa Complex was not pursued in CY 2011. A significant modification was made at the DARHT facility in 2010 by the connection of the cooling tower outfall and septic system into the LANL sanitary sewer. This eliminated the discharge of cooling tower water to one of LANL’s NPDES outfalls and removed the septic system for the DARHT complex. In 2011, phase one of an upgrade to the above ground mineral oil storage tanks at TA-15-0313 Radiographic Support Laboratory (RSL) was initiated with the decommissioning of one existing tank, structure 15-436, in preparation for phase two installation of a double-walled replacement tank, which is expected to be completed in 2012.

Cleanup efforts at the pulsed high-energy radiographic machine emitting x-rays (PHERMEX) facility were initiated in two phases during 2010 and 2011 with the first phase consisting of cleanup of legacy waste on the paved areas of the firing point and the second phase consisting of removing and managing legacy wastes from the interior of the buildings at the complex.

2.7.2 Operations at High Explosives Testing

The 2008 SWEIS identified seven capabilities at this Key Facility. All seven of the capabilities were active in CY 2011, and all were below operational levels projected in the 2008 SWEIS (Table A-13). HET operations were scaled back in CY 2011 with the consolidation of operations primarily within TA-14, 15, and 36, and with TA-39 being utilized on an occasional basis. Levels of research in 2011 were below those predicted by the 2008 SWEIS.

The total amount of depleted uranium expended during testing (all capabilities) is an indicator of overall activity levels at this Key Facility. Less than 10 kilograms (kg) of depleted uranium was expended in 2011, compared with approximately 3,900 kg projected in the 2008 SWEIS. The quantity of expended depleted uranium includes the quantity of depleted uranium expended during material sanitization.

In CY 2011, six hydrotests were performed at DARHT. Intermediate-scale dynamic experiments containing beryllium, single-walled steel containment vessels continued at the Eenie Firing Point (TA-36-0003) along with other programmatic experiments. The use of a steel vessel mitigates essentially all of the fragments and particulate emissions associated with an experiment.

2.7.3 Operations Data for High Explosives Testing

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

2.7.4 Cerro Grande Fire and Las Conchas Fire Effects at High Explosives Testing

Effects and Continuing Effects. The Las Conchas fire did not impact the HET facilities; however, contingencies were prepared for in the event of flash flooding at sites within TA-39. The LANL Environmental Programs (EP) Directorate’s Project Management and Field Services Organization enhanced the storm water control placements and re-vegetation efforts that were conducted immediately after the Cerro Grande fire in response to the Las Conchas fire. To date, these efforts, a direct response to the fires, appear to be successful in stabilizing soils within the HET facility area of LANL by minimizing run-off and reducing storm water flows onto HET property. These inspection and monitoring efforts continued through CY 2011.

Other fire-related activities involved fuel wood mitigation efforts and continued tree and undergrowth thinning throughout the HET Key Facility.

2.8 Tritium Facilities (TA-16)

The Tritium Key Facility consists of tritium operations in the Weapons Engineering Tritium Facility (WETF) located at TA-16. In 2008, tritium operations at TA-21, the

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

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

WETF is listed as a HazCat 2 Nuclear Facility (Table 2-3). In CY 2011, the tritium inventory was greater than 30 grams.

Table 2-3. WETF Buildings with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2011[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 Los Alamos National Laboratory 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 Tritium Facilities

The 2008 SWEIS identified nine capabilities for this Key Facility. Five of the nine capabilities were active in CY 2011, and all were below operational levels projected in the 2008 SWEIS (Table A-15), with WETF performing fewer than the projected 65 gas processing operations. In addition to the capabilities listed in the SWEIS, other activities included disposition of legacy containers and shipment and receipt of bulk tritium.

2.8.3 Operations Data for Tritium Facilities

Data for operations at WETF were well below levels projected in the SWEIS. Table A-16 provides operations data details. Outfall 02A-129 is not active.

2.9 Target Fabrication Facility (TA-35)

The Target Fabrication Facility (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 Target Fabrication Facility

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

2.9.2 Operations at the Target Fabrication Facility

The 2008 SWEIS identified three capabilities at the TFF Key Facility. All three of the capabilities were active in CY 2011, 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 2011 was less than the 6,100 targets per year projected in the 2008 SWEIS.

2.9.3 Operations Data for the Target Fabrication Facility

TFF activity levels are primarily determined by funding from fusion, energy, and other research-oriented programs, as well as funding from some defense-related programs. In CY 2011, operation levels were lower than those projected in the SWEIS. Table A-18 provides operations data details.

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

The Bioscience Key Facility definition includes the main Health Research Laboratory (HRL) facility (TA-43-0001, -0037, and -0020) plus additional offices and labs located at TA-35-0085 and -0254, and TA-03-0562 and -1076. Operations at TA-43 and TA-35-0085 include chemical and laser activities that maintain hazardous materials 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 Bioscience Key Facility activities 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 (LANL 2008a). However, DOE/NNSA cancelled the project in 2010.

During CY 2004, construction was finalized on the BSL-3 facility. The BSL-3 facility is a windowless single-story 3,202-square-foot, stand-alone, biocontainment facility located in TA-03 (TA-03-1076). The building includes two BSL-3 laboratories and one BSL-2 laboratory, plus associated administrative space, designed to safely handle and store biohazardous materials. Due to the BSL-3 facility’s small size and the small quantities of samples studied, there is no expected increase in quantities of sewage, solid wastes, or chemical wastes, nor increased demand for utilities. NEPA coverage for this project was initially provided in 2002 by the *Environmental Assessment for the Proposed Construction and Operation of a Bio-Safety Level 3 Facility at Los Alamos National Laboratory* and a FONSI (DOE 2002a). However, the FONSI for operations was withdrawn by DOE/NNSA on January 22, 2004, due to the need to re-evaluate the environmental consequences of operating the facility with regard to its location on fill material and related seismic concerns. On November 29, 2005, DOE/NNSA issued a NOI to prepare an Environmental Impact Statement (EIS) for the proposed operation of the BSL-3 facility. A Draft EIS is currently in final review prior to release for public comment. The facility remains unused at this time, pending public review of the EIS and issuance of a ROD. If it is decided that the building will not be used for BSL-3 work, or if there are significant delays in the NEPA process related to BSL-3 work, LANL will relocate activities from older, existing buildings intoBSL-3, and conduct other work there that is already covered within the 2008 SWEIS.

2.10.2 Operations at Bioscience Facilities

The 2008 SWEIS identified 12 capabilities for this Key Facility. All of the 12 capabilities were active in CY 2011 and were at or below levels projected in the 2008 SWEIS (Table A-19). In CY 2011, some capabilities were expanded due to Work for Others/Non-Federal Entities proposals and new sponsor funding.

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

The Bioscience Key Facility has BSL-1 and -2 work, which includes limited work with potentially infectious microbes. All activities involving infectious microorganisms are regulated by the Centers for Disease Control and Prevention (CDC), National Institutes of Health (NIH), 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) and capability continue to be located in TA-43-0001. This is not a Bioscience Division capability; however, it is located at TA-43-0001 and therefore, it is a capability within this Key Facility and is included here. Effective July 15, 2010, LANL eliminated routine *in vivo* monitoring for plutonium. For many years, LANL relied on its state-of-the-art urinalysis program to monitor for Pu-238 and Pu-239. This method is approximately 1000 times more sensitive than *in vivo* monitoring for plutonium; radiation from plutonium is almost entirely blocked by body tissue. In the history of LANL, no plutonium intake has ever been identified by routine *in vivo* monitoring. LANL will continue to use routine *in vivo* counting to monitor for uranium, americium, fission products, and activation products, as i*n vivo* monitoring remains an effective technique for monitoring these radionuclides. It will also continue to use *in vivo* monitoring to supplement urinalysis following radiological incidents (special bioassay) when appropriate.

2.10.3 Operations Data for Bioscience Facilities

In CY 2011, operation levels were lower than those projected in the 2008 SWEIS. Table A-20 provides operations data details.

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

The Radiochemistry Key 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 this Key Facility. In CY 2010, there was a significant upgrade to the heating, ventilation, and air conditioning (HVAC) system in the hot-cells wing area (areas where medical radioisotopes are produced and radioactive materials are processed) of TA-48-0001. In CY 2011, a study was launched to evaluate potential segmentation of the hot-cells wing area. The segmentation was determined to not be feasible, therefore no further action was taken.

2.11.2 Operations at the Radiochemistry Facility

The 2008 SWEIS identified 11 capabilities at the Radiochemistry Key Facility. All of the 11 capabilities were active in CY 2011. Three of the capabilities were at levels higher than those projected in the SWEIS; however, radioactive air emissions, outfall discharge, and waste quantities were well below SWEIS projections (Table A-21). These three capabilities are Radionuclide Transport Studies, Isotope Production, Actinide and Transuranic (TRU) Chemistry, and Sample Counting. The remaining eight capabilities were below operational levels projected in the SWEIS.

2.11.3 Operations Data for the Radiochemistry Facility

In CY 2011, some operations within this Key Facility increased. However, the operation data levels were below those projected in the 2008 SWEIS. Table A-22 provides operations data details.

2.12 Radioactive Liquid Waste Treatment Facility (TA-50)

The Radioactive Liquid Waste Treatment Facility (RLWTF) is located at TA-50 and consists of the treatment facility (Building TA-50-0001), support buildings, and liquid and chemical storage tanks. The primary activity at the RLWTF is treatment of radioactive liquid wastes generated at other LANL facilities. The facility also houses analytical laboratories to support these treatment operations.

This Key Facility is a HazCat 3 Nuclear Facility and includes the following structures: the RLWTF itself (Building TA-50-0001), influent tanks and pumping station (TA-50-0002), the acid and caustic waste storage tank vault (TA-50-0066), a 100,000-gallon influent storage tank (TA-50-0090), and a building that houses evaporator storage tanks (TA-50-0248) (Table 2-4).

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

Building	Description	2008 SWEIS	NHC LANL 2011*
TA-50-0001	Main Treatment Plant	3	3
TA-50-0002	Influent Tanks and Pumps	3	3
TA-50-0066	Acid and Caustic Waste Tanks	3	3
TA-50-0090	Holding Tank	3	3
TA-50-0248	Evaporator Storage Tanks	3	3

* DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 2011c)

2.12.1 Construction and Modifications at the Radioactive Liquid Waste Treatment Facility

The 2008 SWEIS projected two modifications to this Key Facility:

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

Design of a replacement RLWTF, placed on hold by the DOE in July 2010, resumed in CY 2011. The design of evaporation tanks at TA-52 was finalized, and construction was started.

Three process modifications were made within the RLWTF during CY 2011:

- *Evaporation of Treated Water*: A new treatment step, an effluent evaporator, started operation on January 3, 2011. The effluent evaporator is located within new structure TA-50-0257, located just east of Room 34 of Building TA-50-0001.Treated water is heated using natural gas in a 4.5 million British thermal unit (BTU) per hour, low-nitrous oxide (NOx) natural gas burner that can evaporate up to 400 gallons of water per hour. The unit is constructed of stainless steel and has received a No Permit Required determination from the New Mexico Air Quality Bureau.

- *Pressure Filters*: Wall-thinning on the gravity filter led the project to install, commission, and operate a pressure filter treatment step that could be operated instead of, or in series with, the gravity filter. Design of the pressure filters began in May, construction and commissioning were completed in August, and the filters were placed into service in mid-September 2011.

- *Demobilization of Waste Evaporator:* Demobilization of a subcontractor waste evaporator, which had been at the RLWTF for 12 years, was completed in December 2011. Subcontractor personnel repaired, refurbished, and shipped both the boiler and evaporator trailers; they also cleaned and rebuilt equipment, decommissioned the secondary containment between the trailers, and decommissioned equipment and piping in building 50-0248. In coordination with subcontractor efforts, LANL personnel disconnected utilities and process piping that had been tied to subcontractor equipment in the trailers.

2.12.2 Operations at the Radioactive Liquid Waste Treatment Facility

The 2008 SWEIS identified two capabilities at this Key Facility. Both capabilities were active in CY 2011, and both fell below operational levels projected in the 2008 SWEIS (Table A-23).

The primary measurement of activity for this facility is the volume of radioactive liquid waste processed through the main treatment plant. In CY 2011, a total of 3.5 million liters of treated water were discharged to the environment. However, because of changes to the US Environmental Protection Agency (EPA) discharge standards, all of this treated water was discharged via the newly installed effluent evaporator. No treated water was discharged to Mortandad Canyon.

Another highlight during CY 2011 was a resumption of low-level sludge treatment. Following equipment and facility modifications, procedure revisions, operator training, an operations assessment, and closure of pre-start findings, the rotary vacuum filter was returned to operation after a four-year outage. Low-level sludge contains more than 90 percent of the radioactivity present in low-level influent; it does not contain hazardous chemical constituents above Resource Conservation and Recovery Act (RCRA) limits and is not a mixed waste.

2.12.3 Operations Data for the Radioactive Liquid Waste Treatment Facility

In CY 2011, operations data levels were below those projected in the SWEIS. Table A-24 provides operations data details.

2.13 Los Alamos Neutron Science Center (TA-53)

The LANSCE Key Facility lies entirely within TA-53. The facility has more than 400 buildings, including one of the largest 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 the LANSCE Key Facility (the User Facility) is composed of the 800-million-electron-volt linac, a Proton Storage Ring, and three major experimental areas: the Manuel Lujan Neutron Scattering Center, the Weapons Neutron Research (WNR) facility, and Experimental Areas B and C.

Experimental Area C is the location of proton radiography experiments for the Science-Based Stockpile Stewardship Program. A new experimental facility, for the production of ultracold neutrons, the Isotope Production Facility (IPF), was commissioned in 2005 in Area B and completed its seventh full run cycle in 2011 (DOE 2002b). Experimental Area A, formerly used for pi meson and cancer therapy research and isotope production, is currently inactive and was emptied of all beam and experimental equipment in 2009. Future programmatic use of Experimental Area A is slated for installation of the Materials Test Station (MTS). A second accelerator facility located at TA-53-0365, the Low-Energy Demonstration Accelerator, was decommissioned and dismantled in 2006. TA-53-0365 is currently being used for buildup of a Free Electron Laser (FEL) prototype.

LANSCE is classified as an Accelerator Facility regulated under DOE Order 420.2B and currently operates under two main safety basis documents. Document one is the LANSCE Safety Assessment Document (SAD), which has seven volumes that describe the accelerator and the experimental areas. The SAD volumes are as follows: Volume I—LINAC, Volume II—IPF, Volume III—Experimental Area C, Volume IV—Experimental Area B, Volume V—Experimental Area A, Volume VI—Lujan Center, Volume VII—Weapons Neutron Research Facility. The second safety basis document is the LANSCE Accelerator Safety Envelope, which provides the operating bounds for the seven areas discussed in SAD Volumes I–VII.

2.13.1 Construction and Modifications at the Los Alamos Neutron Science Center

The 2008 SWEIS projected two modifications to LANSCE:

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

In 2008, execution of the MTS began and the project received Critical Decision (CD)-0 approval (LANL 2008b). In 2009, restoration of TA-53-0003 Area A in preparation for MTS programmatic installation was completed including removal of experimental equipment, beam line components, and hundreds of tons of shielding blocks. MTS completed the conceptual design package in 2011 and is currently awaiting CD-1 approval by the Acquisition Executive.

In addition to the projected facility modifications reflected in the 2008 SWEIS, additional construction and modification projects were initiated and/or completed in 2011 as follows:

The LANSCE WNR National Security Nuclear Science Facility (NS2) 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. The building is scheduled to be completed in July 2012 (LANL 2010a). NS2 is a user facility and would support civilian and national security research. Several projects at LANSCE were planned and/or executed to support the NS2 building and include the WNR experimental area substation switchgear project. This project would provide a feed of secondary electrical loads for several experimental buildings in the southeastern portion of the accelerator facility to include NS2 (LANL 2010b). Final design for the substation is expected to be completed by the end of FY 2012, and construction/installation will be completed in FY 2013. A retaining wall was installed on the perimeter of a hillside on the southern parameter of the NS2 building to mitigate an erosion issue.

Several projects were initiated in 2011 to improve the infrastructure at Building 53-0365, the building dedicated to the FEL program. Approximately 4000 linear feet of sprinkler piping and sprinkler heads in the tunnel were replaced with code-compliant materials and tied into the building fire protection system (LANL 2011b), and a new fire alarm system was designed and installed (LANL 2011c).

The planning, design, and procurement of long lead components for a multiyear project entitled “LANSCE Risk Mitigation” was approved in 2010. The scope of this project encompasses the restoration of the LANSCE 800-million electron volt (MeV) linear accelerator to historic performance levels (DOE 2010a). The LANSCE Risk Mitigation project continues to make progress and is scheduled to be completed in 2018. Infrastructure improvement projects to support the LANSCE restored accelerator were also planned or performed in 2011 and will continue into 2012 and include a Roof Asset Management Program (RAMP) reroofing Sectors C, D, and E, the central control center (Building 53-0004) (LANL 2011D), replacement of the Sector A HVAC system (LANL 2011e), and the experimental area A Crane refurbishment.

Building 53-0030, part of the Lujan Center user facility complex, approved design plans for a new HVAC system 2010. Procurement, construction, and installation of the system began in 2011 and will continue into 2012 (LANL 2010c). Building 53-0030 also received a new roof under the RAMP program (LANL 2011f) with activities starting in 2011 and continuing into 2012. An outfall compliance project was planned in 2010, and installation was completed in 2011. A new chlorine system monitors both the level of chlorine in the cooling tower basin and the level of chlorine discharged to the 03A048 outfall at LANSCE.

2.13.2 Operations at the Los Alamos Neutron Science Center

The 2008 SWEIS identified eight capabilities at this Key Facility. Seven of the eight capabilities were active in CY 2011 and six of the seven fell below operational levels projected in the 2008 SWEIS (Table A-25). LANSCE exceeded 2008 SWEIS projections for the capability of radioactive liquid waste treatment due to contributions of radioactive liquid waste received from RLWTF and from the TA-21 remediation work.

During CY 2011, LANSCE operated the accelerator and four of the five experimental areas. Area A has been idle for more than 10 years. The primary indicator of activity for the LANSCE facility 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 SWEIS. There were no experiments conducted for transmutation of wastes.

The most significant accomplishment in CY 2011 for LANSCE was the successful completion of the run cycle for the three primary experimental facilities: the WNR, the Proton Radiography area, and the Manuel Lujan Center. LANSCE hosted more than 830 user visits during the eight-month 2011 run cycle. The facility operated at an average of 85.5 percent availability for the Lujan Center and 88.2 percent for WNR, allowing the completion of 313 experiments for internal and external neutron scattering and neutron nuclear physics users. Other significant accomplishments at LANSCE during 2011 include the observance of the fifth production run for the ultracold neutron experimental area and the FEL program for the Office of Naval Research. The FEL program continued the design and buildup of the FEL and successfully designed and fabricated a normal conducting radio frequency photo injector in 2011.

2.13.3 Operations Data for the Los Alamos Neutron Science Center

In CY 2011, operations for LANSCE were below 2008 SWEIS projections in all instances except one. Chemical waste generation exceeded 2008 SWEIS projections due to disposal of soil and asphalt that needed to be excavated because of a diesel fuel leak.

Radioactive air emissions are a key environmental parameter since LANSCE emissions have historically accounted for more than 95 percent of the total LANL off-site dose. The total point source emissions were approximately 228 curies. As in recent years, the Area A beam stop did not operate during 2011; however, operations in Line D resulted in the majority of emissions reported for 2011. 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) Key Facility is 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 Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2011[a]
TA-50-0069	Waste Characterization, Reduction, and Repackaging (WCRR) Facility Building	2	2
TA-50-0069 Outside	Nondestructive Analysis Mobile Activities	N/A	2
TA-50-0069 Outside[b]	Drum Storage	2	2
TA-54-Area G[c]	LLW Storage/Disposal	2	2
TA-54-0002	TRU Storage Building	N/A	2
TA-54-0008	Storage Building	2	2
TA-54-0033	TRU Drum Preparation	2	2
TA-54-0038	Radioassay and Nondestructive Testing Facility	2	2
TA-54-0048	TRU Waste Management Dome	2	2
TA-54-0049	TRU Waste Management Dome	2	2
TA-54-0153	TRU Waste Management Dome	2	2
TA-54-0224	Mixed Waste Storage Dome	N/A	2
TA-54-0226	TRU Waste Management Dome	2	2
TA-54-0229	TRU Waste Management Dome	2	2
TA-54-0230	TRU Waste Management Dome	2	2
TA-54-0231	TRU Waste Management Dome	2	2
TA-54-0232	TRU Waste Management Dome	2	2
TA-54-0283	TRU Waste Management Dome	2	2
TA-54-0375	TRU Waste Management Dome	2	2
TA-54-1027	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome	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-Pad10[d]	Storage Pad	2	2

a DOE list of Los Alamos National Laboratory Nuclear Facilities (DOE 2011c).
b "Drum Storage" includes drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69.
c This includes LLW (including mixed waste) storage and disposal in domes, pits, shafts, and trenches; TRU waste storage in domes and shafts (does not include TRU Waste Inspection and Storage Program); TRU legacy waste in pits and shafts; low-level disposal of asbestos in pits and shafts. Operations building: TRU waste storage.
d Pad 10 was originally designated as Pads 2 and 4 in the SWEIS.

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

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

- Plan, design, construct, and operate waste management facilities transition projects to facilitate actions required by the New Mexico Environment Department (NMED) Compliance Order on Consent (Consent Order).

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

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

- Present a risk to national security, public health and safety;
- Present a potential loss of control by a US Nuclear Regulatory Commission or agreement state licensee;
- Are excess and unwanted and are a DOE responsibility under Public Law 99-240[5] (42 USC); or
- Are DOE-owned.

The OSRP, International Threat Reduction Group (N-3), Nuclear Non-Proliferation Division, LANL is tasked by the Office of Global Radiological Threat Reduction, NNSA 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*

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

Uruguay and Other Locations (DOE/EIS-0380-02; DOE 2011a) was prepared for the OSRP project. This SA analyzed transportation of sealed sources recovered from foreign countries to the US through the global commons via commercial cargo aircraft and also examined the role of a commercial facility in managing these sealed sources (an aspect of the OSRP that was not addressed in the 2008 SWEIS). DOE/NNSA issued an amended ROD in the Federal Register on July 20, 2011.

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

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

2.14.2 Operations at the Solid Radioactive and Chemical Waste Facility

The 2008 SWEIS identified seven capabilities at this Key Facility. Four of the seven capabilities were active in CY 2011 and all fell below operational levels projected in the 2008 SWEIS (Table A-27), except for one. The SRCW exceeded 2008 SWEIS projections for the capability of Waste Transport Receipt and Acceptance. Mixed low-level radioactive waste (MLLW) shipped for off-site treatment and disposal exceeded the 2008 SWEIS projections by 5 cubic meters. This was due to the unexpected receipt of 37 cubic meters of MLLW from the TA-21 DD&D/Remediation project.

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 Solid Radioactive and Chemical Waste Facility

The 2008 SWEIS waste projections were exceeded for chemical waste and LLW at SRCW. Chemical waste generation at SRCW exceeded 2008 SWEIS projections due to the clean out and disposal of a number of old source test drums from the Radioassay and Nondestructive Testing (RANT) facility that were no longer in use. This accounted for about 47% (459.5 kg) of total chemical waste generated at SRCW. LLW generation at SRCW exceeded 2008 SWEIS projections due to the cleanout of approximately 5,000 empty drums before the end of FY 2011 to allow for construction of a Permacon (modular containment enclosure) starting in September 2012. The empty LLW drums were shipped via sealand containers. This accounted for about 66 percent (383.8 m^3) of total LLW 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 Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2011*
TA-55-0004	Plutonium Processing	2	2

* DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 2011c)

2.15.1 Construction and Modifications at the Plutonium Complex

The 2008 SWEIS projected two facility modifications:

- TA-55 Reinvestment Project (TRP) (formerly the Plutonium Facility Complex Refurbishment Project):
  - The TRP consists of three line items (TRP I, TRP II, and TRP III). Each line item was split into subprojects. TRP I included the repair and replacement of mission-critical cooling system components for buildings in TA-55 to allow these facilities to continue to operate and for 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. TRP II construction activities were conducted in CY 2011. TRP II and TRP III were in the planning stages during CY 2011.
- TA-55 Radiography Facility Project:
  - TA-55 Radiography/Interim (LANL 2001b): Completed in 2008. TA-55 Radiography, complement to TA-55 Radiography/Interim, remained on hold in CY 2011 due to funding.

In addition, the following construction/modification projects continued in CY 2011:

- CMRR NF Project DOE Pre-conceptual Design (LANL 2001a), ongoing in CY 2011.[6] In 2007, construction of the RLUOB began. Construction was ongoing in 2011. Beneficial occupancy began in 2011.
- 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 2011.
- Nuclear Materials Safeguards and Security Upgrades Project (NMSSUP) Phase II. The project provides physical security upgrades at the Plutonium Facility Complex. NMSSUP Phase II construction activities continued through 2011.

2.15.2 Operations at the Plutonium Complex

TA-55, located just southeast of TA-3, includes the Plutonium Facility Complex and is the chosen location for the CMRR NF. This facility would replace the current CMR facility and would provide chemical and metallurgical processes for recovering, purifying, and converting plutonium and other actinides into many compounds and forms. Additional capabilities would include the means to ship, receive, handle, and store nuclear materials, as well as to manage the wastes and residues produced by TA-55 operations. In 2011, relocated chemistry and metallurgy research, actinide chemistry, and materials characterization capabilities that may be provided at the site through the project were in the pre-conceptual phase of construction.

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

The 2008 SWEIS identified seven capabilities at this Key Facility. All of the seven capabilities were active in CY 2011 and all fell below operational levels projected in the 2008 SWEIS (Table A-29).

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

2.15.3 Operations Data for the Plutonium Complex

Operations data at this Key Facility remained below operational levels projected in the SWEIS, except for in one case. Chemical waste generation exceeded 2008 SWEIS projections due to the disposal of unused/unspent Portland cement. Table A-30 provides operations data details.

2.16 Non-Key Facilities

The balance, and majority, of LANL buildings are referred to in the SWEIS as Non-Key Facilities. Non-Key Facilities house operations that do not have the potential to cause significant environmental impacts. These buildings and structures are located in 30 of LANL's 49 TAs and comprise approximately 14,224 of LANL's 26,058 acres. Table 2-7 shows the LANL Nuclear Hazard Classification List for the Non-Key Facilities.

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

Building	Description	2008 SWEIS	NHC LANL 2011*
TA-10 potential release site (PRS) 10-002(a)-00	Former Liquid Disposal Complex	3	3

* DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 2011c)

2.16.1 Construction and Modifications at the Non-Key Facilities

The 2008 SWEIS projected no major modifications to the Non-Key Facilities under the No Action Alternative. Major projects that have been completed since 2008 are listed in Table 2-8. A complete description of these projects can be found in previous Yearbooks.

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

DESCRIPTION	YEAR COMPLETED
Los Alamos Site Office Building	2008
Protective Force Running Track	2010

New projects that were still under construction or were completed in CY 2011 are discussed in the following paragraphs:

a). *The Tactical Training Facility*

Description. The Tactical Training Facility is a mock facility commonly referred to as a Military Operations in Urban Terrain (MOUT) 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 (CAS), simulated Technical Area Isolation Zone (TAIZ) monitored by the CAS that is inside the building, a briefing room, and a firearms storage area (vault type room). This building is planned to be a pre-manufactured steel building with a slab on grade foundation, modeled after the Oak Ridge Y-12 Dye Marking Cartridge facility currently in use. It is sited on approximately 13.44 acres.

Status. The project received NEPA coverage through the 2008 SWEIS. Construction began in August 2010, was on-going in 2011, and is expected to be complete in June 2012.

b*). Photovoltaic Array Reuse of Los Alamos County Landfill Location*

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

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

c). *Expansion of the Sanitary Effluent Reclamation Facility (SERF-E)*

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

Status. SERF-E received NEPA coverage through a FONSI on August 24, 2010 (DOE 2010c). The project achieved CD-1 in early 2010 and achieved CD-2, Approve Performance Baseline, CD-3, and start of construction in May 2011. Operations were restarted at the facility in September 2011, and the project plans to be operational by July 31, 2012, consistent with the permit requirements.

d). ***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 will also include a weapons and ammo storage area, a classroom, range storage rooms, and restroom facilities. This facility is modeled after an existing facility at Y-12.

Status. Construction began in September 2011 and is expected to be complete in July 2012.

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 2011, no new capabilities were added to the Non-Key Facilities, and none of the eight existing capabilities were deleted.

2.16.3 Operations Data for the Non-Key Facilities

The Non-Key Facilities occupy more than half of LANL. In CY 2011, the Non-Key Facilities generated about 22 percent of the total LANL chemical waste volume; about one half percent of the total LLW volume; less than one half percent of the total MLLW volume; and about eight percent of the total TRU waste volume. Operations data at the Non-Key Facilities remained below operational levels projected in the SWEIS for all waste types. Table A-32 presents operations data details.

The combined flows of the SWWS and the TA-03 Steam Plant account for about 89 percent of the total discharge from Non-Key Facilities and about 68 percent of all water discharged by LANL. Section 3.2 provides more details.

2.17 Environmental Cleanup

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

The EP Directorate includes the operations and responsibilities of the previous Environmental Restoration (ER) Project, which generates a significant amount of waste during characterization and remediation activities; therefore, the EP cleanup programs are included as a section in Chapter 2. The 2008 SWEIS projected that implementation of the Consent Order would contribute 80 percent chemical waste, 65 percent LLW, 97 percent MLLW, and 44 percent TRU and mixed TRU waste at the Laboratory. For further details on waste generation amounts, see Section 3.3.

2.17.1 History of Corrective Action Sites at LANL

The DOE established the EP Directorate, formerly the ER Project, in 1989 to characterize and, if necessary, remediate Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs); areas known or suspected to be contaminated from historical Laboratory operations. Many of the SWMUs and AOCs are located on DOE/NNSA property and some properties containing SWMUs and AOCs have been conveyed to Los Alamos County or to private (within Los Alamos town site) ownership. Characterization and remediation efforts are regulated by the NMED for chemical constituents, by the New Mexico Solid Waste Act (NMSA 1978, §74-9-36[D]) and by DOE/NNSA for radionuclides under the Atomic Energy Act implemented through DOE Order 458.1, "Radiation Protection of the Public and the Environment," and DOE Order 435.1, "Radioactive Waste Management."

On March 1, 2005, the NMED, the DOE, and the University of California entered into the Consent Order, which superseded Module VIII. Under the agreement of the Consent Order, all 2,123 original corrective action sites, six newly identified sites, an additional site resulting from the split of SWMU 00-033, and the 24 sites split during a consolidation effort were subject to the new Consent Order requirements with the exception of 166 sites removed from Module VIII by NMED, 25 AOCs previously approved by NMED, and 541 sites approved for no further action (NFA) by EPA. Therefore, 1,422 sites were originally regulated under the Consent Order. The Consent Order provides that the status of all 1,422 sites (those requiring corrective action and those with completed corrective actions) will be tracked in LANL's Hazardous Waste Facility Permit.

The Consent Order replaced the determination for NFA with a "Certificate of Completion." Since the start of the Consent Order through the end of 2011, NMED issued 122 Certificates of Completion without Controls and 52 Certificates of Completion with Controls. Of the 174 Certificates of Completion issued, two overlap former EPA or NMED approvals for NFA and two overlap NMED removals from Module VIII of LANL's Hazardous Waste Facility Permit; thus, only 170 are subtracted. This administrative action reduced the total number of corrective action sites remaining in the investigation process at LANL to 1,252.

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 RCRA sites as corrective action sites. Combined, these administrative actions reduced the total number of corrective action sites remaining in the investigation process at LANL to 1,234.

In Table IV-2 of the Consent Order, 45 sites within Testing Hazard Zones are deferred for investigation and corrective action until the firing site used to delineate the relevant

Testing Hazard Zone is closed or inactive and the DOE determines that it is not reasonably likely to be reactivated. NMED has also approved delayed corrective action at 80 sites where investigation is not feasible until future DD&D of associated operational facilities and at five sites that are currently active units. 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

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

Eighteen work plans and 27 reports were written and/or revised and submitted to NMED during 2011. A work plan proposes investigation activities designed to characterize SWMUs, AOCs, consolidated units, aggregate areas, canyons, or watersheds. An investigation report presents the data, evaluates the results, determines the site status, and recommends additional investigation, remediation, monitoring, or NFA, as appropriate. In addition to the work plans and reports presented in the tables, numerous other documents related to groundwater, surface water, vapor monitoring, and well installations were written and submitted to NMED. These include periodic monitoring reports, drilling work plans, and well completion reports as well as annual updates to the Interim Facility Groundwater Monitoring Plan and the General Facility Information report. NMED granted Certificates of Completion for 83 SWMUs and AOCs in 2011.

The following table provides summaries of the investigations for which activities were started, continued, and/or completed in 2011 and for which reports were submitted in 2011. In addition, the corrective measure implementation (CMI) status for the 260 Outfall, the status of the Phase III investigation for Material Disposal Area (MDA) C, and the MDA B waste removal and remediation are described below.

Table 1
Summary of Site, Aggregate Area, and Canyon Investigations Conducted and/or Initially Reported on in 2011

Document	TAs	Number of Sites Investigated	Number of Samples Collected	Number of Sites where Cleanup Conducted	Number of Sites where Extent Defined/Not Defined	Risk/Dose Assessments	Conclusions/Recommendations
Investigation Report for Ancho/Chaquehui /Indio canyons, Revision 1	TA-33, TA-39, TA-49	11 reaches, 4 springs and 4 gauging stations	126 sediment samples and 97 water samples (72 non-storm water/ spring water and 25 storm water/snow melt)	N/A[a]	Concentrations decrease down canyon, and no Laboratory-derived chemicals of potential concern (COPCs) have been identified in the farthest down canyon reaches.	Entire canyon system evaluated. No potential unacceptable human health risks or doses and no adverse ecological effects exist under current conditions.	Storm water in the Ancho and Chaquehui watersheds will continue to be monitored under the requirements of the Individual Permit (IP). Corrective actions are not needed to mitigate unacceptable risks in Ancho, Chaquehui, and Indio canyons.
Investigation Report for Lower Sandia Canyon Aggregate Area, Revision 1	TA-20, TA-53	21	Approx. 400	AOC 53-013 excavated approx. 75 yd^3 of soil because of lead.	3 sites extent defined; 18 sites extent not defined.	2 sites do not pose potential human health and ecological risks/doses (no COPCs were identified at AOC 53-014)	3 sites recommended for complete without controls [AOCs 53-013 and 014 and SWMU 53-001(b)]. Additional sampling needed for 17 sites to define extent and remediation recommended for one site. Eight other sites are recommended for delayed characterization and investigation pending DD&D of building and structures. Phase II work plan to be developed.
Phase II Investigation Report for Middle Los Alamos Canyon Aggregate Area, Revision 1	TA-02, TA-21, TA-26	40	Total of approx. 2,200 samples collected to date (additional 670 samples collected as part of Phase II)	4 sites [AOC 02-004(a) excavated approx. 7 yd^3 because of Polycyclic aromatic hydrocarbons (PAHs); AOC 02-004(f) excavated approx. 46 yd^3 because of PCBs; AOC 02-010 excavated approx. 15 yd^3 because of cesium-137; AOC 02-011(a) excavated approx. 230 yd^3 because of PCBs and PAHs]	31 sites extent defined; 9 sites extent not defined.	32 sites do not pose potential human health risks/doses for one or more scenarios. No potential ecological risk was found for any receptor at SWMU 02-006(a) (ecological risk-screening assessment will be conducted for TA-02 core area as one exposure unit once extent defined).	Additional sampling needed to define extent at 9 sites; additional soil removal needed at one of these sites. SWMU 02-006(a) recommended for complete without controls. Phase III work plan to be developed.

Table 1 (continued)

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
Supplemental Interim Measure Report Solid Waste Management Unit 01-001(f), Revision 1	TA-01	1	13 confirmation samples (total of 117 confirmation samples)	98 yd^3 of additional material removed from the outfall area and the drainage (total of approx. 2,900 yd^3 of material removed from the site).	Extent not defined for this SWMU.	PCB concentrations above recreational soil screening levels (SSLs) remain in some locations of the SWMU 01-001(f) outfall area and drainage; no risk assessments conducted.	Additional removal and stabilization activities are recommended for the mesa-top portion of the site. Need to define the lateral and vertical extent of PCBs. Run-on should be diverted from the outfall area and hillside drainage portions of the site and additional stabilization measures implemented within the hillside drainage. Risk assessment is recommended for this area. Surface water monitoring to be performed below the riparian vegetation zone.
Investigation Report for Potrillo/Fence Canyon Aggregate Area, Revision 1	TA-15, TA-36	26	Approx. 530	3 sites [SWMU15-007(a) excavated approx. 125 yd^3 of concrete and 1,500 yd^3 soil and overburden to remove landfill; SWMU 15-008(a) excavated approx. 18.5 yd^3; SWMU 36-006 excavated approx. 12.5 yd^3.]	14 sites extent not defined; also 10 sites deferred or delayed; 2 other sites require remediation and characterization/ confirmation sampling.	0	Additional sampling needed to define extent at 14 sites; 2 other sites require remediation and characterization/confirmation sampling; 10 sites recommended for deferred/delayed investigation; 1 site is a duplicate of another and requires no further investigation. Phase II work plan to be developed.
Bandelier Tuff Unit 4 Background Study Report	TA-06, TA-14, TA-16, TA-49, TA-58, TA-67, TA-69	10 locations sampled	30 subsurface unweathered Quaternary Tshirge Member (Qbt) 4 samples	n/a	N/A	N/A	Qbt 2,3,4 background values (BVs) are not appropriate for comparison with analytical results from weathered Qbt 4. The concentrations of inorganic chemicals and naturally occurring radionuclides in weathered tuff should be bounded by soil BVs because soil represents a very high degree of weathering.

Table 1 (continued)

Document	TAs	Number of Sites Investigated	Number of Samples Collected	Number of Sites where Cleanup Conducted	Number of Sites where Extent Defined/Not Defined	Risk/Dose Assessments	Conclusions/Recommendations
Investigation Report for Water/Cañon de Valle	TA-11, TA-14, TA-15, TA-16, TA-28, TA-29, TA-37, TA-49	25 reaches, 35 surface water locations, 15 storm water locations, 25 springs,16 alluvial groundwater wells, 16 perched intermediate wells, 14 regional wells	Approx. 410 sediment samples; approx. 500 surface water samples; approx. 400 storm water/ snowmelt samples; approx. 4000 groundwater samples	N/A	Concentrations decrease down canyon, and no Laboratory-derived COPCs have been identified in the farthest down canyon reaches.	Entire canyon system evaluated. No potential unacceptable human health risks/doses. Most contaminants not likely to produce adverse ecological impacts. Barium and research department explosive (RDX) in sediment and lead in water need further evaluation.	General down canyon decrease in contaminant concentrations in sediment with distance from a contaminant source area. Surface water and groundwater concentrations have generally remained stable or declined. Ongoing monitoring of surface water, storm water and groundwater will continue. Biota work plan to be developed.
Investigation Report for Lower Mortandad/Cedro Canyons Aggregate Area	TA-05	4	Approx. 170 samples	SWMU 05-006(c) approx. 2.1 yd^3 of soil, debris, and lead fragments excavated.	4 sites extent defined.	4 sites do not pose potential human health and ecological risks/doses.	4 sites recommended for complete without controls [SWMUs 05-003, 05-004, 05-005(b), and 05-006(c)]. Investigation complete.
Investigation Report for Canon de Valle Aggregate Area, TA-14[b]	TA-14	27	Approx. 260 samples	0	5 sites extent defined and 2 sites further sampling for extent not warranted; 10 sites extent not defined.	7 sites do not pose potential unacceptable human health and ecological risks/doses.	7 sites recommended for complete without controls [AOCs 14-001(a, b, c, d, e), C-14-001, SWMU 14-003]. 10 sites require further sampling for extent, 2 of these sites also recommended for remediation. 9 sites recommended for deferred/delayed characterization and investigation.
DP East Building Footprints and Delayed Sites	TA-21	5 plus former building footprints 21-152, 21-155, and 21-209 and associate former structure footprints	Approx. 370 samples	Structures, waste lines, debris, and/or asphalt (approximately 30 yd^3) were removed. Construction/ demolition debris also removed from some areas.	Extent not defined for any of the sites and former building footprints.	0	Phase II work plan to be developed. Additional sampling is needed to define the extent of contamination for one or more inorganic chemicals, organic chemicals, and/or radionuclides. Cleanup of the areas of contamination above SSLs/screening action levels (SALs) may also be warranted.

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Consolidated Unit 16-021(c)-99 (260 Outfall) Corrective Measure Implementation (CMI). In 2011, corrective measure monitoring focused on the performance of the pilot permeable reactive barrier (PRB) installed in Cañon de Valle as well as the effectiveness of the other corrective measures implemented, including surge bed injection grouting and the low-permeability cap constructed in the 260 Outfall drainage. The performance objectives of the corrective measures were to reduce concentrations of barium and research department explosive (RDX) in alluvial groundwater and to prevent their migration to recharge areas for deeper aquifers. Monitoring activities at the PRB consisted of water-level measurements, field-parameter measurements, and collection of samples for both on-site and off-site chemical analysis. The PRB alluvial wells were sampled and field parameters were collected monthly for the first quarter and quarterly for the three remaining quarters.

Groundwater flow through the barrier became impeded, probably due to zero-valent iron (ZVI). Filter media assessments revealed mineral precipitation and biological accumulation within the media beds. Zeolite was moved to the first treatment cell, followed by ZVI in an attempt to have the zeolite remove the barium and possibly some of the carbonate minerals from the water before reaching the ZVI. Analytical results from the second operational period indicated a reduction in barium and RDX by the treatment media. RDX was reduced from 16 μg/L to below detection, and barium was reduced from 4,000 μg/L to 1,000 μg/L. However, flow through the barrier again declined and the use of ZVI for removing RDX was deemed problematic.

The filter medium was changed from ZVI to granular activated carbon (GAC), which has been demonstrated to effectively remove high explosives compounds at the Laboratory. The gravel cells were removed, and only zeolite and GAC were installed for filter material in the vessel. The first two cells contained zeolite, and the next two cells contained GAC. The additional volume of zeolite is intended to increase contact time and increase barium removal efficiency.

One week after the GAC filter media was installed, flash flooding following the Las Conchas fire in Cañon de Valle damaged alluvial wells and sampling ports associated with the PRB. Additional flash flooding destroyed or severely damaged the PRB cutoff wall, inflow plumbing, and several additional alluvial wells in Cañon de Valle. Because of the substantial flash-flooding damage to the PRB system, the PRB is non-operational until repairs are made to the equipment or a modification to the corrective measure approach is found.

Site inspections in 2011 were performed to evaluate the structural integrity and efficacy of the low-permeability cap. No degradations in materials were noted, and the alluvial well installed to monitor for infiltration did not indicate water had breached either the cap or the injection grouting.

MDA C. Phase III investigation activities were conducted to better define the lateral and vertical extent of subsurface volatile organic compounds (VOCs) and tritium pore gas contamination at MDA C, install downgradient regional groundwater monitoring wells, and characterize background concentrations of inorganic chemicals detected in dacitic rocks.

Field activities included installing one new regional aquifer monitoring well and four new vapor-monitoring wells, collecting quarterly vapor samples, and collecting dacite samples from the Tschicoma Formation. Vapor samples were collected quarterly from 14 existing vapor-monitoring wells, and beginning in January 2011 from the four new vapor-monitoring wells. These samples were analyzed for VOCs and tritium. During installation of the vapor-monitoring wells at MDA C, two of the boreholes to the south of MDA C were drilled into the dacite and samples collected to evaluate background concentrations for inorganic chemicals in the dacite lava flow. Dacite samples from the Tschicoma Formation were analyzed for inorganic chemicals. A new regional groundwater monitoring well (R-60) was also installed next to the downgradient boundary of MDA C (100 ft to the east of MDA C). Quarterly groundwater samples were collected from well R-60 (starting in first quarter of 2011) as well as from existing monitoring well R-46, also located downgradient of MDA C.

A Phase III investigation report for MDA C was submitted and approved in 2011. Based on the characterization data from the investigations conducted at the site, the nature and extent of contamination in vapor were defined. Sampling results from the four deepest sampling ports, ranging from 632.5 ft to 688 ft below ground surface (BGS), indicate very low VOC concentrations in the deepest stratigraphic units sampled. The maximum concentrations of most organic chemicals in vapor were detected at a depth of approximately 250 ft, with concentrations decreasing sharply below that depth. The highest detected concentrations of tritium were generally at depths of less than 125 ft bgs. Tritium concentrations decreased with depth in most of the boreholes, but especially in the deeper boreholes. The vertical extent of both VOCs and tritium in vapor was defined. Vapor sampling results for VOCs and tritium were screened to evaluate the potential for the detected concentrations to result in groundwater contamination above cleanup levels. Results of this screening evaluation showed no current risk of groundwater contamination.

The results of dacite sampling indicated that concentrations of inorganic chemicals previously detected at the top of the dacite lava during the Phase II investigation appear to be naturally occurring and are associated with soil present at the top of the dacite.

Regional well R-60 was drilled to a total depth of 1,418 ft bgs. The regional aquifer was encountered at a depth of 1,319.5 ft bgs in the Puye Formation. Well R-60 has a single well screen set at a depth of 1,330 ft to 1,350 ft bgs. The results of sampling performed at wells R-46 and R-60 indicated no release of contaminants from MDA C to the regional aquifer. Water-level data collected from R-60 during the Phase III investigation were used to update an evaluation of the groundwater monitoring network for MDA C. This evaluation showed that wells R-46 and R-60 have a high efficiency for detecting potential releases from MDA C.

Based on the results of the Phase III and previous investigations, it is recommended that a Corrective Measure Evaluation (CME) be conducted to assess alternatives for preventing future exposure. Additional focused subsurface vapor monitoring is recommended to ensure detected concentrations of VOCs and tritium remain protective of groundwater. Based on the results from monitoring wells R-46 and R-60, the evaluation of subsurface vapor data, and the proposed vapor monitoring in the deep stratigraphic units, installation of regional monitoring well R-59 is not recommended at this time.

MDA B. The Laboratory's American Reinvestment and Recovery Act (ARRA) projects included the removal and remediation of waste from MDA B. Excavation activities at MDA B commenced in June 2010 and were completed in September 2011. Remediation activities included the removal of an asphalt cover that was present over 75 percent of MDA B and removal of soil overburden from the east end of MDA B as well as all waste contained within the disposal trenches. MDA B was completely excavated.

Overburden material, consisting of soil and tuff capping the disposal trenches, was removed before the excavation of waste and contaminated soil. All excavated overburden material that met the overburden criteria was used as fill during backfilling operations. Overburden used as fill was placed deep in the excavation and then topped with clean backfill material obtained from an off-site source (per NMED direction). All wastes were removed from the trenches. A total of 47,350 yd^3 of waste was removed from the disposal trenches at MDA B and shipped off site for disposal. The waste consists of 47,026 yd^3 of LLW, 304 yd^3 of industrial waste, and 20 yd^3 of MLLW.

The Laboratory submitted the investigation report for MDA B to NMED in September 2011.

The maximum biweekly dose measured at the eight air monitoring network (AIRNET) stations during the project period (June 21, 2010, through August 15, 2011) was 1.05 mrem. Most biweekly doses measured below 0.04 mrem. The maximum year-to-date accumulated total dose for any of these eight stations was 3.10 mrem. The average accumulated total for all stations during the project period was 0.98 mrem. These values were all less than the 5 mrem Laboratory administrative rolling 12-month allocation for the project. The EPA regulatory limit of 10 mrem/y applies collectively to all Laboratory operations.

In order to determine whether the site was appropriately sampled and adequately characterized based on the work plan proposed sampling frequency, an analysis was conducted using confirmation samples collected and data from the MDA B trenches. This analysis included using statistical tools contained in the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM). The results of the MARSSIM analysis indicated that the number of samples collected for each radionuclide detected from 0-10 ft and from all depths exceeded the number of samples needed to illustrate that the site was appropriately sampled. Therefore, there is 95 percent confidence that the site is adequately characterized.

The trench walls and floors were inspected for the presence of any significant fractures that could serve as a migration pathway for waste constituents. Rock fractures are a common feature of ash-flow tuff such as in the Bandelier Tuff. Although fracture apertures were not measured or studied during the course of the excavation remediation, visual and video inspection of completed excavation walls and floor cuts into the Bandelier Tuff do not show any evidence of abnormal fracturing. This is supported by the fact that tuff walls were stable and did not shown signs of weakening or collapse during excavation of MDA B. In addition, analytical results from the vertical boreholes indicate a pathway for contaminant infiltration and migration is not present.

The cleanup goal was to achieve residential soil screening levels (SSLs) for hazardous constituents and residential screening action levels (SALs) for radionuclides. A primary assumption for the residential scenario is that exposure to contaminated media occurs from 0–10 ft bgs. This exposure depth interval (0–10 ft bgs) is the standard depth applied to the residential scenario in all Consent Order risk assessments, as well as associated dose assessments, and has been accepted by NMED and DOE in the investigation reports submitted to date.

Hazardous constituent data from the confirmation samples were compared with the applicable residential SSL. With the exception of arsenic in Enclosure 3, no hazardous constituent concentrations in the confirmation samples from the depth interval of 0–10 ft bgs at the MDA B trenches exceeded residential SSLs. However, the arsenic confirmation data were not statistically different from background data, thereby meeting the cleanup goal for arsenic. Benzo(a)pyrene was detected above the residential SSL in one sample from Enclosure 5 collected at a depth of 13.6 ft bgs, which is below the residential exposure depth.

Radionuclide data from the confirmation samples were compared with the applicable residential SAL. Concentrations for all radionuclides were below the residential SALs from 0–10 ft bgs, except for one location where a concentration slightly exceeded the residential SAL for plutonium 239/240 (33 pCi/g). The 95 percent upper confidence limit of the mean (9.85 pCi/g) for plutonium 239/240 from 0–10 ft bgs was below the residential SAL. There were also detected concentrations of plutonium-239/240 and cesium-137 above residential SALs at depths greater than 10 ft.

No hazardous constituents were detected at concentrations above residential SSLs in the new vertical borehole samples. Radionuclide results for the new vertical boreholes were below residential SALs. Both locations chosen for the vertical boreholes (i.e., the deep borehole and the collocated shallow boreholes) were based on previous confirmation sample locations with concentrations of cesium-137 and plutonium-239/240 above residential SALs at depth. The sample collected from the deep borehole at the base of the trench had no detected concentrations of cesium-137 or plutonium-239/240; other radionuclides were either not detected and were below background concentrations. At the shallow borehole location, plutonium-239/240 was detected (12.2 pCi/g) at the base of the trench, but decreased with depth from the bottom of the excavation and was not detected at total depth.

Eleven VOCs were detected in pore gas samples collected at MDA B. The VOC results were evaluated using screening levels based on groundwater screening levels, in the same manner as done in periodic monitoring reports for vapor sampling. The maximum detected concentration of trichloroethene (TCE) (2,800 $\mu g/m^3$) slightly exceeded the screening level, which is the gas-phase TCE concentration (2,000 $\mu g/m^3$) that would be in equilibrium with a water-phase concentration equal to the groundwater cleanup level for TCE. This screening evaluation is very conservative and does not consider processes that would dilute or attenuate vapors during migration to groundwater. All other detections of TCE were at least an order of magnitude less than the maximum detected concentration and well below the screening level, and no other VOCs were detected above screening levels. Thus, the potential for VOCs present in subsurface vapor at MDA B to result in groundwater contamination is extremely low.

Tritium was detected in two of the four pore gas samples collected at MDA B. The potential for tritium in subsurface vapor to pose a risk of groundwater contamination was evaluated by comparing the tritium activities to the drinking water maximum contaminant level (MCL) for tritium (20,000 pCi/L). The maximum detected tritium activity (9,943 pCi/L) is less than half the MCL. Therefore, the potential for tritium present in subsurface vapor at MDA B to result in groundwater contamination is extremely low.

The nature and extent of any residual contamination at MDA B following the removal of the waste has been characterized by results from prior investigations at MDA B, confirmation sample data from MDA B, and the results from the three post-remediation boreholes. The prior MDA B investigations include installation of seven angled boreholes in 1998 and direct-push technology sampling at 87 locations in 2009. These data demonstrate that the nature and extent of any impact from historic waste disposal activities have been defined and that no contaminants from MDA B wastes have impacted the surrounding environment.

The network of boreholes defines the vertical extent of any residual contamination that may have been associated with past disposal practices across the MDA B site. The confirmation samples collected defined the vertical and lateral extent of any residual contamination from historic disposal practices at MDA B. Lateral extent is defined because the concentrations decreased from what was detected in the waste and decreased as areas were further excavated and sampled.

No perched aquifers or areas of high moisture content were observed during drilling of any of the borings associated with the MDA B boring network.

Interim Facility-Wide Groundwater Monitoring Plan. The 2011 Interim Facility-Wide Groundwater Monitoring Plan was approved with modification. Water monitoring in 2011 included base flow, alluvial groundwater, intermediate-perched groundwater, and regional aquifer groundwater in seven major watersheds or watershed groupings: Los Alamos/Pueblo canyons, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, Water Canyon/Cañon de Valle, Ancho/Chaquehui/Frijoles canyons, and White Rock Canyon. Monitoring beyond LANL boundaries was conducted in areas affected in the past by LANL operations as well as in areas unaffected by LANL for the purpose of providing baseline data.

2.17.3 Site/Facility Categorization

No new nuclear environmental sites were added to the DOE/LANL Nuclear Facilities List during 2011 (Table 2-9). In January 2011, MDA C was removed from the list. Three disposal pits from MDA-A were also removed from the list.

Table 2-9. Environmental Sites with Nuclear Hazard Classification

Site	Description	2008 SWEIS	NHC LANL 2010*
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

Site	Description	2008 SWEIS	NHC LANL 2010*
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 Los Alamos National Laboratory Nuclear Facilities (DOE 2011c).

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3.0 Site-Wide 2011 Operations Data

Chapter 3 summarizes operational data at the site-wide level. This chapter compares actual operating data to projected environmental effects for the parameters discussed in the 2008 SWEIS, including effluent, workforce, regional, and long-term environmental effects.

3.1 Air Emissions

3.1.1 Radiological Air Emissions

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

Radiological airborne emissions from point sources (i.e., stacks) during 2011 totaled approximately 328 curies, less than one percent of the annual projected radiological air emissions of 34,000 curies[7] 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 76 curies.

The total point source emissions from LANSCE were approximately 228 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 2011, non-point air emissions from LANSCE were approximately 15 curies. However, the remediation of MDA B in 2011 resulted in elevated air concentrations around that site; the measured air dose at the public receptor adjacent to MDA B resulted in a dose of 3.37 millirem at that location due to MDA B cleanup operations. Additional detail about radioactive air emissions is provided in LANL's 2011 annual compliance report to the EPA (LANL 2012a),

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

submitted in June 2012, and in the 2011 Environmental Report (formerly the Environmental Surveillance Report) (LANL 2012b).

For 2011, maximum off-site dose to the maximally exposed individual was 3.53 millirem. The dose was primarily due to non-point emissions sources as described above; measured stack emissions and potential emissions from minor sources contributed the difference. The maximum off-site dose to the maximally exposed individual projected in the 2008 SWEIS is 7.8 millirem per year. The EPA radioactive air emissions limit for DOE facilities is 10 millirem per year. This dose is calculated to the theoretical maximum exposed individual who lives at the nearest off-site receptor location 24 hours per day, eating food grown at that same site. No actual person received a dose of this magnitude.

3.1.2 Non-Radiological Air Emissions

Emissions of Criteria Pollutants. The 2008 SWEIS projects 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 NOx, sulfur oxides (SOx), carbon monoxide (CO), and particulate matter (PM). Compared to 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 2011 emissions of criteria pollutants are far below the estimated emissions presented in the 2008 SWEIS with one exception. SOx emissions exceeded 2008 SWEIS projections due to the operation of a generator at TA-33 that ran for three days in order to complete a project involving national security.

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

Pollutants	Units	2008 SWEIS	2011 Operations
Carbon monoxide	Tons/year	58	14.5
Nitrogen oxides	Tons/year	201	20.2
Particulate matter	Tons/year	11	2.3
Sulfur oxides	Tons/year	0.98	1.2[b]

a Emissions included on the annual Emissions Inventory Report do not include insignificant sources.
b SOx emissions exceeded SWEIS projections primarily due to the fact that a generator at TA-33 operated outside of the permitted hours (7 a.m.-5 p.m.) for three days and for longer than 8 hours for two of those three days in order to complete a project involving national security.

Criteria pollutant emissions from LANL's fuel-burning equipment are reported in the annual Emissions Inventory Report (LANL 2012c) as required by the 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 (sometimes referred to as the steam plant) and combustion turbine, and the TA-60 Asphalt Batch Plant. In addition, emissions from the data disintegrator, carpenter shops, degreasers, oil storage tanks, and permitted beryllium machining operations are reported. For more information, refer to LANL's Emissions Inventory Report for 2011 (LANL 2012c). In CY 2011, more than half of the significant criteria pollutants (NOx and CO) originated from the TA-03 steam plant.

In April 2004, LANL received a Title V Operating Permit from the NMED. This permit included facility-wide emission limits and additional recordkeeping and reporting requirements. Table 3-2 summarizes the facility-wide emission limits in the Title V Operating Permit, the 2008 SWEIS emission projections, and the 2011 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. All emissions were below the levels projected in the 2008 SWEIS with one exception. SOx emissions exceeded 2008 SWEIS projections due to the operation of a generator at TA-33 that ran for three days in order to complete a project involving national security.

Table 3-2. 2011 Emissions for Criteria Pollutants as Reported on LANL's Title V Operating Permit Emissions Reports[a]

Pollutants	Units	2008 SWEIS	Title V Facility-Wide Emission Limits	2011 Emissions
Carbon monoxide	Tons/year	58	225	38.3
Nitrogen oxides	Tons/year	201	245	54.0
Particulate matter	Tons/year	11	120	4.7
Sulfur oxides	Tons/year	0.98	150	1.5[b]

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

b SOx emissions exceeded SWEIS projections primarily due to the fact that a generator at TA-33 operated outside of the permitted hours (7 a.m.-5 p.m.) for three days and for longer than 8 hours for two of those three days in order to complete a project involving national security.

Chemical Usage and Emissions. Chemical usage and calculated emissions for Key Facilities are reported using ChemLog. The quantities presented here represent all chemicals procured or brought on site in the respective CY. This methodology is identical to that used by LANL for reporting under Section 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 2012c).

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 Yearbooks. First, usage of listed chemicals was calculated per facility. It was then estimated that 35 percent of the chemical used was released into the atmosphere. Emission estimates for some metals, however, were based on an emission factor of less than 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 are reported.

Information on total VOCs and hazardous air pollutants (HAPs) estimated from research and development operations is shown in Table 3-3. Projections by 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.

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

Pollutant	Emissions (Tons/year)	
	2010	2011
HAPs	3.8	2.6
VOCs	6.7	6.4

Greenhouse Gas Emissions. In CY 2011, LANL reported to the EPA its greenhouse gas emissions from stationary combustion sources for the second time. The stationary combustion sources at LANL include permitted generators, emergency backup generators, the asphalt plant, the power plant, the combustion turbine, and all boilers. In CY 2011, these stationary combustion sources emitted 59,307.5 metric tons of carbon dioxide equivalents (CO_2e). Methane has approximately 21 times the global warming potential of carbon dioxide, and nitrous oxide has approximately 310 times the global warming potential of carbon dioxide. Methane and nitrous oxide 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 tons per year (not CO_2e).

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

Gas Name	Units	2008 SWEIS	2011 Emissions
Methane	Tons/year	*	1.13
Nitrous Oxide	Tons/year	*	0.12
Carbon Dioxide	Tons/year	*	59,246.6

* 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.

LANL implemented the Outfall Reduction Program to reduce the total number of outfalls discharging to the environment. From January 1, 2011, through October 10, 2011, LANL had 15 wastewater outfalls (14 industrial outfalls and one sanitary outfall) that were regulated under NPDES Permit No. NM0028355. Effective October 11, 2011, four industrial outfalls were deleted from the permit (all four were associated with Key Facilities). Based on discharge monitoring reports prepared by LANL's Water Quality and RCRA Group, 10 permitted outfalls had recorded flows in CY 2011, totaling an estimated 164.1 million gallons. This is approximately 22.3 million gallons more than the CY 2010 total of 141.8 million gallons. The 2011 total volume of discharge is below the maximum flow of 279.5 million gallons that was projected in the 2008 SWEIS. Treated wastewater released from LANL's NPDES outfalls rarely leaves the site. Details on NPDES noncompliance during 2011 is provided in the 2011 Environmental Report (LANL 2012b).

CY 2011 discharges are summarized by watershed and compared with watershed totals projected in the 2008 SWEIS in Table 3-5. The bulk of the CY 2011 discharges came from Non-Key Facilities (Table 3-6).

Key Facilities accounted for approximately 39.7 million gallons of the CY 2011 total. LANSCE discharged approximately 23.6 million gallons in 2011, about 5.8 million gallons more than in 2010, accounting for about 59.6 percent of the total discharge from all Key Facilities. Table 3-6 compares NPDES discharges by Key and Non-Key Facilities.

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 TA-16 HEWTF did not discharge any wastewater in CY 2011.

The RLWTF (TA-50-0001) Outfall 051 discharges into Mortandad Canyon. During CY 2011, The RLWTF did not discharge any wastewater.

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

Watershed	No. of Outfalls 2008 SWEIS	No. of Permitted Outfalls CY 2011	Discharge 2008 SWEIS	Discharge CY 2011
Guaje	0	0	0	0
Los Alamos	5	1	45.6	22.9
Mortandad	5	4	44.3	2.3
Pajarito	0	0	0	0
Pueblo	0	0	0	0
Sandia	6[a]	5	187.3	138.9
Water[b]	5	1	2.26	0
Totals	21	11	279.5	164.1

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.

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

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

Key Facility	No. of Outfalls 2008 SWEIS	No. of Permitted Outfalls CY 2011	Discharge 2008 SWEIS	Discharge CY 2011
Plutonium Complex	1	1	4.1	1.22
Tritium Facility	2	None	17.4	0
CMR Building	1	None	1.9	0
Sigma Complex	2	1	5.8	0.84
High Explosives Processing	3	1	0.06	0
High Explosives Testing	2	None	2.2	0
LANSCE	4	2	28.2[a]	23.63
Metropolis Center	1	1	13.6	13.97
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	39.66

Key Facility	No. of Outfalls 2008 SWEIS	No. of Permitted Outfalls CY 2011	Discharge 2008 SWEIS	Discharge CY 2011
Non-Key Facilities	4	4	200.9	124.4[b]
Totals	21[c]	11[d]	279.5	164.1

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

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

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

d From January 1, 2011, through October 10, 2011, LANL had 15 wastewater outfalls. Effective October 11, 2011, four industrial outfalls were deleted from the IP, leaving a total of 11 permitted outfalls.

As previously stated, discharges from the Non-Key Facilities made up the majority of the total CY 2011 discharge from LANL. This total, 124.4 million gallons, was about 76.5 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 89 percent of the total discharge from Non-Key Facilities and about 68 percent of all water discharged by LANL in CY 2011.

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

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

During 2011, the Laboratory implemented and maintained 45 construction-site SWPPPs and addendums to SWPPPs and performed 596 storm water inspections associated with construction sites. The Laboratory uses a geographic information system (GIS) to manage project information and generate status reports that facilitate reporting under the Director's Portfolio Reviews. The overall NPDES CGP inspection compliance record in 2011 was 97.7%, 582 of the 596 inspections.

The LANL storm water team continued to use relatively new methods to assist with storm water compliance in 2011. Improvements in accounting for non-uniform distribution of precipitation were made by using a network of rain gauges in association with the Thiessen polygon method. This method associated 13 precipitation gauges across the Laboratory with LANL construction projects to ensure refined data were used for triggering storm water inspections. The gauges were equipped with 5-minute tipping buckets connected to existing stations with data loggers. The team incorporated solutions for preventing non-compliances in its Quality Improvement Performance Report. To further reduce future NPDES CGP non-compliances and to increase awareness of NPDES CGP requirements, the storm water team briefed subcontractors on requirements at pre-bid and pre-construction meetings. Storm water requirements were put into subcontract requirements, so each bidder who responds to or bids on a subcontract for a Laboratory project is given project-specific environmental requirements. The team also gave presentations to multiple LANL organizations to increase awareness of NPDES CGP requirements and continued to hold a standing monthly meeting with LANL Project Management personnel to review the storm water compliance status of projects.

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

The current permit for MSGP was issued by the EPA on September 29, 2008. In December 2008, LANS submitted to the EPA a NOI for coverage under the MSGP. The 2008 MSGP authorization to discharge expires on September 29, 2013. The intent of the 2008 MSGP is to authorize storm water discharges from specified facilities and minimize the discharge of potential pollutants.

The 2008 MSGP required 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 requirements for the LANL permitted facilities 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 action.
- Performing required benchmark, impaired waters and effluent limitations storm water monitoring of specific analytical parameters for the industrial activities listed under the permit.

In CY 2011, to achieve compliance with the 2008 MSGP, LANL implemented and maintained 11 SWPPPs covering 14 facilities.

The CY 2011 monitoring data indicate that LANS exceeded the effluent limitation guideline (ELG) for total suspended solids (TSS) at the TA-60 Asphalt Batch Plant. Since the entire facility is covered with gravel or asphalt except the detention pond that discharges storm water into a flume (the discharge from which would trigger the automatic storm water sampler during a qualifying storm event), the source of the TSS is presumed to be the pond. Therefore, corrective actions relative to this exceedance included the following:

- Excavating the pond approximately one foot deeper to provide additional storage of storm water during a typical rainy season with back-to-back storm events.
- Installing filter fabric over the entire earthen areas within the pond (bottom and side slopes) to provide a barrier between the clay fines and storm water within the pond.
- Installing river rock to protect the fabric from ultraviolet (UV) degradation and wildlife.

All of these corrective actions were completed within 14 calendar days. The water quality standard for copper was exceeded at two facilities. Administrative changes have been implemented to address these exceedances.

Since LANS started monitoring under the 2008 MSGP in April 2009 to the end of CY 2011, LANS has discontinued monitoring for 439 of the original 485 individual outfall/parameter requirements. The permit allows discontinuation of monitoring under the following circumstances:

- Constituents are found to not 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).

On February 13, 2009, EPA Region 6 issued NPDES Individual Permit (IP) No. NM0030759 to co-permittees, LANS and the DOE. Immediately following issuance of the IP by the EPA, the IP was publicly appealed. Following permit modification negotiations in 2009, the EPA issued a Final Permit Modification Decision in September 2010. The effective date for this new modified IP was November 1, 2010. The purpose of the IP is to regulate storm water discharges from 405 specified SWMUs and AOCs, referred to in the permit as "Sites." Potential contaminants of concern within these Sites are metals, organics, high explosives, and radionuclides. The IP also establishes a schedule for implementation of control measures, monitoring, specified corrective actions, and reporting for the regulated sites.

The Sites listed in the IP are associated with historical LANL operations dating back to the Manhattan Project era of the 1940s. The IP lists 405 permitted Sites that must be managed to prevent the transport of contaminants off site via storm water runoff. 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 runoff.

The IP requires monitoring at 250 Site Monitoring Areas (SMAs). The purpose of storm water monitoring is to compare storm water quality data against applicable Target Action Levels (TALs), which are based on New Mexico Water Quality standards and are set forth in the IP. If a TAL is exceeded, permittees must take corrective action measures as specified in the IP. These measures are then certified to the EPA upon completion. 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 TAL exceeded); (4) confirmation sampling in support of corrective actions; and (5) closeout or alternative compliance.

Additional IP requirements include development and implementation of a Site Discharge Pollution Prevention Plan, site inspections, training, recordkeeping, semi-annual public meetings, and a public website.

During CY 2011, per the IP, baseline controls were installed at all Sites within six months of the effective date of the IP, and storm water samplers were deployed at the SMAs. Sixty-eight SMAs exceeded TALs, and enhanced controls were installed at seven locations. The remaining 61 planned enhanced control installations will be completed in CY 2012.

3.3 Solid Radioactive and Chemical Wastes

Due to the complex array of facilities and operations, LANL generates a wide variety of waste types including solids, liquids, semi-solids, and contained gases. These waste streams are variously regulated as solid, hazardous, LLW, TRU, or wastewater by a host of state and federal regulations. The institutional requirements relating to waste management at LANL are located in a series of documents that are part of the Laboratory's Institutional Procedures. These requirements specify how all process wastes and contaminated environmental media generated at LANL are managed. Wastes are managed from planning for waste generation for each new project through final disposal or permanent storage of those wastes. This ensures that LANL meets all requirements including DOE Orders, federal and state regulations, and LANL permits.

LANL's waste management operations capture and track data for waste streams, regardless of their points of generation or disposal. This 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 and DD&D of facilities. Actual waste volumes from remediation may be smaller, depending on regulatory decisions by NMED, and because of waste volume reduction techniques.

LANL generates radioactive and chemical wastes as a result of research, production, maintenance, and construction. In addition, EP Directorate performs cleanup operations of sites and facilities formerly involved in weapons research and development. EP Directorate includes the operations and responsibilities of the previous ER Project. Table 3-7 summarizes waste types and generation for LANL in CY 2011.

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 (PRSs) 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 annual waste volume projection from Table I-70 will be used as the projection for EP waste types for the SWEIS Yearbooks.

Table 3-7. LANL Waste Types and Generation

Waste Type	Units	2008 SWEIS[a]	CY 2011
Chemical	10^3 kg/yr	4,273.6	1,788.12
LLW	m^3/yr	109,470	35,864.57
MLLW	m^3/yr	14,106	93.05
TRU	m^3/yr	1,736	100.86
Mixed TRU	m^3/yr	[b]	78.47

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 quantities from CY 2011 LANL operations were significantly below the 2008 SWEIS projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities (Table 3-7).

3.3.1 Chemical Wastes

The 2008 SWEIS projected chemical waste to decline for normal operations at LANL; however, significant quantities of this waste type are expected due to environmental restoration activities. Chemical waste includes not only construction and demolition debris, but also all other non-radioactive wastes passing through the SRCW Key Facility. In addition, construction and demolition debris is a component of those chemical wastes that in most cases are sent directly to off-site disposal facilities. Construction and demolition debris consists primarily of asbestos and construction debris from DD&D projects. Construction and demolition debris is disposed of in solid waste landfills under regulations promulgated pursuant to Subtitle D of RCRA. (Note: Hazardous wastes are regulated pursuant to Subtitle C of RCRA.) DD&D waste volumes are tracked in Section 3.11.2 of this Yearbook.

Chemical waste generation for LANL in CY 2011 was about 42 percent of the chemical waste volume projected in the 2008 SWEIS. EP chemical wastes accounted for about 40 percent of the volumes projected in the 2008 SWEIS. Table 3-8 summarizes chemical waste generation during CY 2011.

Table 3-8. Chemical Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2011
Key Facilities	10^3 kg/yr	596	181.69
Non-Key Facilities	10^3 kg/yr	650	392.54
EP	10^3 kg/yr	3,027.6[a,b]	1,213.89
LANL	10^3 kg/yr	4,273.6	1,788.12

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

b Projected annual waste generation for FY 2011 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 off-site disposal. In CY 2011, LLW volumes were well below volumes projected in the 2008 SWEIS (Table 3-9). LLW generation in CY 2011 for LANL was about three percent of volumes projected in the 2008 SWEIS. EP produced about 34,000 cubic meters of MLLW in 2011, about three percent of the volumes projected for EP in the 2008 SWEIS. Table 3-9 summarizes LLW generation during CY 2011.

Table 3-9. LLW Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2011
Key Facilities	m^3/yr	7,646	1,757.01
Non-Key Facilities	m^3/yr	1,529	178.60
EP	m^3/yr	100,295[a,b]	33,928.96
LANL	m^3/yr	109,470	35,864.57

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

b Projected annual waste generation for FY 2011 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, but the quantity is projected to be less than 2 percent of the quantity of LLW generation. MLLW generation in CY 2011 for LANL was less than 1 percent of volumes projected in the 2008 SWEIS. EP produced about 73 cubic meters of MLLW in 2011, less than 1 percent of the volumes projected for EP in the 2008 SWEIS. Table 3-10 summarizes MLLW generation during CY 2011.

Table 3-10. MLLW Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2011
Key Facilities	m^3/yr	68	20.00
Non-Key Facilities	m^3/yr	31	0.37
EP	m^3/yr	14,007[a,b]	72.68
LANL	m^3/yr	14,106	93.05

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

b Projected annual waste generation for FY 2011 from Implementation of the Consent Order, Removal Option, 2008 SWEIS Table I-70)

3.3.4 Transuranic Wastes

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

In CY 2011, TRU wastes were generated almost exclusively in three Key Facilities (the Plutonium Facility Complex, the CMR Building, and the SRCW Facility), as well as Non-Key Facilities. The 2008 SWEIS combines TRU and mixed TRU waste into one waste category since they are both managed for disposal at WIPP. Table 3-11 summarizes TRU wastes generation during CY 2011.

Table 3-11. TRU Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2011
Key Facilities	m^3/yr	413[a]	54.96
Non-Key Facilities	m^3/yr	23[a]	7.9
EP	m^3/yr	1,300[a,b]	38
LANL	m^3/yr	1,736[a]	100.86

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 2011 from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).

3.3.5 Mixed TRU Wastes

In CY 2011, mixed TRU wastes were generated at two Key Facilities: the Plutonium Facility Complex and the CMR Building. TRU waste generation in CY 2011 for LANL was about 6 percent of volumes projected in the 2008 SWEIS. EP produced about 38 cubic meters of TRU waste in CY 2011, about 3 percent of the volumes projected for EP in the 2008 SWEIS. The 2008 SWEIS combines TRU and mixed TRU waste into one waste category since they are both managed for disposal at WIPP. See Table 3-11 for

2008 SWEIS projections. Table 3-12 summarizes mixed TRU waste generation during CY 2011.

Table 3-12. Mixed TRU Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2011
Key Facilities	m^3/yr	413[a]	78.47
Non-Key Facilities	m^3/yr	23[a]	0
EP	m^3/yr	1,300[a,b]	0
LANL	m^3/yr	1,736[a]	78.47

a The 2008 SWEIS combines TRU and mixed TRU into one waste category since they are both managed for disposal at WIPP.

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

3.3.6 Sanitary Waste

The 2008 SWEIS projected that the Los Alamos County landfill would not reach capacity until about 2014. Since 2008, DOE/NNSA has implemented goals for Waste Minimization (WMin). LANL has instituted aggressive P2, WMin, and recycling programs that have helped reduce the amount of waste disposed in sanitary landfills.

LANL's total sanitary waste generation can be classified as routine and non-routine. The waste can also be categorized as recyclable and non-recyclable. Table 3-13 shows LANL sanitary waste generation for CY 2011. The recycle of total sanitary waste (routine and non-routine) for CY 2011 was 44 percent.

Table 3-13. LANL Sanitary Waste Generation in CY 2011 (metric tons)

	Routine	Non-routine	Total
Recycled	1,497	6,231[a]	7,729
Landfill disposal	1,958	7,846[b]	9,804
Total	3,455	14,077	17,533

a Brush, dirt, metal, concrete, and asphalt

b Construction and demolition debris, non-hazardous solid waste from TA-54.

Routine sanitary waste consists mostly of food and food-contaminated waste and cardboard, plastic, glass, Styrofoam packing material, and similar items. Non-routine sanitary waste is typically derived from construction and demolition projects, including all recycled metal. Construction of new facilities and demolition of old facilities are expected to continue to produce substantial quantities of this type of waste. Recycling programs for concrete, asphalt, dirt, and brush were established in 2001 and, as a result, LANL is recycling more construction waste and decreasing landfill disposal.

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 the County provides these services to the communities of White Rock and Los Alamos.

Utility infrastructure demands for electricity, natural gas, and water are projected to increase for LANL through 2021, and among other Los Alamos County users who rely upon the same utility systems as LANL through 2013.

3.4.1 Gas

Los Alamos County and LANL receive their natural gas from the Public Service Company of New Mexico (PNM). The gas pipeline comes from Bloomfield, NM to Los Alamos. At the end of 2009, the Combustion Gas Turbine Generator (CGTG) was installed and operational. The CGTG serves as one of LANL's on-site energy sources by producing electricity from the combustion of fuel. The CGTG is capable of producing 27 MW and is available to serve the Los Alamos Power Pool and regional utility network on an as required basis for peak-load shaving and emergency situations.

Record high electricity and natural gas demand was experienced during the January 31st to February 7, 2011 cold weather period in New Mexico, West Texas and Arizona. The extended cold weather overwhelmed electrical generating facilities and natural gas production facilities. The result was that natural gas pressures in northern New Mexico dropped to levels that caused a system emergency for New Mexico Gas Company (NMGCO).

On February 2, 2011 NMGCO requested assistance from LANL in the form of a voluntary curtailment. LANL responded by changing to backup fuel oil at the Power Plant. This reduced the LANL heating load by 50 percent. Other measures included the early release of personnel to further reduce the heating load.

On February 3, 2011, the NMGCO shut off service to an estimated 25,000 customers in Northern New Mexico. Emergency warming shelters had to be established to accommodate those without gas. Many of the 25,000 Northern New Mexico customers were Laboratory employees and their families. These Laboratory employees and their families lived in the Española Valley, Taos, Dixon, and Red River. LANL closed Friday, February 4, 2011, in response to the disruption of gas service in areas of New Mexico. Operations at the laboratory were also curtailed on February 5 and 6, 2011. LANL was able to divert 14 MW of power to the electric grid within just three hours to meet rising electricity needs for things such as electric space-heater use. In addition, 35 Laboratory plumbers and pipefitters worked around the clock to assist with the emergency situation. Service was restored to virtually all NMGCO customers by February 8.

Table 3-14 presents LANL's CY 2011 gas usage. Approximately 93 percent of the gas used by LANL in 2011 was for heat production. The remainder was used for electricity production. LANL electricity generation is used to fill the difference between peak loads and the electricity import capability and for training of the power plant operators in turbine operation.

Total gas consumption for CY 2011 was less than projected in the 2008 SWEIS.

Table 3-14. Gas Consumption (decatherms[a]) at LANL in CY 2011

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 2011	1,076,713	73,543	1,003,170	319,803[c]

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

b klb: Thousands of pounds

c TA-03 steam production has two components: that used for electricity production (1,708 klb in CY 2011) and that used for heat (292,531 klb in CY 2011).

Note: Any difference between consumption and production is due to feedwater heating.

3.4.2 Electrical

LANL is supplied with electricity through the Los Alamos Power Pool. The DOE and Los Alamos County entered into a 10-year contract (with extensions) known as the Electric Coordination Agreement whereby each entity's electricity resources are consolidated or pooled. Changes in transmission agreements with PNM resulted in the removal of contractual restraints on Power Pool resources import capability. Import capacity is now limited only by the physical capability (thermal rating) of the transmission lines that is 115 MW from a number of hydroelectric, coal, and natural gas power generators throughout the western United States.

On-site electricity generation capability for the Power Pool is limited by the existing TA-03 Co-generation Complex (the power plant generates both steam and power), which is capable of producing up to 10 MW of electricity with the steam driven turbine generators #1 and #2 and 27 MW from the CGTG for a total of 37 MW that is shared by the Power Pool under contractual arrangement. The #3 steam turbine at the Co-generation Complex is a 10-MW unit, but 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 existing equipment.

In an effort to beneficially use the LANL TA-61 "brownfield" landfill site, the County is proposing to lease and use approximately 15 of the 46 acres of land it operated as a landfill for the installation of up to 2 MW of PV to generate electric power. The system will be connected to a 7 MWh battery storage system, which, in turn, will be connected to the Los Alamos Power Pool infrastructure. Construction started in December 2011, with completion scheduled for June 2012. The other 1.0 to 1.5 MW will be installed through a Los Alamos County-issued power purchase agreement. The entire system is expected to be in place and operating no later than the summer of 2013.

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

The current transmission line configuration is not vulnerable to a single failure taking out both incoming transmission lines due to re-configuration of the lines when the Southern Technical Area Station was installed. However, the import capacity of 115 megavolt ampere (MVA) is expected to be exceeded in CY 2018. Re-conductoring of the Norton Line is planned prior to this date and will increase the import capacity to 142 MVA allowing loads to be served by off-site generation for the next 10 years and beyond.

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 hydro power 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 hydro power 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 total electricity consumption was reduced to a number closer to the average actual electricity consumption for the six years analyzed making the new total 495,000 megawatt-hours. In addition, the electricity peak load under the No Action Alternative is 91,200 kilowatts.

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 the Roadrunner Super Computer platform was one of the few elements of the Expanded Operations Alternative that was approved to go forward. This decision would impact the total electricity peak demand and the total electricity consumption at LANL; therefore, the LANL total in Table 3-15 under the 2008 SWEIS represents 91,200 kilowatts for LANL plus 18,000 kilowatts operating requirements for the Metropolis Center.

Table 3-16 shows annual use of electricity for CY 2011. LANL's electricity use remains below projections in the SWEIS. Actual use has fallen below these values and projected brownouts have not occurred. However, on a regional basis, failures in the PNM system have caused blackouts in northern New Mexico and elsewhere.

Table 3-15. Electricity Peak Coincidental Demand in CY 2011[a]

Category	LANL Base	LANSCE	Metropolis Center[b]	LANL Total	County Total	Pool Total
2008 SWEIS	57,200	34,000	18,000[c]	103,200[d]	19,800	111,000
CY 2011	40,452	17,966	10,232	68,650	18,356	87,006

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

Table 3-16. Electricity Consumption in CY 2011[a]

Category	LANL Base	LANSCE	Metropolis Center[b]	LANL Total	County Total	Pool Total
2008 SWEIS	356,000	139,000	131,400[c]	582,400[d]	150,000	645,000
CY 2011	261,690	100,157	86,739	448,586	128,894	577,480

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

3.4.3 Water

In September 2001, DOE/NNSA officially turned over the water production system and transferred 70 percent of the water rights to Los Alamos County. Los Alamos County continues to lease the remaining 30 percent of the water rights from DOE/NNSA. LANL is now considered a customer of Los Alamos County. Los Alamos County is continuing to pursue the use of San Juan-Chama Trans-mountain Diversion water as a means of maintaining those water rights. Los Alamos County has completed a preliminary engineering study and is currently negotiating a contract, which will provide more stability, before further investment.

LANL has installed water meters on high-usage facilities and has a Supervisory Control and Data Acquisition/Equipment Surveillance System on the distribution system to keep track of water usage and to determine the specific water use for various applications. Data are being accumulated to establish a basis for conserving water. LANL continues to maintain the distribution system by replacing portions of the over-60-year-old system as problems arise.

Elements of the Expanded Operations alternative were discussed in the two RODs. Expansion of the capabilities and operational levels at the Metropolis Center to support the Roadrunner Super Computer platform, and MDA remediation were two of the few elements of the Expanded Operations Alternative that were approved to go forward. Expansion of the Metropolis Center to support the Roadrunner Super Computer platform would impact water usage at LANL. Expanding to a 15-megawatt maximum operating platform is expected to potentially increase current water usage to 51 million gallons (193 million liters) per year. This higher usage would include the additional water lost to cooling tower evaporation and blowdown. Improvements to the SERF in CY 2012 are expected to lead to increased use of recycled effluent in the cooling towers in CY 2013. Metropolis Center water consumption was metered for the first time in CY 2011. Water consumption at the Metropolis Center was 42.6 million gallons.

Table 3-17 shows water consumption in million gallons for CY 2011. 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 2011, LANL consumed approximately 428 million gallons of water. Total use by LANL in 2011 was about 10 million gallons more than the 2008 SWEIS projection of 418 million gallons. The calculated NPDES discharge of 164.1 million gallons (see Table 3-6) in CY 2011 was about 38 percent of the total LANL usage of 428 million gallons.

Table 3-17. Water Consumption (million gallons) in CY 2011

Category	LANL Total	Metropolis Center[a]	LANSCE	Los Alamos County	Total
2008 SWEIS ROD	417.8[b]	51[c]	[d]	1,241	1,621
CY 2011	427.8	42.6[e]	49.0	Not Available[f]	Not Available[f]

a The Metropolis Center became a new Key Facility under the 2008 SWEIS.
b This number represents 380 million gallons for LANL under the No Action Alternative plus 32 million gallons (51 Expanded Operations limit – 19 No Action Alternative) to expand the capabilities and operational levels of the Metropolis Center and 5.8 million gallons of water to be used during MDA remediation activities, as stated in the SWEIS RODs.
c 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.
d Water consumption at LANSCE was not projected in the 2008 SWEIS.
e Metropolis Center water consumption was metered for the first time in CY 2011.
f In September 2001, Los Alamos County acquired the water supply system, and LANL no longer collects this information.

The County bills LANL for water and all future water use records maintained by LANL will be based on those billings. The distribution system used to supply water to LANL facilities now consists of a series of reservoir storage tanks, pipelines, and fire pumps. The LANL distribution system is primarily gravity fed with pumps available for high-demand fire situations at limited locations.

3.5 Worker Safety

The LANL Safety Policy is as follows:

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

An Institutional Worker Safety and Security Team (IWSST) has been established at the Laboratory 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 (POCs) for any worker at the Laboratory with a safety or security concern or idea.
- Track and address individual safety and security concerns raised by the worker, institutional safety, or security data.
- Evaluate and recommend improvements for the effectiveness of safety and security activities.
- Achieve a cooperative attitude for a safe and secure environment.
- Celebrate successes in demonstrating safe and secure behavior among workers at the Laboratory.
- Review concerns of workers over implementation of proposed policies concerning safety and security.
- Assist in the development of institutional goals, objectives, and measures with regard to safety and security.

Worker Safety and Security Teams (WSSTs) reside within the line organizations and act as conduits for sharing information and communicating decisions. There are approximately 100 directorate, division, and group-level WSSTs. The purpose of the WSSTs is to achieve employee ownership of personal and institutional safety. To achieve this goal, the WSST provides input and receives feedback on safety and health issues. Employee involvement helps drive behaviors that support the Integrated Safety Management System (ISMS) 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 (VPP) at "Merit Status". LANL maintained Merit Status during a subsequent DOE assessment in 2011. LANL received 10 "Opportunities for Improvements" as a result of the 2011 assessment. Many improvements were made in work control, expansion of behavior-based safety, and the completion of Human Performance Improvement (HPI) training by all managers and approximately 1,500 employees.

3.5.1 Accidents and Injuries

Analysis of LANL's injury and illness performance shows an improvement by two percent in 2011 over 2010 with respect to the Days Away, Restricted or Transferred (DART) rate and an increase of 13 percent in the Total Recordable Case (TRC) rate.

For 2011, there were 164 recordable injury cases with approximately 43 cases that resulted in days away, restricted or transferred duties per year. Table 3-18 summarizes CY 2011 occupational injury and illness rates.

Table 3-18. Total Recordable and Days Away Restricted/Transferred Case Rates at LANL

LANS	2008 SWEIS	CY10	CY11	Percent Change	Total 2011 Cases
TRC Rate	2.04	1.58	1.79	13% Increase	164
DART Rate	1.18	0.48	0.47	2% Reduction	43

3.5.2 Ionizing Radiation and Worker Exposures

Occupational radiation exposures for workers at LANL during CY 2011 are summarized in Table 3-19. The collective total effective dose (TED) for the LANL workforce during CY 2011 was 127.4 person-rem. Data in Table 3-19 show 125 more radiation workers received measurable dose in CY 2011 than CY 2010; with more workers and similar collective dose, the average non-zero dose per worker was lower by 7 mrem. Of the 127.4 person-rem collective TED reported for CY 2011, 0.909 person-rem was from internal exposures to radioactive materials, consisting of small intakes from routine tritium operations, uranium, and plutonium. 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 3-19. Radiological Exposure to LANL Workers*

Parameter	Units	2008 SWEIS	CY 2011
Collective TED (external + internal)	person-rem	280	127.4
Number of workers with measurable dose	number	2,018	1460
Average non-zero dose: • external + internal radiation exposure	millirem	139	87

* Data in this report are current as of December 31, 2011.

The highest individual doses in CY 2011 indicate an overall decrease of typical doses received since CY 2000. Senior management and the Institutional Radiation Safety Committee have set expectations and put in place mechanisms to drive individual and collective doses as low as reasonably achievable (ALARA) through performance goals and other ALARA measures. For whole body doses, no worker exceeded DOE's 5-rem/year dose limit, and no worker exceeded the 2-rem/year LANL administrative control level established for external exposures. Table 3-20 summarizes the highest individual dose data for CYs 2007–2011.

Table 3-20. Highest Individual Annual Doses (TED) to LANL Workers (rem)*

CY 2007	CY 2008	CY 2009	CY 2010	CY 2011
7.430	2.106	1.142	1.198	1.039
1.642	1.198	0.933	0.940	1.004
1.573	1.132	0.932	0.859	0.993
1.508	1.096	0.885	0.856	0.983
1.503	0.952	0.877	0.833	0.910

* Data in this report are current as of 12/31/2011.

Comparison with the SWEIS Baseline. The collective TED for CY 2011 is about 46 percent of the 280 person-rem per year baseline in the 2008 SWEIS.

Work and Workload: Changes in workload and types of work at nuclear facilities, particularly the TA-55 Plutonium Facility Complex, TA-53 LANSCE, and the TA-50 and TA-54 waste facilities tend to increase or decrease the LANL collective TED. Worker exposure under the 2008 SWEIS No Action Alternative is 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 are 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 will result in a reduced worker dose.

TA-55 operations accounted for about half of the occupational dose at LANL. CY 2011doses in this facility were similar to CY 2010; radiological work was comparable. Besides occupational exposure from both weapons manufacturing and Pu-238 work, work on repackaging materials, access to storage areas, and providing radiological control support for radiological work and system maintenance were major contributors to worker dose at TA-55.

In addition to TA-55 operations, significant portions of the LANL collective dose were accrued by workers performing maintenance at TA-53 and workers performing retrieval, repackaging, and shipping of radioactive solid waste at LANL waste facilities at TA-50 and TA-54.

Internal doses reflect a combination of routine tritium doses from LANL tritium operations and unanticipated low-level intakes of uranium and plutonium. The highest reported internal dose (130 mrem committed effective dose) resulted from a uranium airborne radioactivity exposure.

ALARA Program: LANL occupational exposure continues to be deliberately managed under an aggressive ALARA Program within the LANL Radiation Protection Program, with an emphasis on dose optimization, ALARA goals, performance measurement, line management engagement, and oversight by the Institutional Radiation Safety Committee and LANL senior management. Based on established ALARA goals, dose accrued to date, and expected workload, CY 2012 collective doses are again expected to be on the order of 125 rem. Improvements in maintaining radiation exposures ALARA, such as improved dose tracking during work activities, additional shielding, better radiological safety designs, worker involvement, and innovative solutions should result in continually lower LANL radiological worker doses relative to the work conducted.

Collective TEDs for Key Facilities. In general, extracting collective TEDs by Key Facility or TA is difficult because 1) these data are collected at the group level, 2) groups are often tenants in multiple facilities, and 3) members of many groups receive doses at several locations. The fraction of a group's collective TED coming from a specific Key Facility or TA can only be estimated. For example, personnel from the Health Physics Operations group and crafts workers are distributed across the Laboratory, and these two organizations account for a significant fraction of the LANL collective TED. Approximately 80 percent of the collective TED that these groups incur is estimated to come from operations at TA-55. The total collective TED for TA-55 residents in CY 2011 was approximately half of the LANL collective TED. As discussed previously, maintenance activities at TA-53 and solid waste operations at TA-50 and TA-54 also contributed a significant dose to the LANL total.

3.6 Socioeconomics

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

The LANL-affiliated workforce continues to include LANS employees and subcontractors. 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 3-21, the total number of employees in CY 2011 is 14 percent lower than 2008 SWEIS projections. The 11,672 total employees at the end of CY 2011 reflect no significant change as compared with the 11,609 employees reported in the 2010 SWEIS Yearbook.

Table 3-21. 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 2011	10,666 [d]	525	78	0	403	11,672

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

b Total number of employees was presented in the SWEIS, the breakdown had to be calculated based on the percentage distribution shown in the 1999 SWEIS for the base year.

c Data were not presented for non-technical contractors or consultants.

d KBR/Shaw/LATA (KSL) employees converted to LANS under "CRAFT" Type of Appointment effective 12/2008.

LANL has had a positive economic impact on northern New Mexico. A University of New Mexico report (Bhandari 2011) indicated that in 2009 the economic impact on northern New Mexico included $2.47 billion indirect output (operation and construction) and $1.4 billion on labor income. In addition, the report indicated an additional $1.6 billion in value added income to northern New Mexico (e.g., employee compensation, proprietor income, other property income, and indirect business income). No update on this data exists for 2011.

The residential distribution of the LANL-affiliated workforce reflects the housing market dynamics of three counties. As seen in Table 3-22, 78 percent of LANS employees reside in Los Alamos, Rio Arriba, and Santa Fe counties.

Table 3-22. 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 2011	4,523	1,832	2,298	1,026	9,679	1,993	11,672

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 2011, the land resources (i.e., undeveloped and developed lands) available for use at LANL had been reduced. No lands were conveyed or transferred in CY 2011. Since CY 2001, the following lands were transferred under Public Law 105-119[8] (42 USC 2391), which were analyzed in the Land Conveyance and Transfer Environmental Impact Statement (DOE 1999c) and managed by LANL's Environmental Protection Division's Land Conveyance and Transfer Project Office:

- ~2,100 acres of land have been transferred to the Department of Interior to be held in trust for the Pueblo of San Ildefonso and
- ~340 acres of land have been conveyed to Los Alamos County.

In January 2011, Public Law 105-119 was extended to September 30, 2022, when President Obama signed the National Defense Authorization Act. Table 3-23 provides a summary of the land parcels remaining to potentially be transferred or conveyed.

Projects under construction in CY 2011 include the new Tactical Training Facility and Indoor Firing Range, RLUOB, and DD&D of TA-21. CY 2011 land use was similar to the previous CYs.

LANL's EP Directorate is unique from a land use standpoint. Rather than using land for development, this program cleans up legacy wastes and makes land available for future use. In CY 2011, remediation of MDA B was completed, and this area will be made available for conveyance to Los Alamos County in the future. Through these efforts, LANL may make several large tracts of land available for use (DOE 1999c).

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[8] On November 26, 1997, Congress passed PL 105-119 (42 USC 2391). Section 632 of this Act directed the Secretary of Energy to convey to the Incorporated County of Los Alamos, New Mexico, or to the designee of the County, and transfer to the Secretary of the Interior, in trust for the Pueblo of San Ildefonso, parcels of land under the jurisdictional administrative control of DOE at or in the vicinity of LANL. Such parcels, or tracts, of land must meet suitability criteria established by the Act. The Public Law now expires 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.

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

Table 3-23. Potential Land Transfer/Conveyance Tracts Analyzed in the Land Conveyance and Transfer Environmental Impact Statement

Land Tract	Acreage	Location
TA-21/A-16	250	On the eastern end of the same mesa on which the central business district of Los Alamos is located.
DP Canyon/A-10	13	Between the western boundary of TA-21 and the major commercial districts of the Los Alamos town site.
Rendija Canyon/ A-14 a, c, d	890	North of and below Los Alamos town site's Barranca Mesa residential subdivision.
TA-74 South/ A-18a	520	Southern reach of Pueblo Canyon between the White Rock Y and Airport.
B-3	3	Pueblo Canyon, situated within a preservation easement
DP Road South/ A-8 b	3	DP Road Site, situated west of MDA B on south side of DP Road
Airport-3 South 2/ A-5-2	44	The Airport Site, situated north of TA-21 and south of NM 501
TA-21 West 2/A-15-2	1	DP Road
C-2, C-3 and C-4	150	Highway near White Rock "Y"

3.8 Groundwater

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

The Laboratory performed significant groundwater compliance work in 2011 pursuant to the Consent Order. These activities included groundwater monitoring, groundwater investigations, and installation of monitoring wells in support of various groundwater investigations and CMEs.

In 2011, LANL installed one monitoring well in the perched/intermediate aquifer and five monitoring wells (with six screens) in the regional aquifer (Table 3-24). New wells drilled in 2011 include R-55i (1/18/11), R-63 (2/9/11), R-61 (5/3/11), R-64 (7/11/11), R-62 (10/3/11), and R-66 (11/16/11).

During 2011, LANL plugged and abandoned Test Well 3, Test Well H-19, Test Holes 5 and 6 in Pajarito Canyon, Seismic Hazard Boreholes SHB-1, SHB-3, and SHB-4, TA-21 Distillation Hole, a US Geological Survey (USGS) Test Hole east of MDA C, Beta Hole in Water Canyon, and Test Holes 1, 2, 3, and 5 at TA-49.

In 2011, LANL sampled 215 groundwater wells, well ports, and springs in 813 separate sampling events. Many alluvial wells could not be sampled. Many wells were dry due to severe drought conditions. In Cañon de Valle, flooding following the Las Conchas fire created adverse field conditions that prevented collection of numerous groundwater samples. These samples could not be collected because damage to roads prevented access to the wells, wells were overtopped by floodwater, or wells were either destroyed or buried by flood debris.

Table 3-24. Wells and Boreholes Installed in 2011

Type[a]	Identifier	Watershed (Canyon)	Total depth (ft bgs)[b]	Screened interval (ft bgs)	Water level (ft bgs)	Comments
I	R-55i	Mortandad	565	510 – 531.1	6036.7	TA-54 Monitoring Group well completed in perched intermediate groundwater east of MDA G. Monitors for potential contaminant releases from MDA G and other sources in Pajarito Canyon. NMED completed on 1/18/2011.
R	R-61	Mortandad	1265.0	1125.0 – 1135.0 (sc 1) 1220.4 – 1241.0 (sc 2)	5838.7 (composite)	Chromium Investigation Monitoring Group well located on the mesa south of Mortandad Canyon. Primary objective was to define the western extent of the flow path for chromium migration. Completed on 5/3/2011.

Type[a]	Identifier	Watershed (Canyon)	Total depth (ft bgs)[b]	Screened interval (ft bgs)	Water level (ft bgs)	Comments
R	R-62	Water	1260.0	1158.4 - 1179.1	5839.2	Chromium Investigation Monitoring Group well located on a ridge between Sandia and Mortandad Canyon at the east end of Sigma Mesa. Completed 10/03/11.
R	R-63	Los Alamos	1367.0	1325.0 – 1345.3	6193.97	TA-16 260 Monitoring Group well completed in the regional aquifer approximately 1430 feet east of R-25 near Cañon de Valle. Completed on 2/9/2011
R	R-64	Los Alamos	1380.0	1285.0 – 1305.5	5852.47	TA-21 Monitoring Group well located immediately northeast of MDA T on the mesa between Los Alamos and Pueblo canyons. Completed on 5/15/11
R	R-66	Los Alamos	910.4	819.4 – 839.7	5833.06	TA-21 Monitoring Group well installed near LA County production well Otowi-4. Well monitors for potential contaminants from upper Los Alamos and DP canyons. Completed 11/16/11.

a I = perched intermediate ground water zone well; R = regional aquifer well
b feet BGS

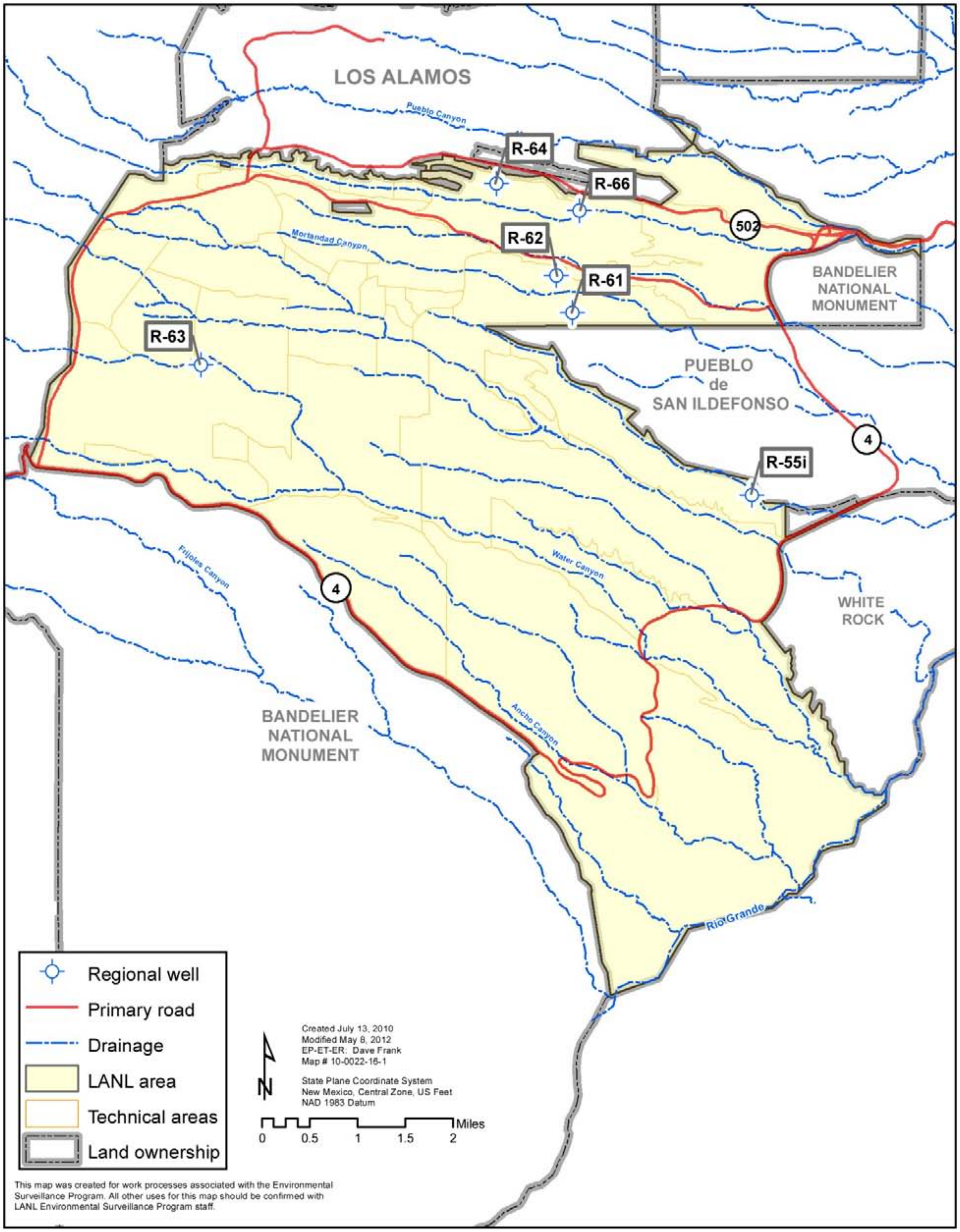

Figure 3-1. Map of wells and boreholes installed in 2011

3.9 Cultural Resources

LANL has a large and diverse number of historic and prehistoric properties. Approximately 88 percent of DOE-administered land in Los Alamos County has been surveyed for prehistoric and historic cultural resources. More than 1,800 prehistoric sites have been recorded (Table 3-25). During FY 2007, sites excavated since the 1950s were removed from the site count numbers, lowering LANL's number of recorded sites. In FY 2011, sites that were removed from the overall site count numbers included those destroyed by early construction activities, those that are pre-1966 National Historic Preservation Act, and those removed per consultations with the New Mexico State Historic Preservation Office (SHPO). Nearly 73 percent of the total number of archaeological sites date from the 13th, 14th, and 15th centuries. Most of the sites are situated in the piñon-juniper vegetation zone, with more than 77 percent lying between 5,800 and 7,100 feet in elevation. Fifty-nine percent of all sites are found on mesa tops. Within LANL's limited access boundaries, there are ancestral villages, shrines, petroglyphs, sacred springs, trails, and traditional use areas that could be identified by Pueblo and Athabascan[9] communities as traditional cultural properties.

To date, LANS Cultural Resource Specialists have identified no sites associated with the Spanish Colonial or Mexican periods. During FY 2004, the historic periods (Historic Pueblo, US Territorial, Statehood, and Undetermined Athabascan) were combined into one site affiliation code, "Early Historic Pajarito Plateau" (AD 1500 to 1943). Many of the 2,319 potential historic cultural resources are temporary and modular properties, sheds, and utility features associated with the Manhattan Project and Cold War periods. Since the 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 LASO, the SHPO, and the Advisory Council on Historic Preservation. Additionally, LANS Cultural Resource Specialists have evaluated many Manhattan Project and Early Cold War properties (1943–1963) and those properties built after 1963 that potentially have historical significance, reducing the total number of potential historic cultural resource sites. During 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 571 (Table 3-26). Most buildings built after 1963 are being evaluated on a case-by-case basis as projects arise that have the

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

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

LANS Cultural Resource Specialists 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).

Table 3-25. Acreage Surveyed, Prehistoric Cultural Resource Sites Recorded, and Cultural Resource Sites Eligible for the NRHP at LANL FY 2008, 2009, 2010 and 2011[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

a Source: Information on LANL provided by DOE/NNSA and LANL to the Secretary of Interior for a Report to Congress on Federal Archaeological Activities.

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

c As part of ongoing work to field-verify sites recorded 20 to 25 years ago, LANL has identified sites that have been recorded more than once and have multiple Laboratory of Anthropology site numbers. Therefore, the number of recorded archaeological sites is less than indicated in FY 2002. This effort will continue over the next several years and more sites with duplicate records will likely be identified.

d No tracts of land were conveyed to Los Alamos County during FY 2011. The total acres surveyed using the new DOE/NNSA boundary is 23,094.50.

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 2011 support this projection. These data are reported in the 2011 Environmental Report (LANL 2012b).

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 include remediation of several MDAs, DD&D of TA-21, and elimination or reduction of outfall releases in Mortandad Canyon and its tributaries. Other BAs are completed as needed.

LANL management approved a LANL Biological Resources Management Plan (BRMP) in September 2007 (LANL 2007). LANS Biologists updated a source document for migratory bird protection BMPs (LANL 2011g) and a source document for sensitive species protection in 2011 (LANL 2011h). These source documents are updated annually when new information is available.

3.10.1 Conditions of the Forests and Woodlands

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

In CY 2011, the annual Wildland Fire Management Plan was implemented. The overall goals of the Wildland Fire Management Plan are to

(1) protect the public, LANL workers, facilities, and the environment from catastrophic wildfire;

(2) prevent interruptions of LANL operations from wildfire;

(3) minimize impacts to cultural and natural resources while conducting fire management activities; and

(4) improve forest health and wildlife habitat at LANL and, indirectly, across the Pajarito Plateau; and promote and support interagency collaboration for wildfire-related activities.

These goals are accomplished through reducing fuel loads within LANL forests to decrease wildfire hazards, treating fuel to decrease the risk of wildfire escapes at LANL-designated firing sites, and improving wildland fire suppression capability through fire road improvements.

LANL is located in a fire-prone region, and there will always be a high potential for wildfires. Recent modeling of wildfire risks indicates that the greatest potential for lightning to ignite fires occurs along the western and southwestern boundary of LANL and in the adjacent mountainous areas. Because of this risk, thinning has been a primary management activity to reduce fire hazards in forests and woodlands at LANL.

Appendix E provides details on the 2011 Las Conchas fire and LANL actions taken in response to the fire.

3.10.2 Threatened and Endangered Species Habitat Management Plan

Under the Threatened and Endangered Species Habitat Management Plan (HMP; LANL 2011i) in CY 2011, LANL continued annual surveys for Mexican Spotted Owls and Southwestern Willow Flycatchers. Surveys were also conducted for two state-listed species, the Jemez Mountains salamander and the Gray Vireo. 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 Biological Assessments and Compliance Packages

DOE submits BAs to the U.S. Fish and Wildlife Service (USFWS) to review proposed activities and projects for potential impacts on 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 HMP. 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 prepared floodplain assessments in accordance with 10 Code of Federal Regulations (CFR) 1022.

Floodplain or wetland assessments were completed for the following projects in CY 2011:

- Las Conchas Wildfire Response LA-UR-11-03907.

During CY 2011, DOE submitted six BAs to USFWS.

- Biological Assessment of the Effects of the Sigma Mesa Clean Fill Yard on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory LA-CP-12-00038.
- Biological Assessment of the Effects of Proposed Temporary Spoils Storage, Staging, New Parking, and Vehicle Turnaround on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory LA-CP-11-00306.
- Biological Assessment of the Effects of Las Conchas Wildfire Mitigations Including Mexican Spotted Owl Habitat Redelineation in Los Alamos Canyon on

Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory LA-CP-11-01147.
- Biological Assessment of the Effects of the Construction and Use of the Upper Sandia Canyon Access Road on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory LA-CP-11-01686.
- Biological Assessment of the Effects of Construction and Operation of a Transuranic Waste Facility at Los Alamos National Laboratory LA-CP-11-00165.
- Amended Consultation for 22420-2006-I-0090: Biological Assessment of the Potential Effects of Monitoring and Maintenance of Monitoring Stations and Wells on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory LA-CP-11-00013.

The USFWS concurred in the determination that the projects may affect, but were not likely to adversely affect, federally listed species for three of these assessments. As of December 31, 2011, DOE is awaiting concurrence on the three others.

3.11 Footprint Elimination and Decontamination, Decommissioning, and Demolition

3.11.1 Footprint Elimination

Footprint reduction efforts funded by multiple programs contribute to the reduction of the LANL footprint as required to meet all related goals and mandates in place since 2006. 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 2011, DOE/NNSA removed 61 structures. Of these structures, 50 were demolished, nine were salvaged, and two were transferred to Santa Clara Pueblo, eliminating a total of 425,343 square feet of the Laboratory's footprint.

3.11.2 Decontamination, Decommissioning, and Demolition

DD&D are those actions taken at the end of the useful life of a building or structure to reduce or remove substances that pose a substantial hazard to human health or the environment, retire it from service, and ultimately eliminate all or a portion of the building or structure. When DOE/NNSA declares a LANL facility as surplus (no longer needed), it is shut down and prepared for DD&D. DD&D activities at LANL are covered under the 2008 SWEIS, and all waste volumes generated from these activities are tracked in the SWEIS Yearbook. 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 off site.

In CY 2011, DOE/NNSA demolished 50 structures. Table 3-26 summarizes the waste volumes for all buildings that went through the DD&D process in CY 2011.

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Table 3-26. CY 2011 DD&D Facilities Construction and Demolition Debris[a]

	Building Number[b]	DD&D Completed	Waste Volumes (m^3)						
			Construction/ Demolition Debris	Asbestos[c]	Universal Waste	Recyclable Metal[d]	Recyclable Asphalt/ Concrete	Recyclable Wood	Equipment Salvaged[d]
	03-0043	5/12/2011	11316	1307	9	2295T	1727		600T
	03-0406	4/7/2011	95	5	<1	2T	11		
	03-1462	4/11/2011	10	0	<1	2T	5		
	03-1516	4/6/2011	89	3	<1	2T	11		
	03-1540	5/11/2011	47	2	<1	1T	6		
	03-1541	5/11/2011	47	2	<1	1T	6		
	03-1736	4/2/2011	50	2	<1	1T	6		
	03-1737	4/2/2011	50	2	<1	1T	6		
	03-1738	4/2/2011	50	2	<1	1T	6		
	03-1903	4/2/2011	44	2	<1	1T	5		
	03-2237	5/10/2011	40	1	<1	1T	5		
	09-0272	10/25/2011	114	3	<1	4T	19		
	09-0273	10/31/2011	114	3	<1	4T	19		
	15-0456	10/20/2011	113	3	<1	4T	19		
	15-0562	5/5/2011	0	0	<1	100T	38		
	18-0028	8/18/2011	45	23	<1	82T	370		
	18-0030	10/18/2011	218	113	2	402T	1806		
	18-0031	8/25/2011	20	10	<1	10T	162		
	18-0147	8/18/2011	12	6	<1	6T	100		
	18-0189	8/23/2011	9	4	<1	4T	70		
	21-0031	4/22/2011	311	129	<1	18T	78		
	21-0212	4/5/2011	22	6	<1	2T	22		
	21-0357	4/15/2011	542	0	<1	157T	0		
	22-0001-PR	11/16/2011	88	2	<1	3T	15		
	46-0119	8/10/2011	90	1	<1	2T	3		
	46-0180	8/1/2011	123	1	<1	2T	5		
	46-0194	8/8/2011	87	1	<1	2T	3		
	46-0195	8/8/2011	96	1	<1	2T	4		
	46-0201	7/28/2011	144	1	<1	3T	6		
	46-0204	8/2/2011	124	1	<1	2T	5		

	Building Number[b]	DD&D Completed	Waste Volumes (m³)						
			Construction/ Demolition Debris	Asbestos[c]	Universal Waste	Recyclable Metal[d]	Recyclable Asphalt/ Concrete	Recyclable Wood	Equipment Salvaged[d]
	46-0314	8/11/2011	58	0	<1	1T	2		
	46-0342	8/20/2011	25	0	<1	1T	1		
	48-0056	9/16/2011	144	1	<1	3T	6		
	48-0057	9/16/2011	144	1	<1	3T	6		
	48-0203	9/14/2011	122	1	<1	2T	5		
	46-0546	10/20/2011	31	0	<1	0T	1		
	55-0162	6/9/2011	0	0	<1	20T	21		
	55-0264	2/1/2011	189	0	<1	12T	273		
	59-0029	4/13/2011	112	4	<1	2T	13		
	59-0030	4/13/2011	112	4	<1	2T	13		
	59-0031	4/13/2011	112	4	<1	2T	13		
	59-0032	4/13/2011	112	4	<1	2T	13		
	59-0033	4/13/2011	112	4	<1	2T	13		
	59-0034	4/13/2011	112	4	<1	2T	13		
	59-0035	4/13/2011	112	4	<1	2T	13		
	59-0036	4/19/2011	112	4	<1	2T	13		
	59-0037	4/19/2011	112	4	<1	2T	13		
	59-0118	4/11/2011	47	2	<1	1T	6		
	59-0119	4/11/2011	47	2	<1	1T	6		
	63-0001	10/3/2011	150	6	<1	6T	70		
2008 SWEIS			**246,409 m³ [a]**						
TOTAL			**16,075**	**1,685**	**59**	**3,185T**	**5,052**	**0**	**600T**

a Construction/demolition debris includes uncontaminated wastes such as steel, brick, concrete, pipe, and vegetative matter from land clearance. This number represents 151,382 m³from the No Action Alternative, 2,293 m³from the RLWTF upgrade, 2,133 m³ from the Plutonium Refurbishment, 35,934 m³from the TA-21 DD&D Option, 12,998 m³from the TA-18 DD&D Option, and 41,669 m³from 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 Certain waste volumes were only tracked in tons (not in cubic meters). These are designated with a T after the number.

4.0 Trend Analysis

Beginning in 1999, the SWEIS Annual Yearbook included a new chapter that examined trends by comparing actual LANL operating conditions to SWEIS projections. The 2007 Yearbook represents the last Yearbook in which a five-year trend section was included. With the issuance of the first ROD for the 2008 SWEIS on September 19, 2008, the decision was made to only include the trend section in the Yearbook when examining five years of operating data. DOE/NNSA's regulations require a review, called a SA, of the SWEIS every five years to determine if the SWEIS is adequate, if the SWEIS needs to be supplemented, or if a new SWEIS should be written. The Yearbook and specifically the trend analysis chapter are essential components in DOE/NNSA's five-year evaluation of how accurately the SWEIS represents LANL current and projected operations.

This chapter compares actual operating data from CY 2007–2011 to projected effects for parameters discussed in the 2008 SWEIS, including emissions, effluent, workforce, and waste data. This chapter gives figures that show trends for which data were available. Although the data from CY 2007 is included in this five-year review of operating data, the SWEIS projections that are represented in the figures and graphs are those from the 2008 SWEIS and associated RODs.

4.1 Air Emissions

Air emissions continued to be within regulatory limits for CY 2007 to CY 2011. LANL continues to be in compliance with air quality standards under the Clean Air Act.

4.1.1 Radiological Air Emissions

The 2008 SWEIS projected annual radioactive stack emissions for LANL at 34,000 curies[10] per year. Since 2007, LANL's radiological stack emissions have not exceeded 1,670 curies, which occurred in 2008. While within the overall envelope projected by the SWEIS, LANL emissions in 2008 were dominated by an increase in both LANSCE and tritium Facility emissions, relative to other years. The total point sources for LANSCE and tritium Facility emissions were approximately 846 curies and 739 curies,

[10] 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.

respectively. Even with these higher-than-average emissions numbers, LANL is still operating well within the parameters that the 2008 SWEIS analyzed (Figure 4-1).

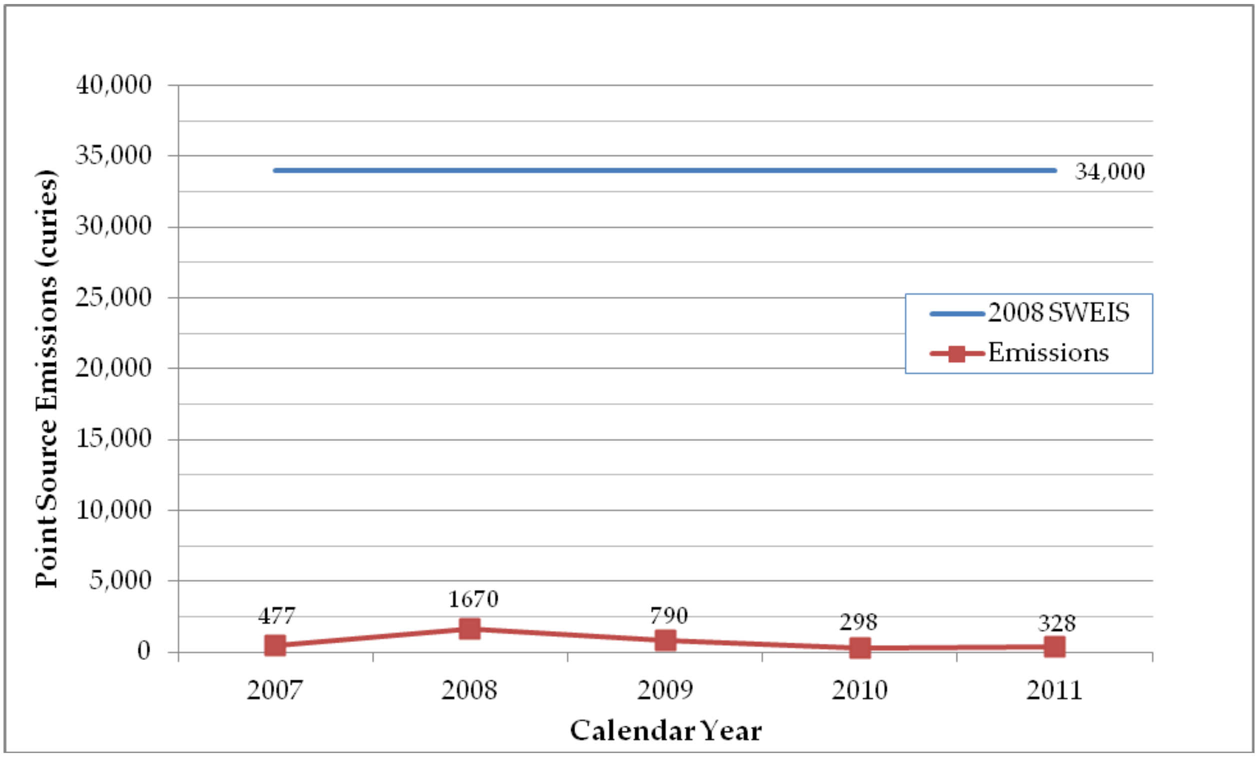

Figure 4-1. Radiological air emissions from point sources for CY 2007–2011

The two largest contributors to radioactive air emissions were tritium from the Tritium Facilities (both Key and Non-Key) and activation products from LANSCE. Tritium emissions from Key Facilities were within the projections of the 2008 SWEIS for CY 2007–2011 (Figure 4-2). In CY 2008, tritium operations at TA-21 (TSFF and TSTA) ceased and were conducted at TA-16 in the WETF. The DD&D of the Tritium Facilities at TA-21 was completed in CY 2010. The 2008 SWEIS ROD parameter for tritium emissions is 2,400 curies per year.

The 2008 SWEIS projected the maximum off-site dose to the maximally exposed individual to be 7.8 millirem per year. In the period from 2007 to 2011, the actual maximum off-site dose was lower than 2008 SWEIS projections. The maximum off-site dose for CY 2011 was the highest in recent years, due primarily to the remediation of MDA B, which resulted in elevated air concentrations around that site. The final dose value was 3.53 millirem, still below the 2008 SWEIS projection and the EPA air emissions limit of 10 millirem per year established for DOE facilities (Figure 4-3).

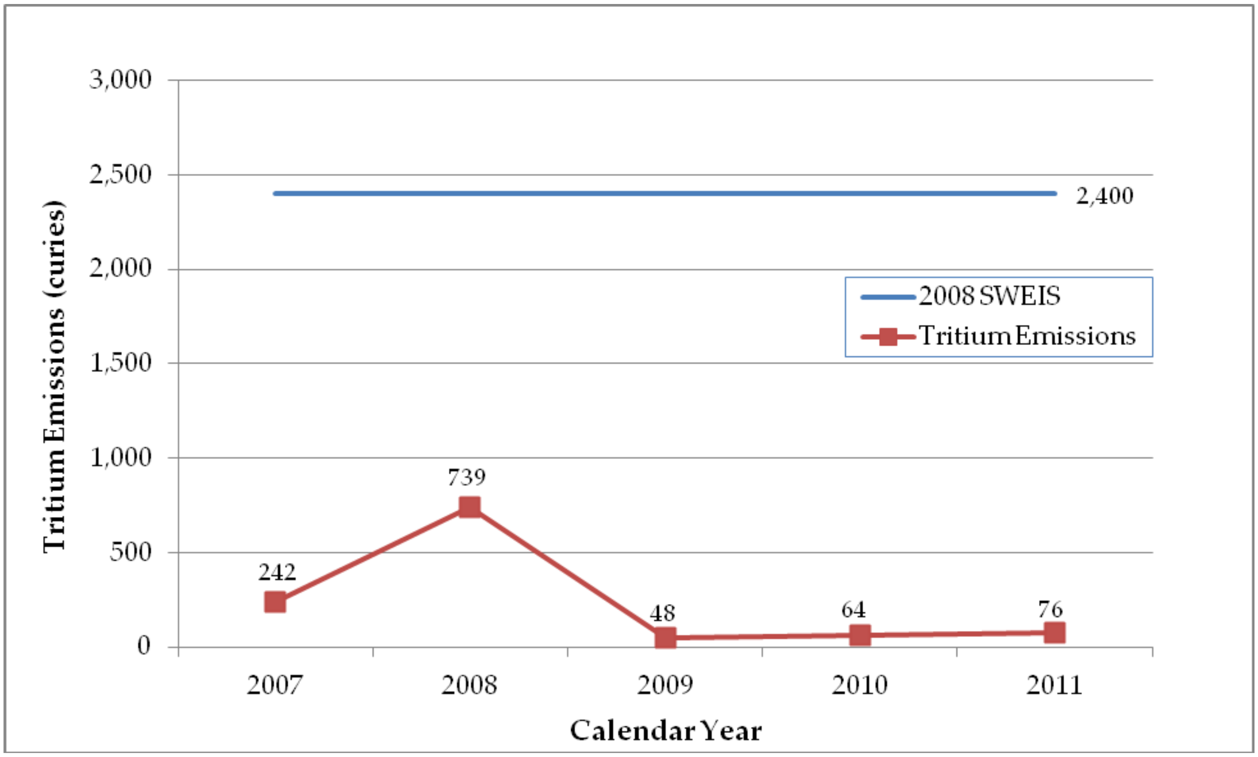

Figure 4-2. Tritium emissions from Key Facilities for CY 2007–2011

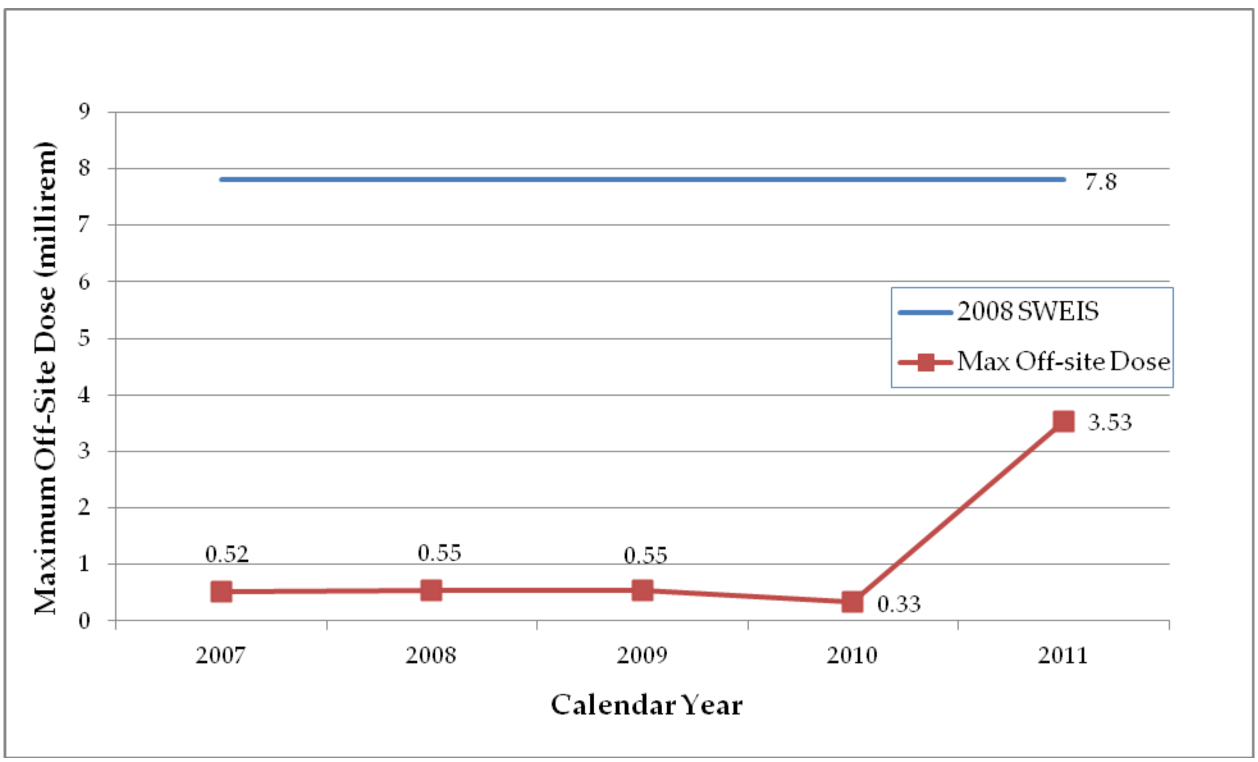

Figure 4-3. Estimates of maximum off-site dose to maximally exposed individual for CY 2007–2011

4.1.2 Non-Radiological Air Emissions

The Los Alamos area continues to be an attainment area for criteria air pollutants under the Clean Air Act. With a few exceptions, the annual emissions of criteria air pollutants from LANL operations from 2007 to 2011 remained within SWEIS projections for all four categories: CO (Figure 4-4), NOx (Figure 4-5), PM (Figure 4-6), and SOx (Figure 4-7). Although emissions in 2007 exceeded 2008 SWEIS projections, they did not exceed 1999 SWEIS projections, the parameter set for those emissions during that time. In 2011, SOx emissions exceeded SWEIS projections due primarily to the fact that a generator at TA-33 operated outside of the permitted hours (7 a.m. to 5 p.m.) for three days and for longer than eight hours for two of those three days in order to complete a project involving national security.

The 2008 SWEIS projections for VOCs and HAPs were expressed as concentrations rather than emissions; and therefore, direct comparisons cannot be made between collected data and the 2008 SWEIS limits. Total VOCs and HAPs estimated from LANL operations for CY 2007 to CY 2011 were expressed in tons per year (Figure 4-8).

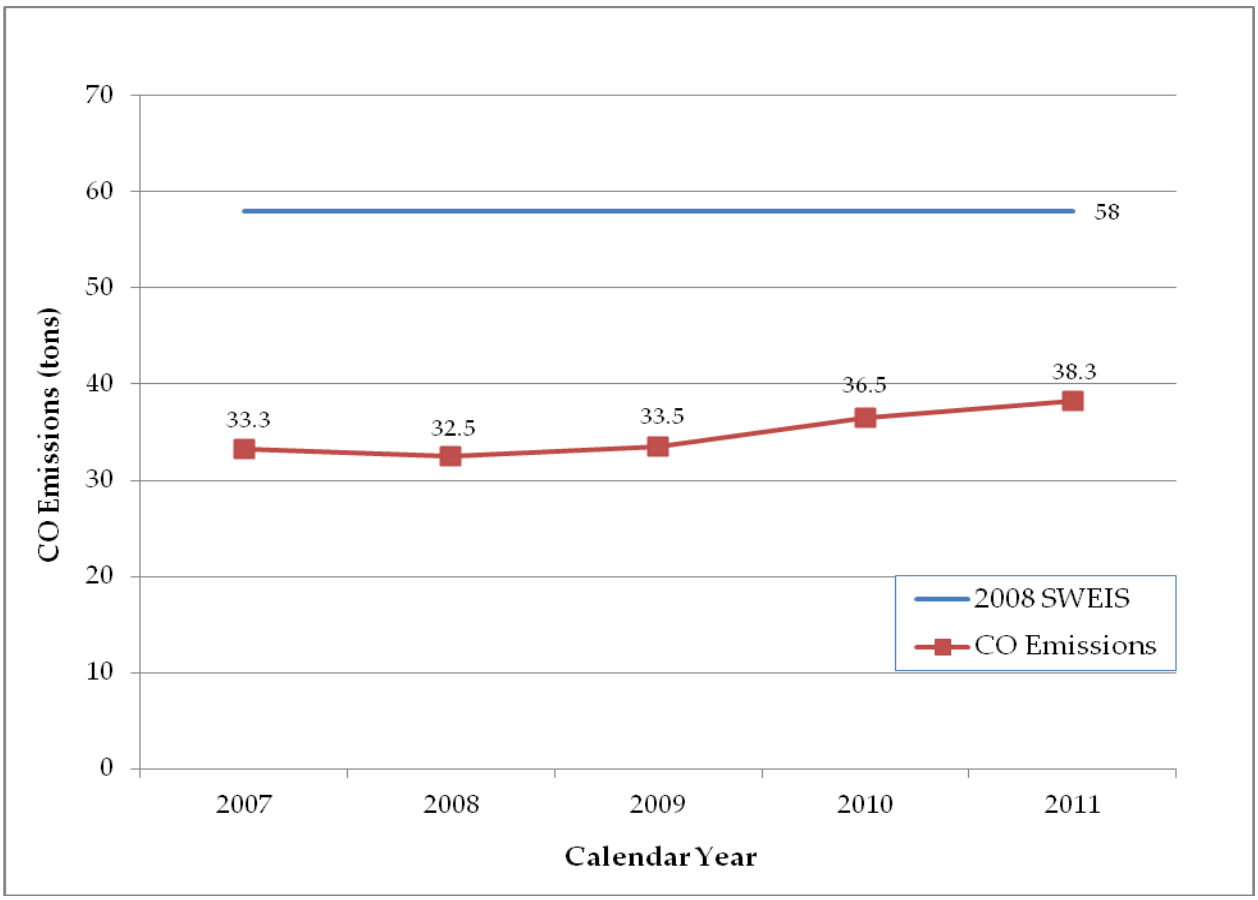

Figure 4-4. Carbon monoxide (CO) emissions for CY 2007–2011

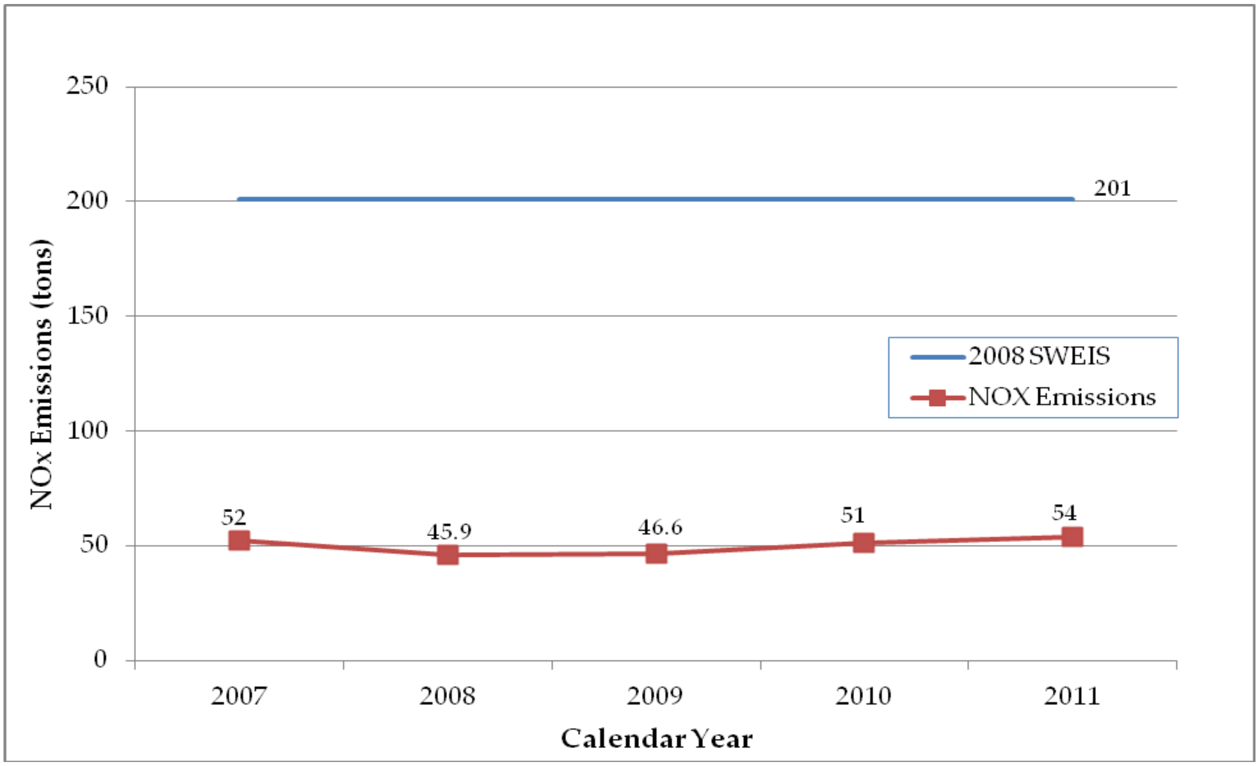

Figure 4-5. Nitrogen oxides (NOx) emissions for CY 2007–2011

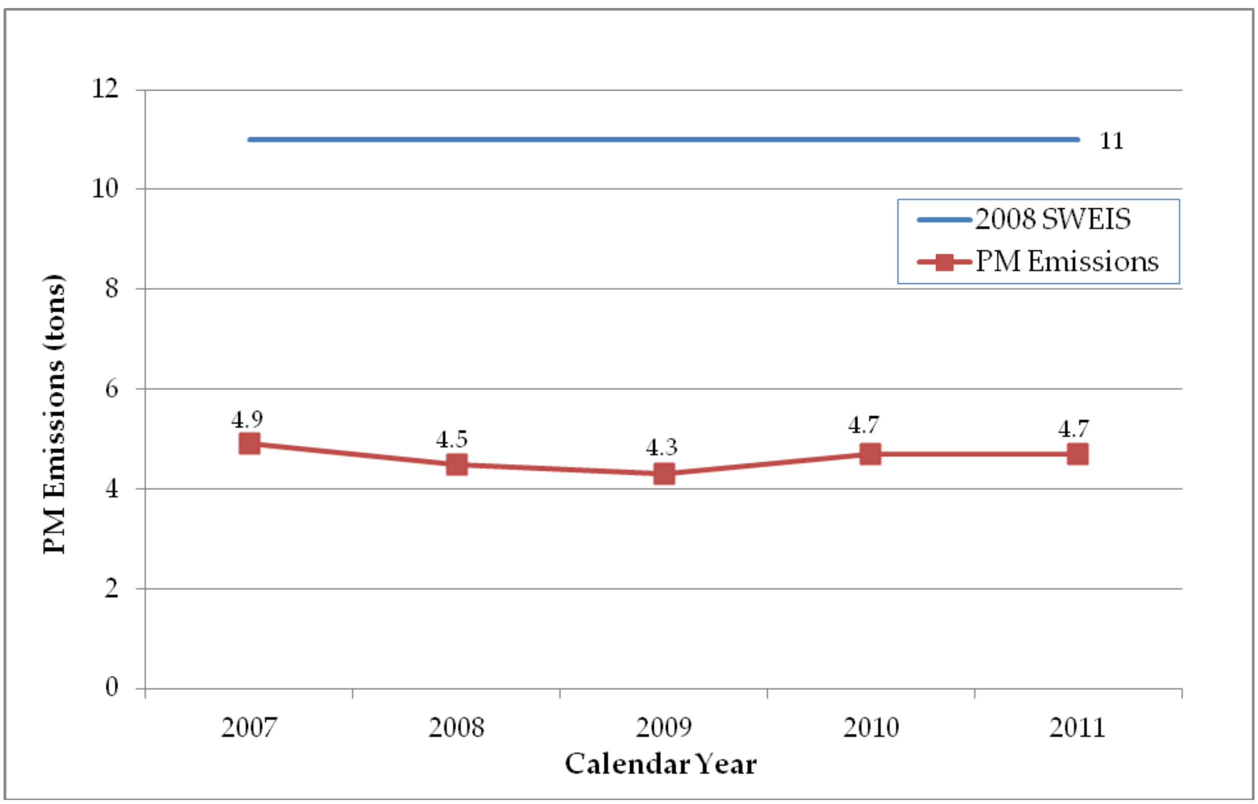

Figure 4-6. Particulate matter (PM) emissions for CY 2007–2011

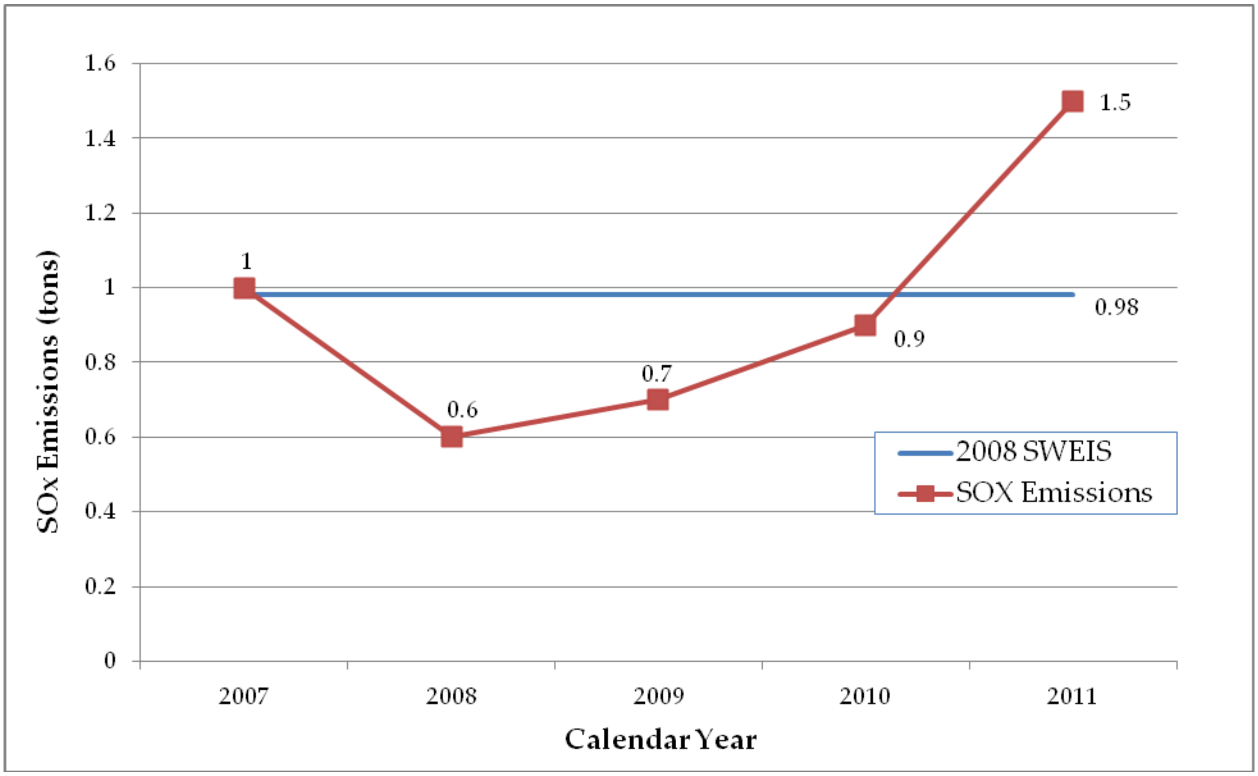

Figure 4-7. Sulfur oxides (SOx) emissions for CY 2007–2011

4.2 Liquid Effluents

The 2008 SWEIS assumed that reducing outfall volumes would result in improved surface water quality since fewer contaminants would be discharged. The number of permitted outfalls at LANL decreased from 21 in January 2007 to 15 in August 2007 to 11 in October 2011. From 2007 to 2011, NPDES total discharge decreased by approximately 8 percent (Figure 4-9).

The 2008 SWEIS also assumed that water treatment improvements at the RLWTF and at HEWTF would contribute to higher surface water quality. From 2007 to 2011, the effluent volumes at RLWTF were reduced. Effective August 2010, new EPA standards for the discharge of treated water at RLWTF became more restrictive. Alternative strategies for the treated water were implemented. In 2010, treated water was evaporated in cooling towers at TA-50 while some treated water was trucked to TA-53 to be evaporated in the evaporation basins. At HEWTF, a new evaporator system was installed, and there have been no discharges through the outfall since 2007. Although effluent volumes at LANSCE and the Metropolis Center have been treading upward, LANL's Outfall Reduction Program continues to make improvements to significantly reduce discharges site-wide (Figure 4-10).

4.3 Solid Radioactive and Chemical Wastes

Total solid radioactive and chemical waste generation was below quantities projected by the 2008 SWEIS from CY 2007 to CY 2011. This waste includes EP waste; waste from exhumation of materials placed into the environment during the early history of LANL, and newly created waste from routine operations. EP wastes are typically shipped off site for disposal at EPA-certified waste treatment, storage, and disposal facilities and do not impact the local environment. As a result of the uncertainty in EP waste estimates and differences in the SWEIS projections for EP versus routine waste, totals for LANL waste generation both with and without the EP are presented in this Trend Analysis.

Chemical Waste. Figure 4-11 compares the total LANL chemical waste generation from CY 2007 to CY 2011 to the 2008 SWEIS projections. Figure 4-12 compares EP chemical waste generation from CY 2007 to CY 2011 to the 2008 SWEIS projections; and Figure 4-13 compares non-EP, routine chemical waste generation from CY 2007 to CY 2011 to the 2008 SWEIS projection. In CY 2010, non-EP chemical waste exceeded 2008 SWEIS projections due primarily to the start of the DD&D of the former Administration Building (TA-03-0043).

Low-Level Waste. Total LLW (Figure 4-14), EP LLW (Figure 4-15), and Non-EP LLW (Figure 4-16) generation from CY 2007 to CY 2011 fell well below 2008 SWEIS projections.

Mixed Low-Level Waste. Total MLLW and EP MLLW generation for CY 2007 to CY 2011 fell well below 2008 SWEIS projections (Figures 4-17 and 4-18). The largest amount of total MLLW generated was 113.9 cubic meters, which is less than one percent of the SWEIS projection for that year (CY 2010). In CY 2007 and CY 2010, SWEIS projections were exceeded for non-EP MLLW generation due to contaminated soil and asphalt generated by construction activities (CY 2007) and a legacy waste clean-out in order for the Facility Operations Director (FOD) to bring TA-03-0016 into compliance and a cold and dark status (CY 2010) (Figure 4-19).

TRU and Mixed TRU Waste. Total, EP, and Non-EP TRU and mixed TRU waste generation (Figures 4-20, 4-21, and 4-22) remained within the projections of the 2008 SWEIS for CY 2007 to CY 2011.

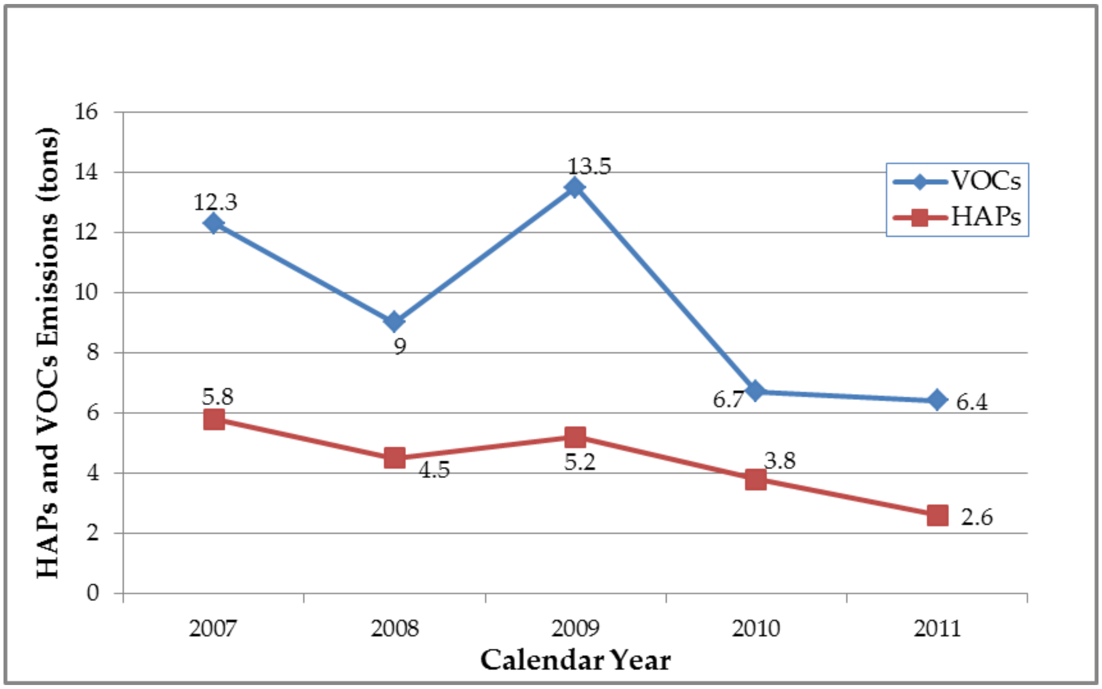

Figure 4-8. Emissions of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) for CY 2007–2011

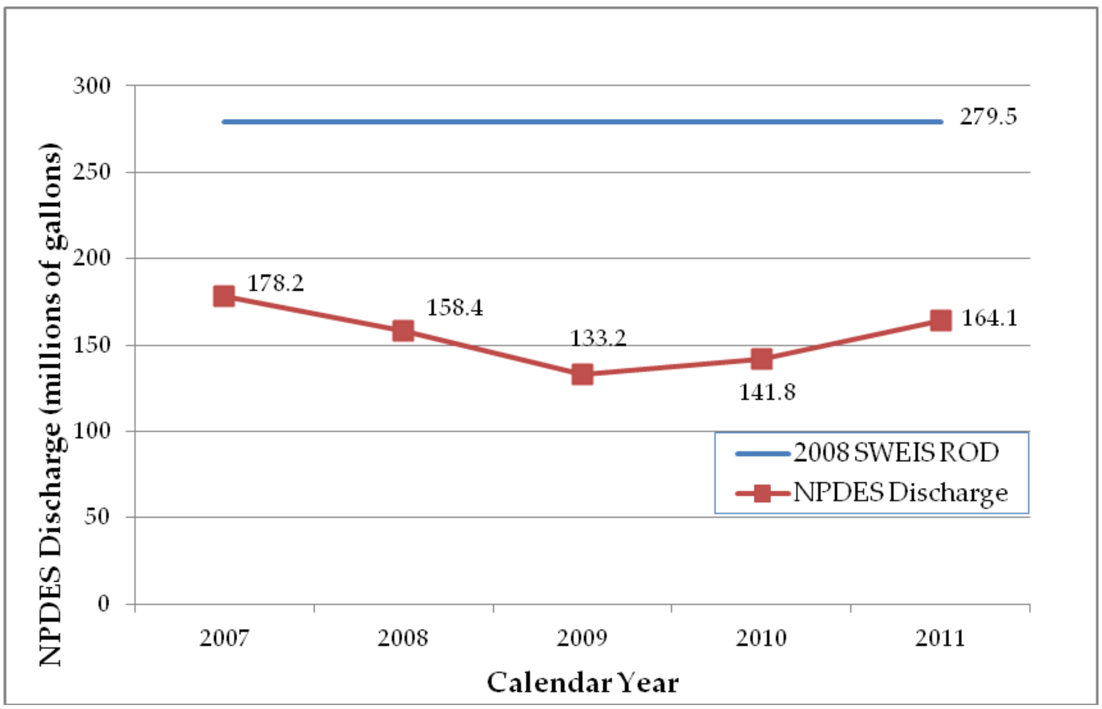

Figure 4-9. NPDES total discharge for CY 2007–2011

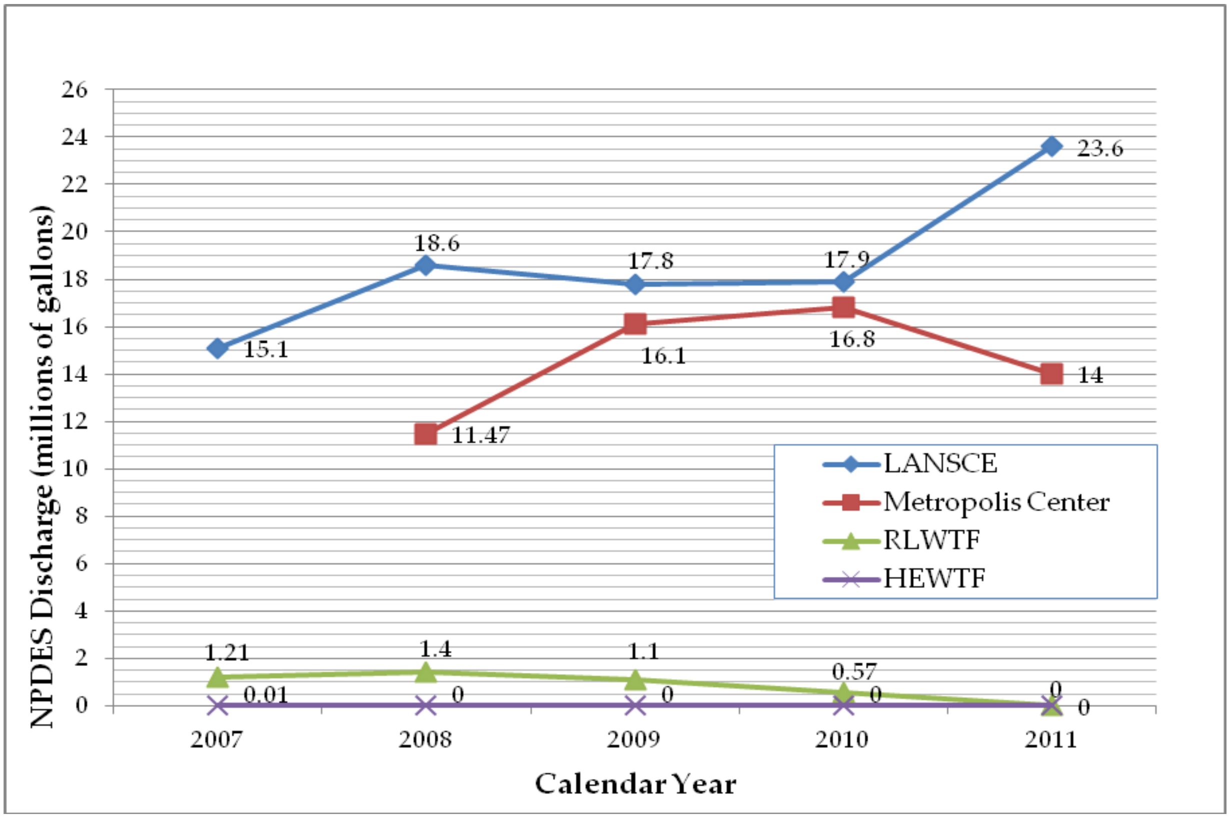

Figure 4-10. NPDES discharges by facility for CY 2007–2011

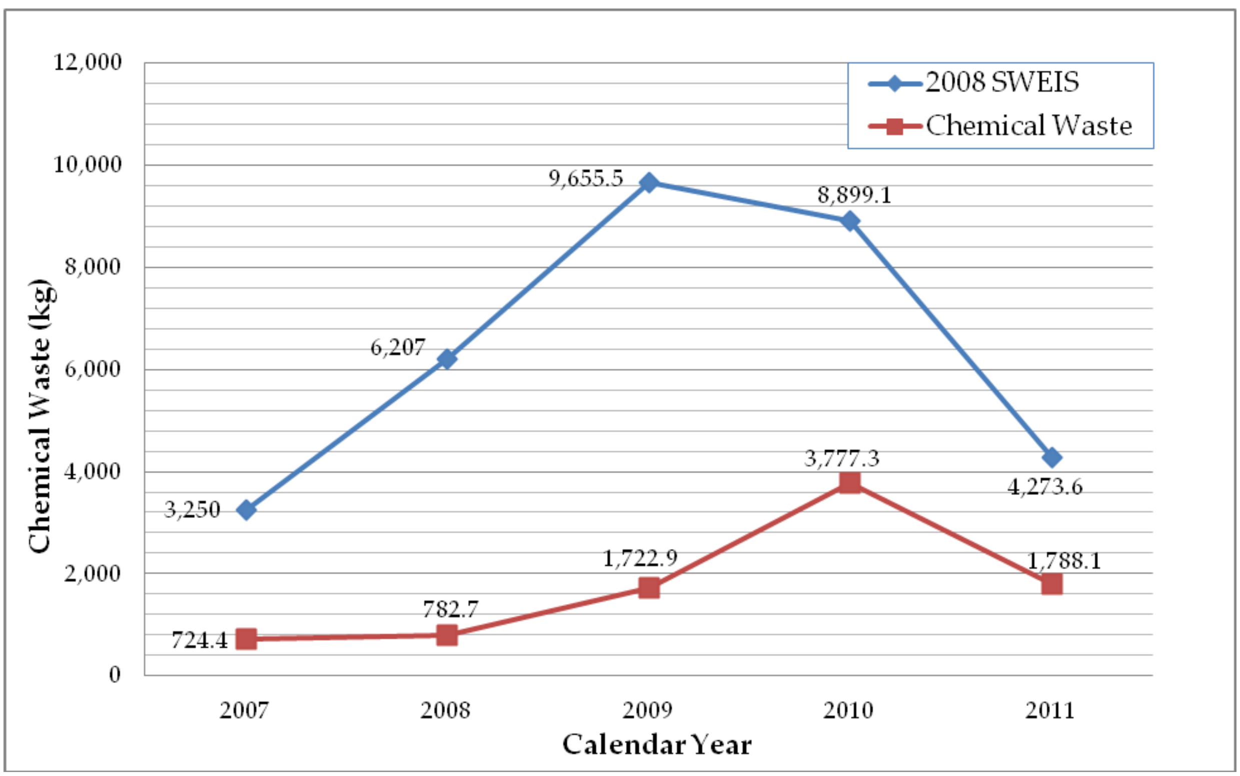

Figure 4-11. LANL Total chemical waste generation for CY 2007–2011

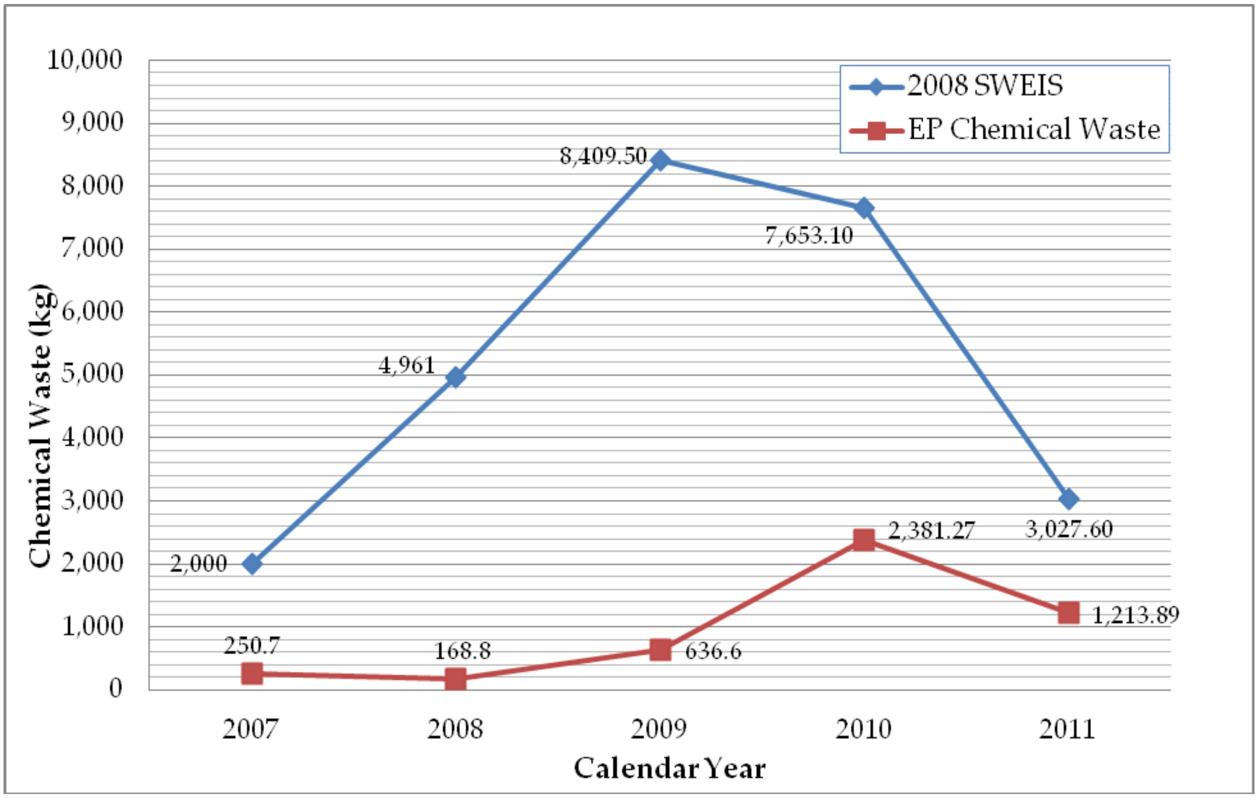

Figure 4-12. EP Chemical waste generation for CY 2007–2011

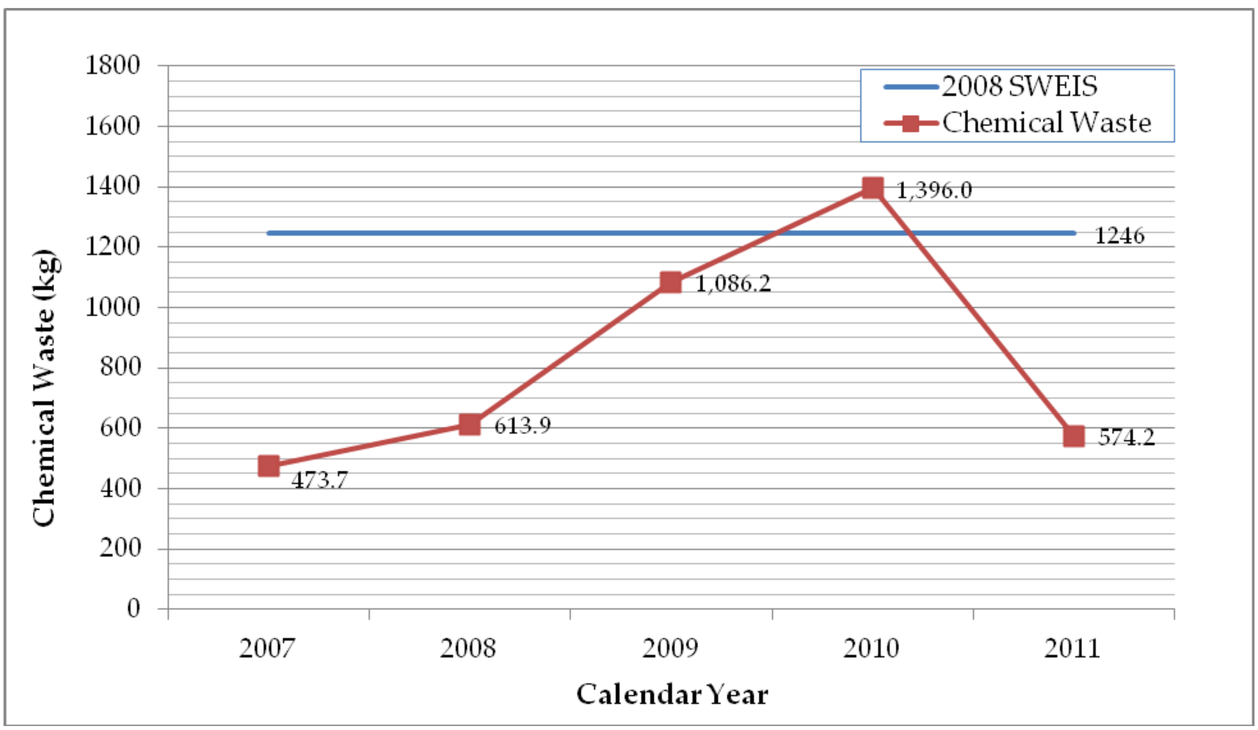

Figure 4-13. Non-EP Chemical waste generation for CY 2007–2011

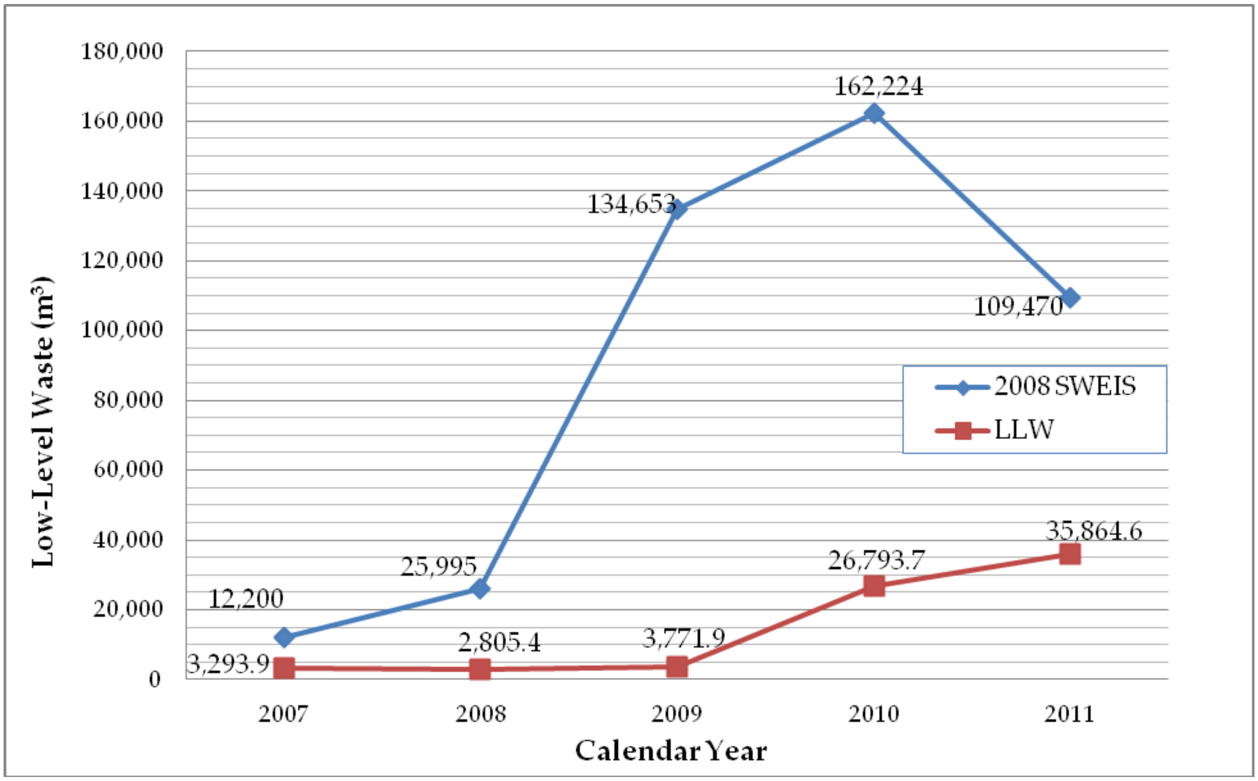

Figure 4-14. LANL total low-level waste generation for CY 2007–2011

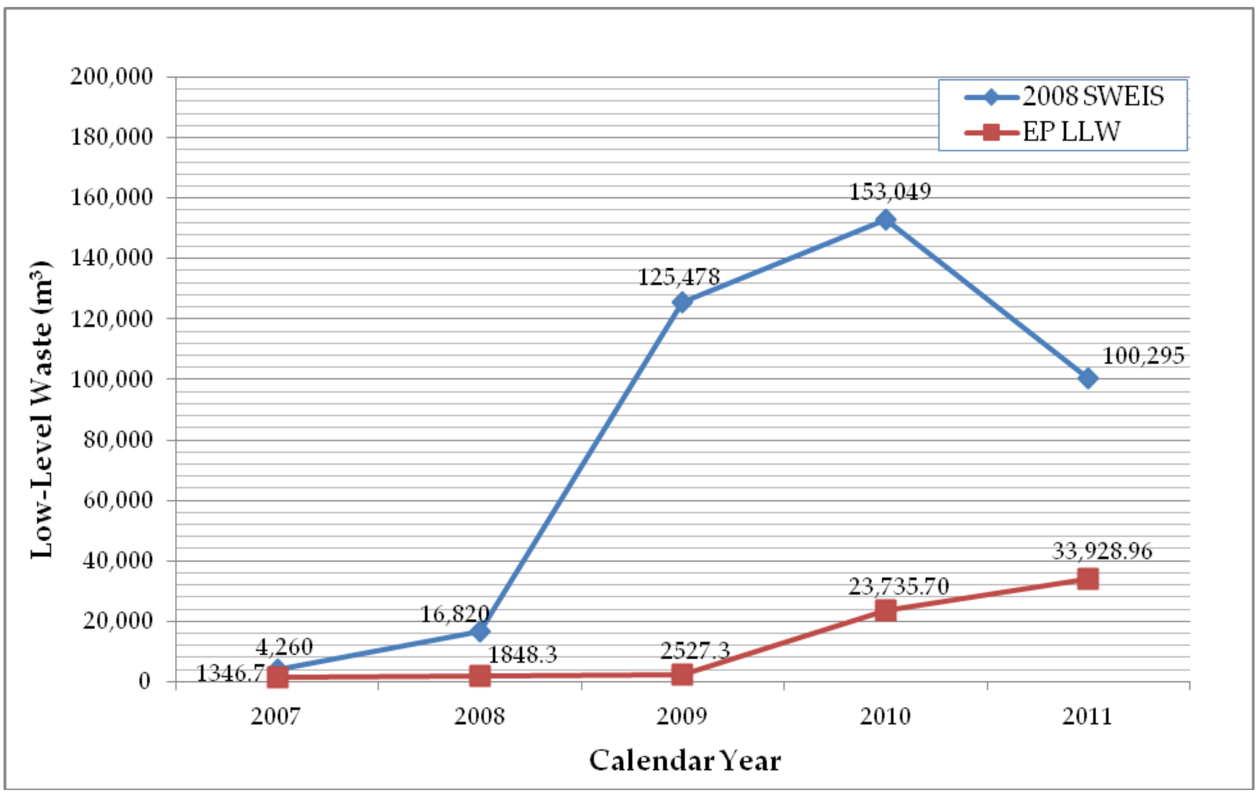

Figure 4-15. EP low-level waste generation for CY 2007–2011

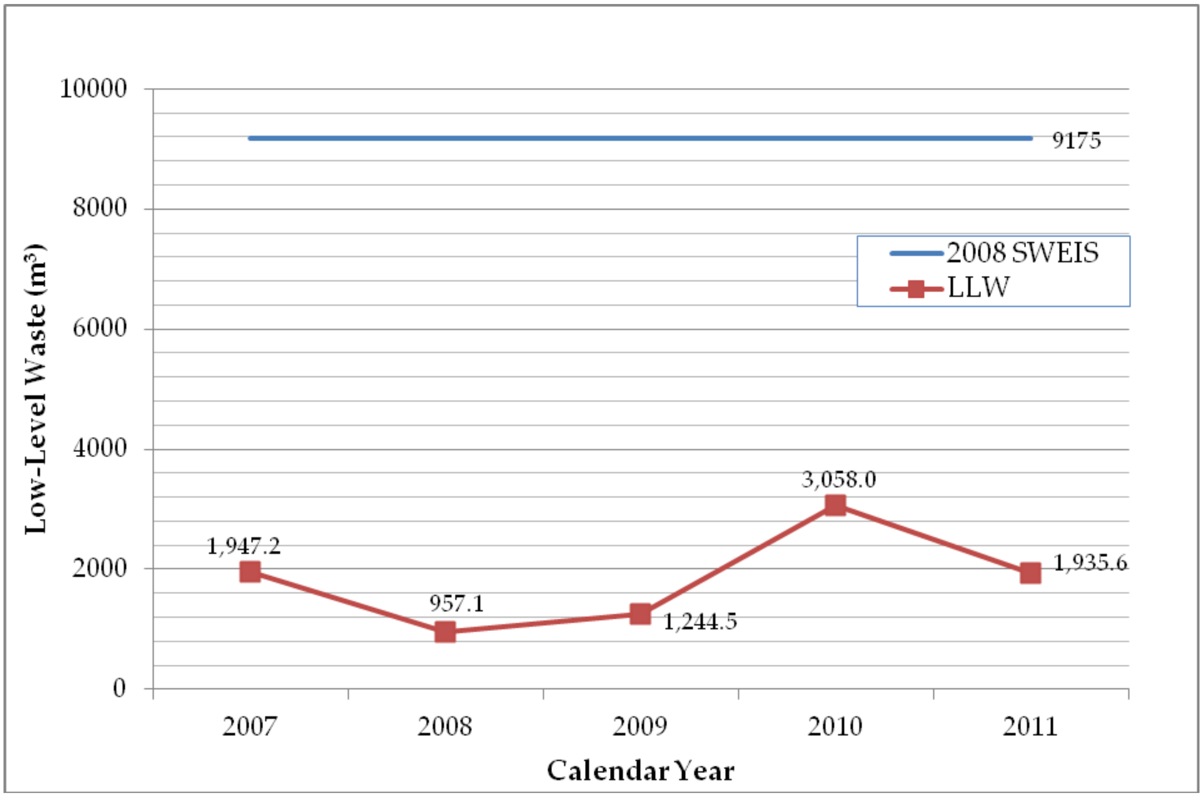

Figure 4-16. Non-EP low-level waste generation for CY 2007–2011

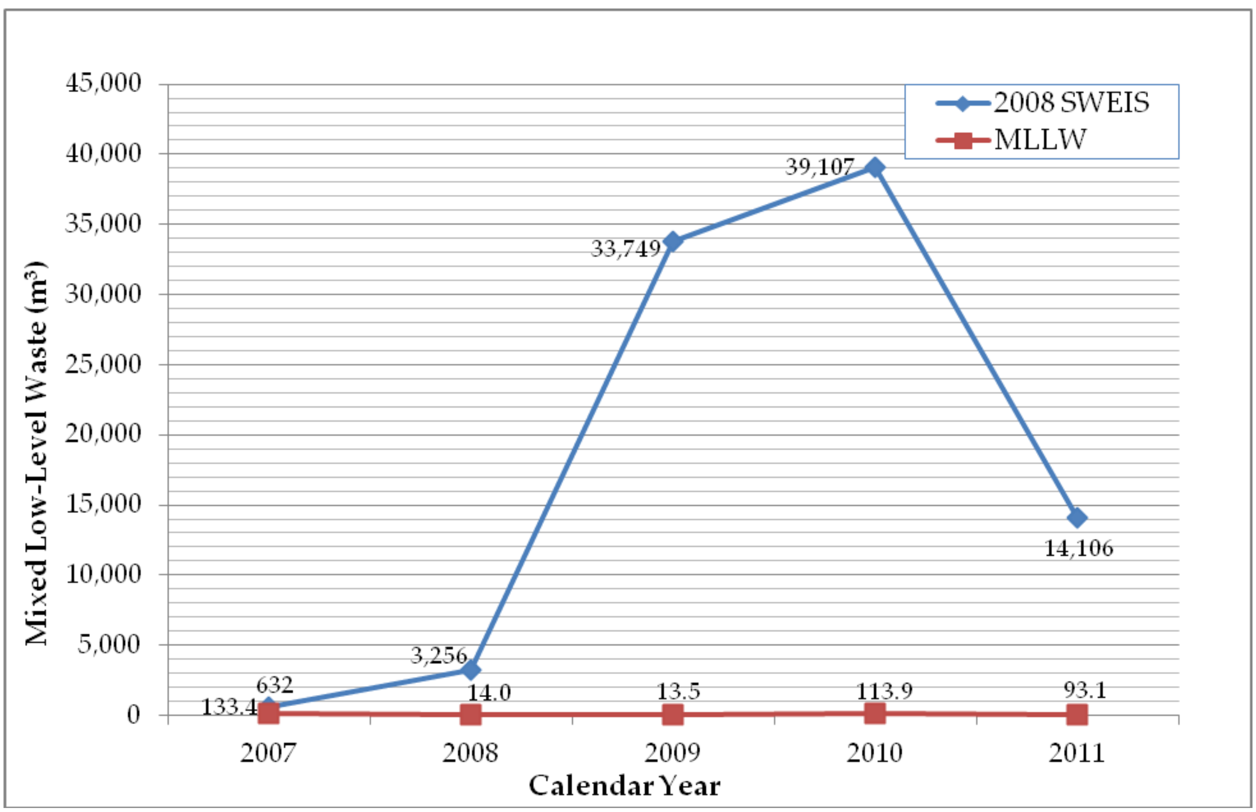

Figure 4-17. LANL total mixed low-level waste generation for CY 2007–2011

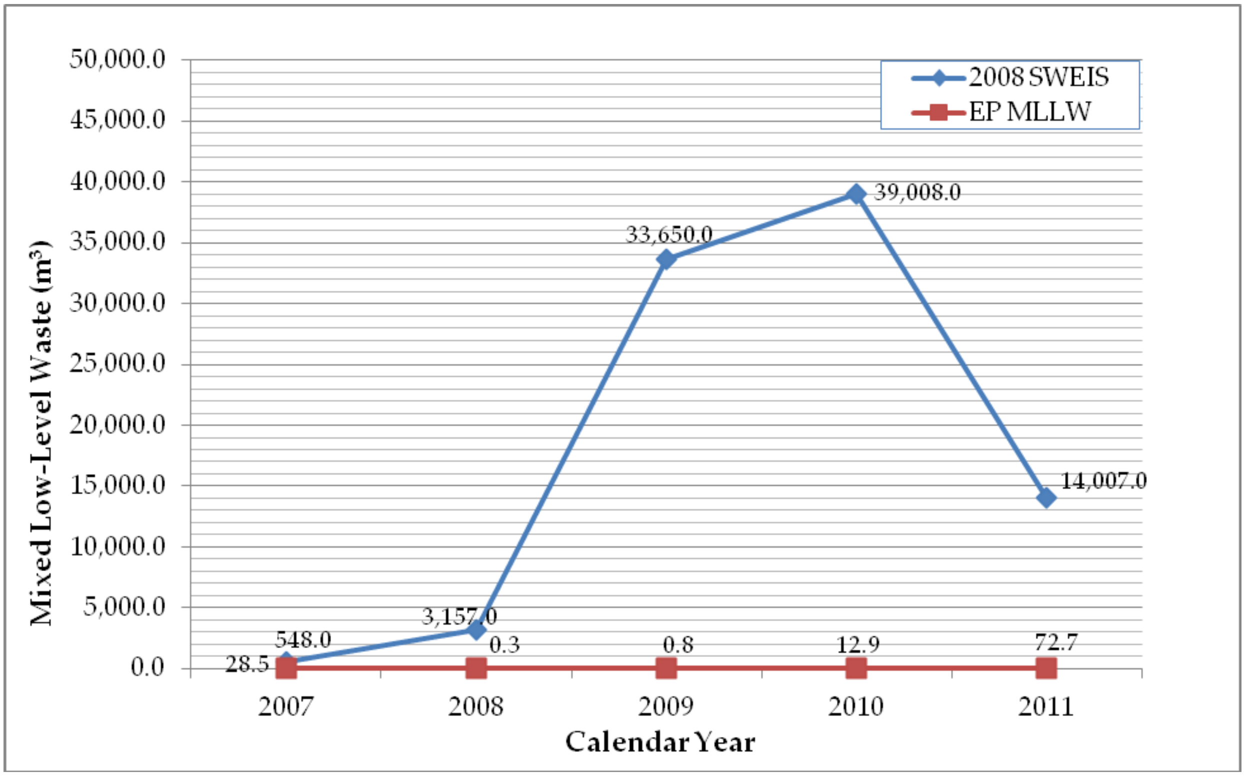

Figure 4-18. EP mixed low-level waste generation for CY 2007–2011

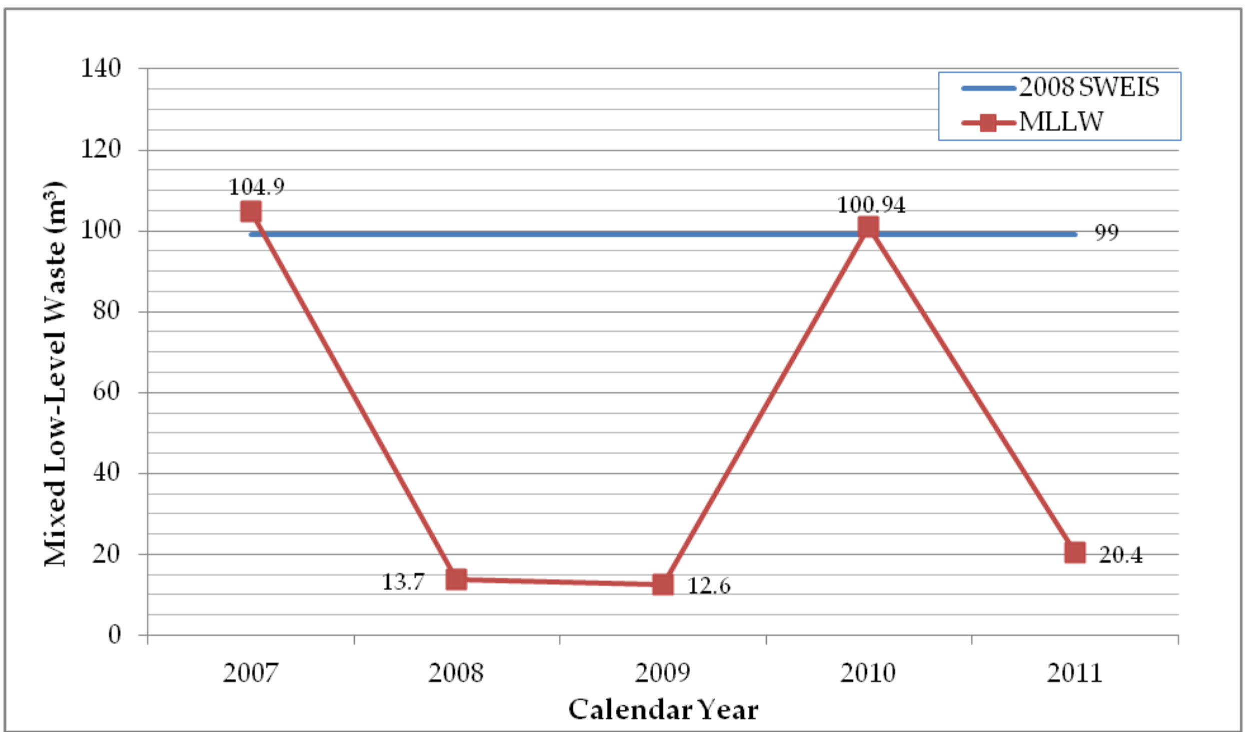

Figure 4-19. Non-EP mixed low-level waste generation for CY 2007–2011

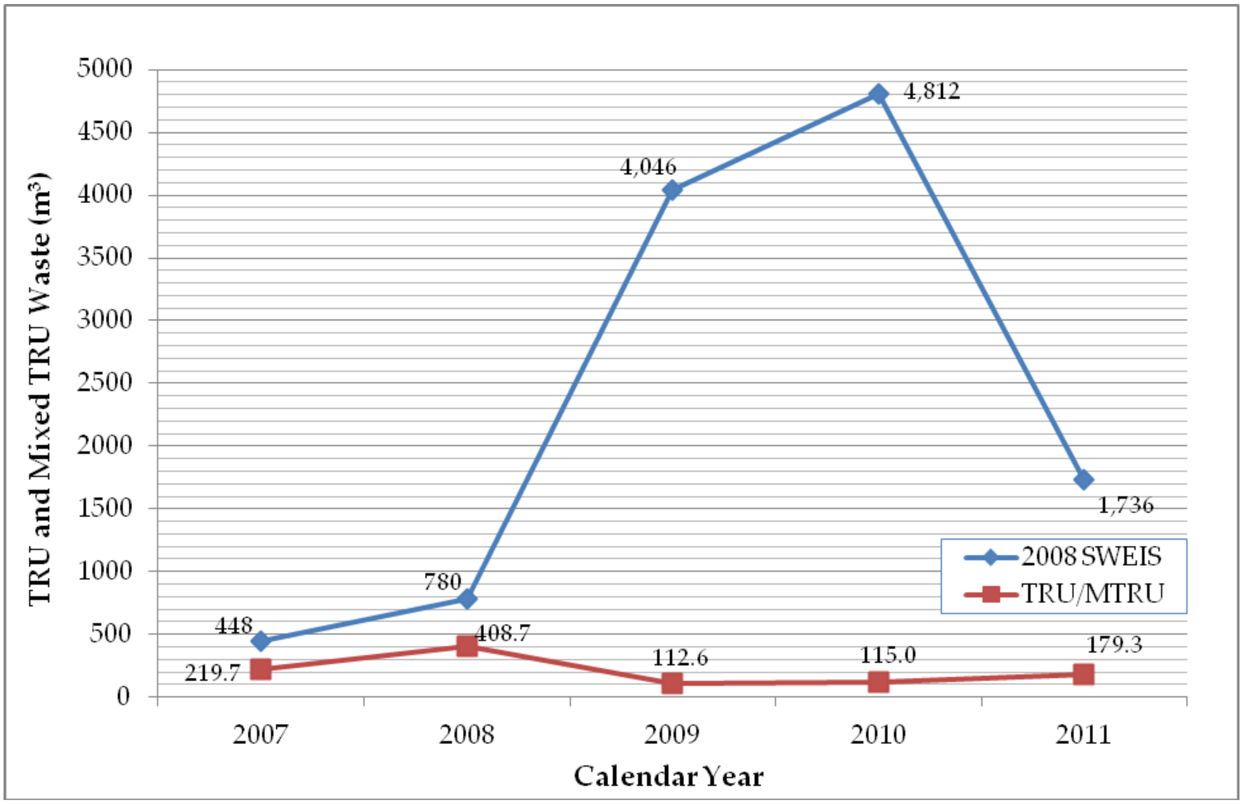

Figure 4-20. LANL total TRU and mixed TRU waste generation for CY 2007–2011

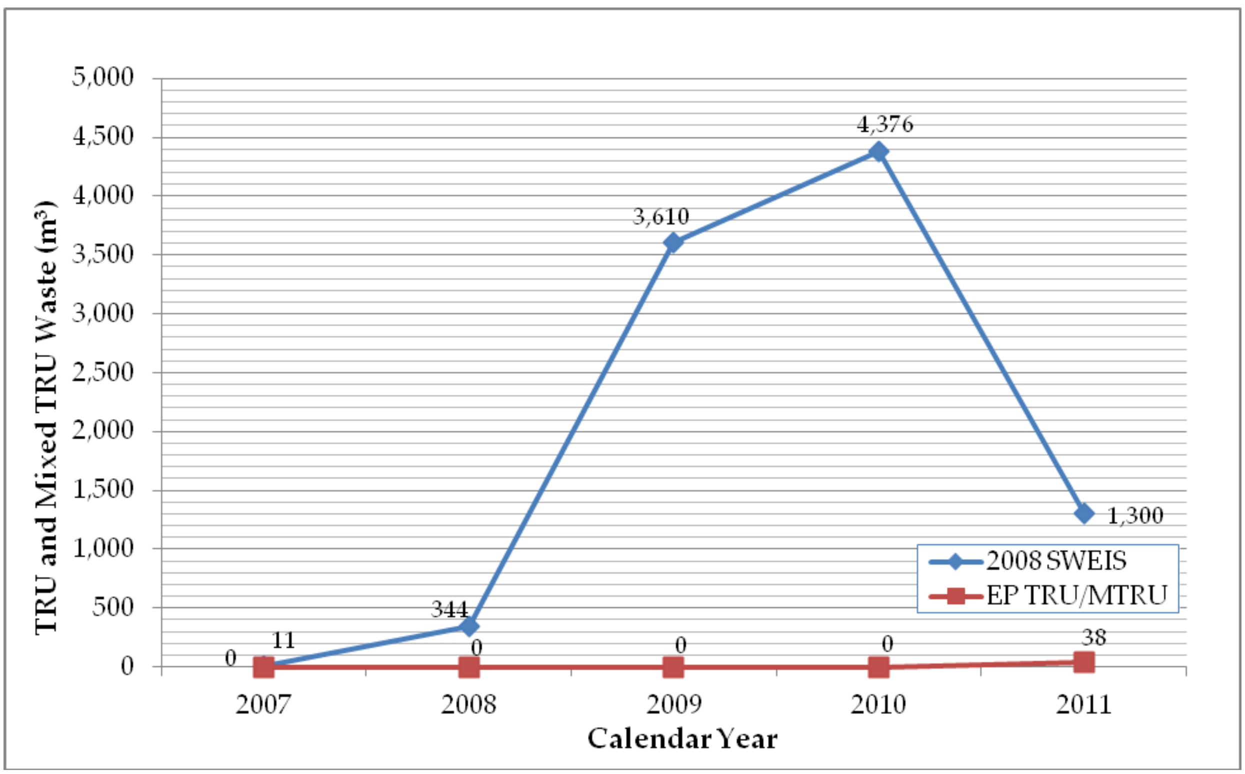

Figure 4-21. EP TRU and mixed TRU waste generation for CY 2007–2011

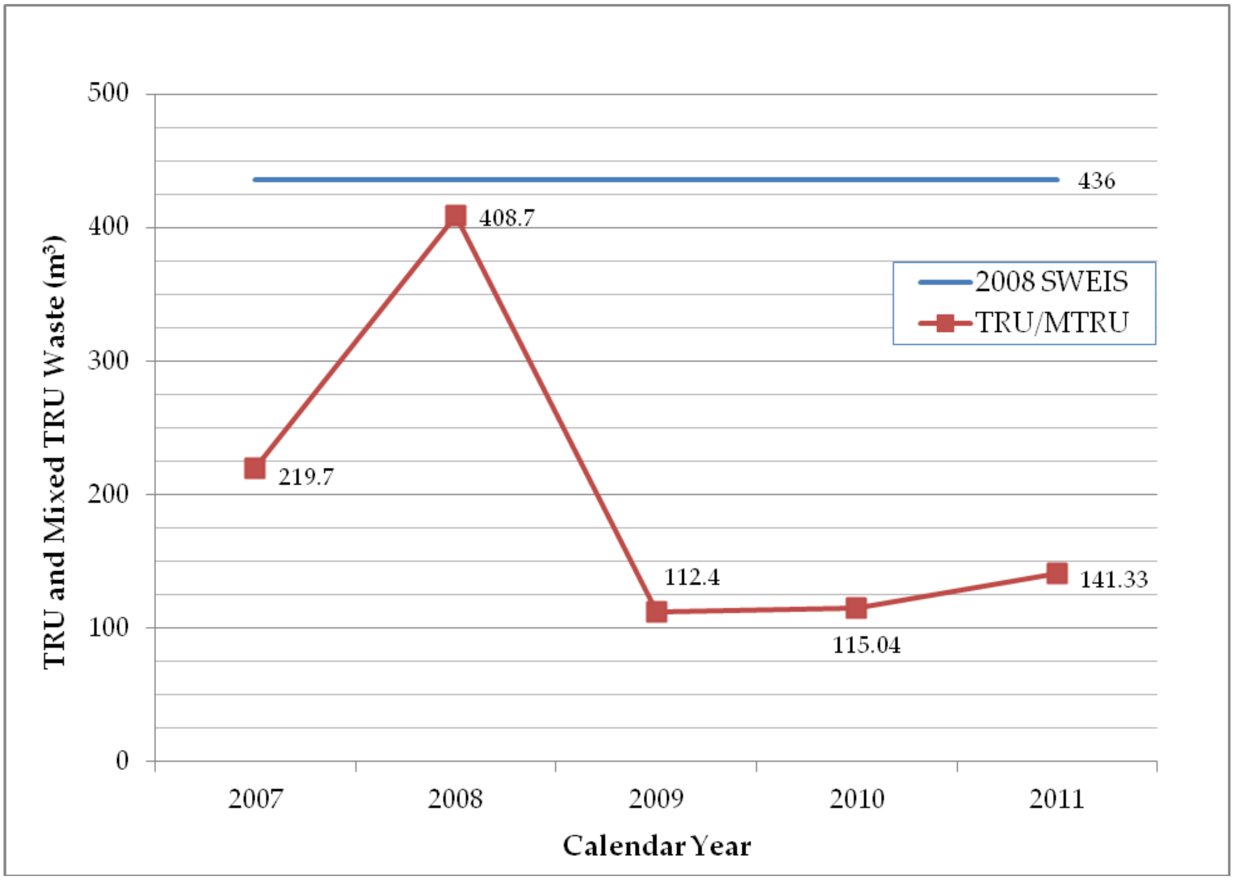

Figure 4-22. Non-EP TRU and mixed TRU waste generation for CY 2007–2011

4.4 Utilities Consumption

Consumption of electricity, water, and gas is not additive in the same context as waste generation. Rather, consumption of these commodities is restricted by contract and is compared to the 2008 SWEIS projections for annual consumption. Section 3.4 presents three types of utility consumption: gas, electricity, and water (Figures 4-23, 4-24, and 4-25).

In the 2008 SWEIS No Action Alternative, the total utility consumption projections were reduced to a number closer to the average utility consumption for the six years analyzed. For example, the 1999 SWEIS projection for annual water consumption was 759 million gallons compared to the significantly reduced 2008 SWEIS projection of 417 million gallons. From CY 2007 to CY 2011, gas and electricity consumption did not exceed 2008 SWEIS projections. Gas consumption decreased by about 5 percent, while electricity consumption increased by about 4 percent. Water consumption, on the other hand, exceeded 2008 SWEIS projections by 10 million gallons (approximately 2 percent) in CY 2011 and increased by about 22 percent from CY 2007 to CY 2011.

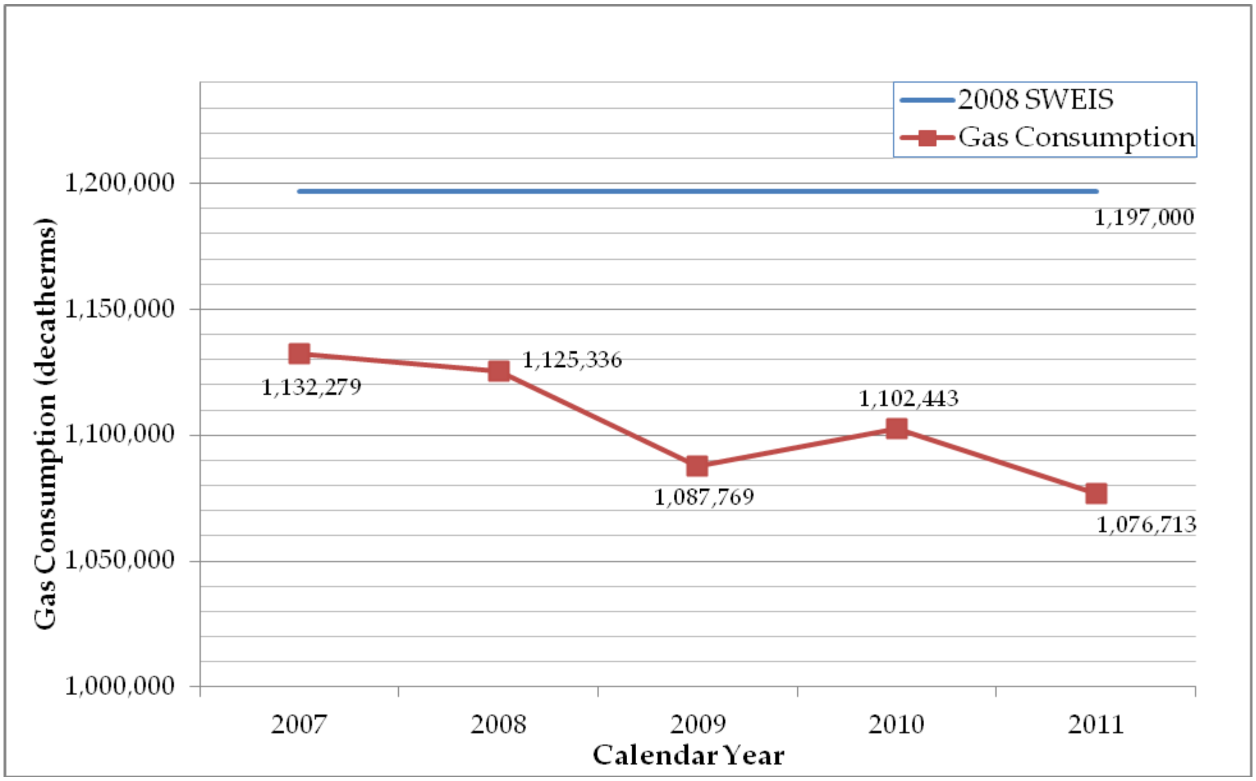

Figure 4-23. Gas consumption for CY 2007–2011

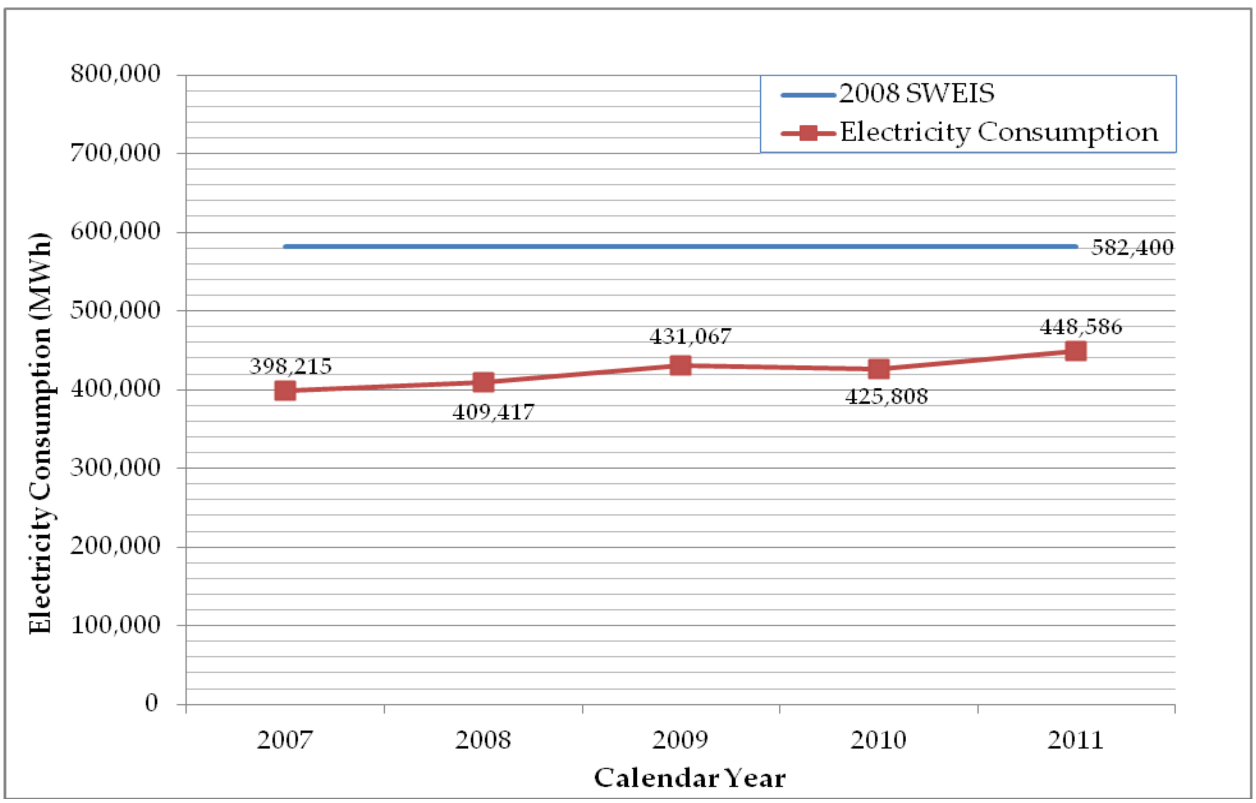

Figure 4-24. Electricity consumption for CY 2007–2011

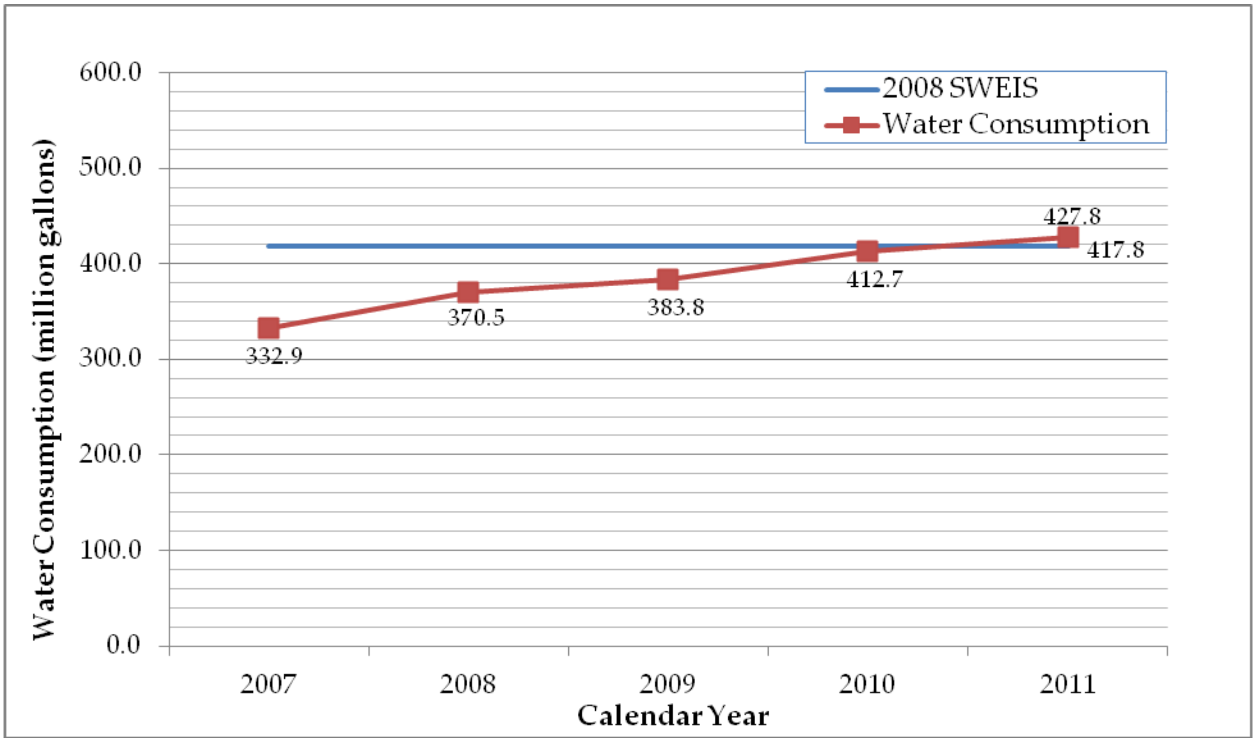

Figure 4-25. Water consumption for CY 2007–2011

4.5 Worker Safety

Working conditions at LANL have remained essentially the same as those identified in the 2008 SWEIS. More than half the workforce remains routinely engaged in activities that are typical of office and computing industries. Much of the remainder of the workforce is engaged in light industrial and bench-scale research activities.

The 2008 SWEIS projected an average of 2.04 TRC and 1.18 DART. These rates correlate to reportable injuries and illnesses during the year for 200,000 hours worked. From CY 2007 to CY 2011, the occupational injury and illness rates for workers continued to be small (Figures 4-26 and 4-27).

Radiological exposures to LANL workers are well below the levels projected by the 2008 SWEIS. There is some variation from year to year, but in no case are the doses more than the 2008 SWEIS projected levels (Figure 4-28).

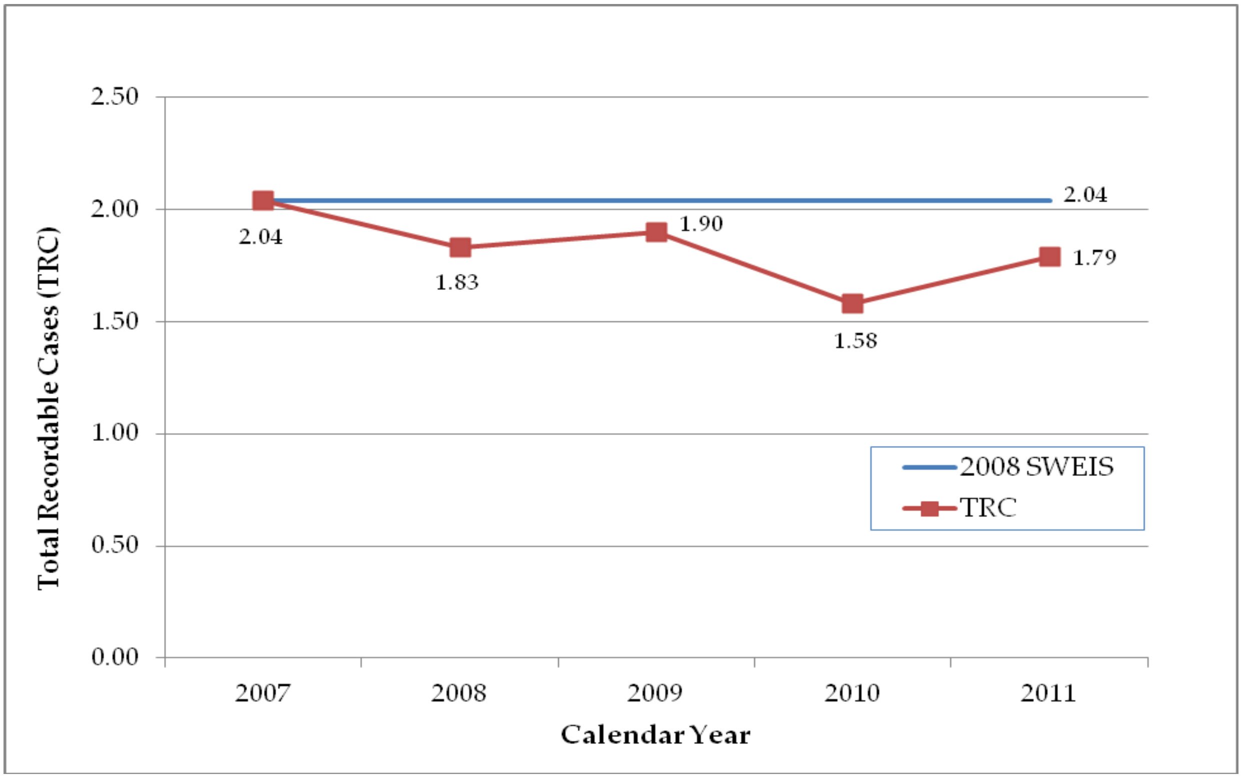

Figure 4-26. Total recordable cases (TRC) for CY 2007–2011

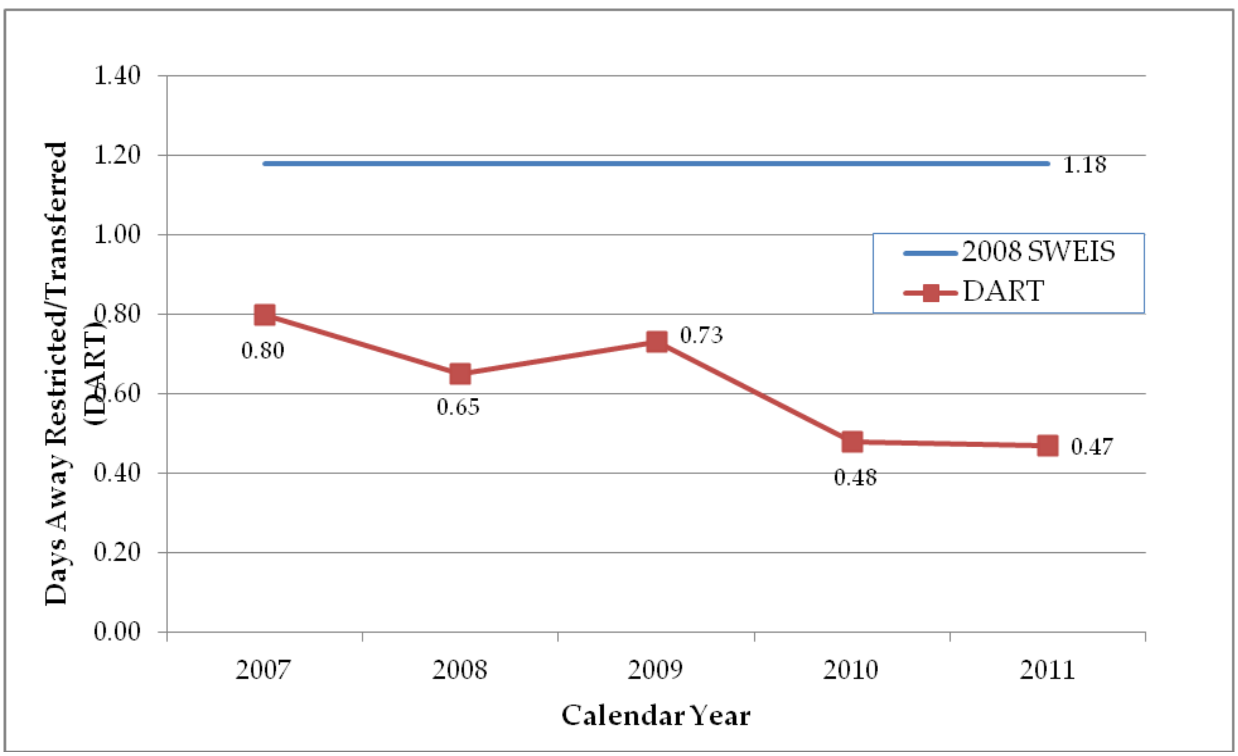

Figure 4-27. Days away, restricted, or transferred (DART) for CY 2007–2011

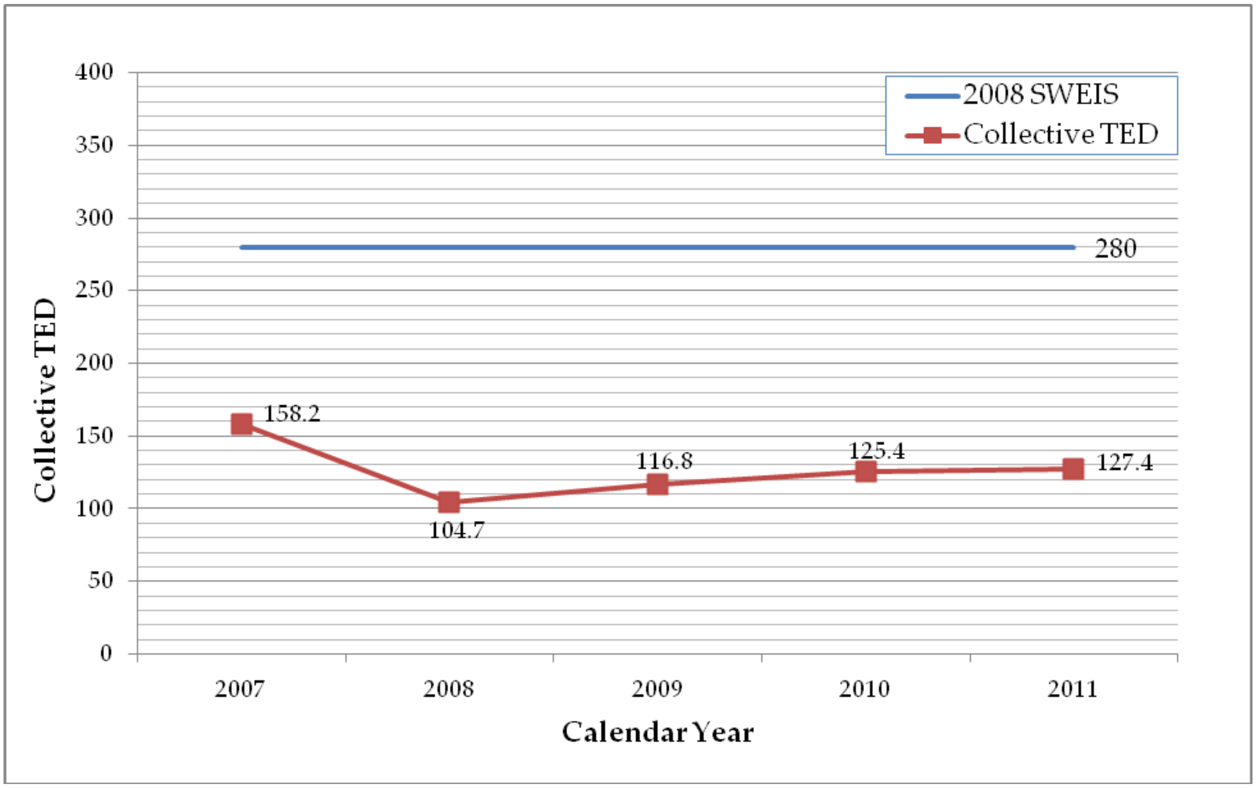

Figure 4-28. Radiological exposure to LANL workers for CY 2007–2011

4.6 Socioeconomics

The 2008 SWEIS projected a workforce of 13,504 persons. Since 2007, the size of the workforce has remained below what was projected in the 2008 SWEIS and has been fairly consistent, varying by a maximum of 731 employees. Beginning in CY 2007, LANL announced a voluntary separation program (VSP) in an effort to reduce the number of LANL employees. During the VSP, 570 employees voluntarily retired from LANL. Then in December 2008, a significant number of KSL employees were converted to LANS employees. Since 2008, the number of employees has been slowly increasing with the highest number of employees for the last five years in CY 2011 (Figure 4-29). These employees have had a positive economic impact on Northern New Mexico.

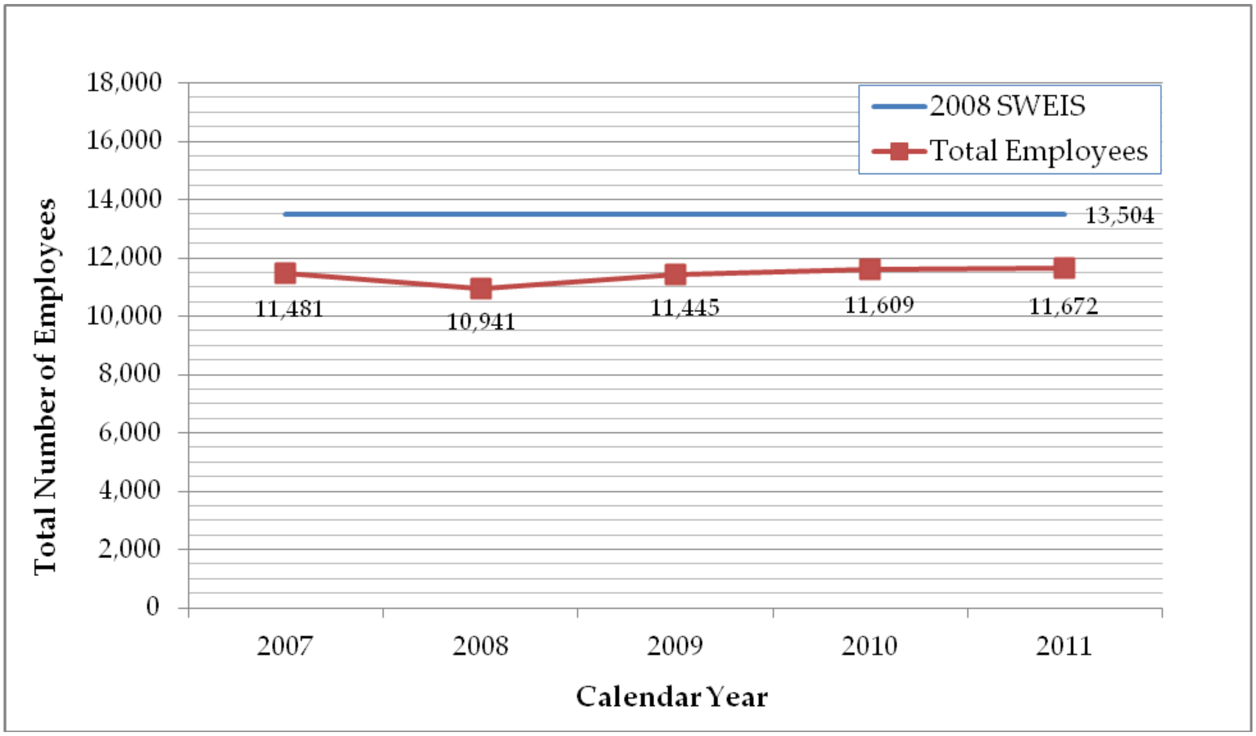

Figure 4-29. Total number of employees for CY 2007–2011

4.7 Environmental Effects of Operations

LANL operations over the past five years have fallen for the most part below the 1999 and 2008 SWEIS projections. Environmental effects of operations levels that exceeded the SWEIS levels, with the exception of utilities, were one-time, non-routine events that do not represent the day-to-day operations of the Laboratory (chemical waste exceedance in CY 2010 for the demolition of the Old Administration Building and mixed low-level waste exceedance in CY 2010 from a legacy cleanup project).

Utility consumption during the past five years has been trending upward. Although gas and electricity consumption have remained within the lowered 2008 SWEIS projections, water consumption exceeded the 2008 SWEIS projections by 10 million gallons in CY 2011. DOE/NNSA is committed to reducing energy and water consumption and will continue to make improvements towards that goal in the future. Energy reduction initiatives like night setbacks, lighting retrofits, HVAC upgrades and High Performance Sustainable Buildings (HPSB) are being implemented. In addition, improvements to the SERF-E in CY 2012 are expected to lead to increased use of recycled effluent in the cooling towers at the Metropolis Center in CY 2013, therefore significantly reducing the amount of potable water consumed. Details can be found in LANL's Site Sustainability Plan (LANL 2011a)

5.0 Summary and Conclusion

This Yearbook reviews CY 2011 operations for the 15 Key Facilities (as defined by the SWEIS) and the Non-Key Facilities at LANL and compares those operations to levels projected by the 2008 SWEIS. The Yearbook also reviews the environmental effects associated with operations at the Key Facilities and the Non-Key Facilities and compares these data with 2008 SWEIS projections. In addition, the Yearbook presents a number of site-wide effects of those operations and environmental parameters.

The 2008 SWEIS No Action Alternative and approved elements of the Expanded Operations Alternative projected a total of 15 facility construction and modification projects within the Key Facilities. During 2011, six construction/modification projects were undertaken:

- Electrical and mechanical systems were expanded to meet new computer requirements at the Nicholas C. Metropolis Center;
- Construction of the RLUOB continued at TA-55;
- The NMSSUP continued at TA-55;
- The TRP construction continued;
- Construction of evaporation tanks at TA-52 for the RLWTF was started; and
- Construction of the LANSCE WNR NS2 began.

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

- Construction of the Photovoltaic Array Reuse of Los Alamos County Landfill began in December;
- Construction of the SERF-E began in May; and
- Construction of the Indoor Firing Range began in September.

During CY 2011, 79 capabilities were active and 11 capabilities were inactive at LANL's Key and Non-Key Facilities. At the CMR Key Facility, Destructive and Nondestructive Analysis, Nonproliferation Training, and Large Vessel Handling capabilities were not active. No High-Pressure Gas Fills and Processing, Diffusion and Membrane Purification, Hydrogen Isotopic Separation, or Radioactive Liquid Waste Treatment took place at the Tritium Facilities. MTS equipment was not installed at LANSCE. No Waste Retrieval, Waste Treatment, or Decontamination Operations took place at SRCW Facilities.

During CY 2011, operation levels for four LANL facilities exceeded the 2008 SWEIS capability projections – LANSCE, MSL, Radiochemistry, and SRCW.

LANSCE exceeded SWEIS projection levels for the capability of treatment of radioactive liquid waste due to contributions of radioactive liquid waste received from RLWTF and from the TA-21 remediation work. MSL exceeded operation level projections in the SWEIS for the capability of Mechanical Behavior in Extreme Environments. Although both facilities also exceeded chemical waste generation quantities, this was due to one-time, non-routine events that were not associated with increases in capability levels.

Radiochemistry Facilities conducted radionuclide transport studies at levels twice the number projected in the 2008 SWEIS and increased isotope off-site shipments by 20 percent compared to levels projected in the 2008 SWEIS. However, radioactive air emissions, outfall discharge, and waste quantities were well below SWEIS projections for both of these Key Facilities.

The SRCW Facility exceeded operation level projections in the SWEIS for the capability of Waste Transport, Receipt, and Acceptance. Mixed low-level radioactive waste (MLLW) shipped for off-site treatment and disposal exceeded the 2008 SWEIS projections by 5 cubic meters. This was due to the unexpected receipt of 37 cubic meters of MLLW from the TA-21 decontamination, decommissioning, and demolition (DD&D)/Remediation project.

In CY 2011, the following facilities exceeded their chemical waste projections in the 2008 SWEIS due to one-time, non-routine events; however, the total LANL site-wide chemical waste generation amount for these facilities for CY 2011 was below the 2008 SWEIS projection:

- LANSCE – disposal of asphalt contaminated by a diesel leak (98 percent of total chemical waste generated at LANSCE);
- MSL – disposal of asbestos generated in a re-roofing project of TA-03-1698 (70 percent of total chemical waste generated at MSL);
- Plutonium Complex – disposal of unused/unspent Portland Cement (50 percent of total chemical waste generated at Plutonium Complex); and
- Sigma Complex – disposal of contaminated soil generated during the automated gate installation project (96 percent of total chemical waste generated at Sigma Complex); and
- SRCW Facilities – clean out and disposal of a number of old source test drums from the RANT facility that were no longer in use (47 percent of total chemical waste generated at SRCW Facilities).

The SRCW Facilities also exceeded LLW projection in the 2008 SWEIS due to the cleanout of approximately 5,000 empty LLW drums before the end of FY 2011 to allow for construction of a Permacon. The empty LLW drums were shipped via sealand containers. This accounted for about 66 percent of total LLW generated at SRCW. This was a one-time, non-routine event and LANL site-wide LLW generation for CY 2011 remained below the 2008 SWEIS projection.

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

Radioactive emissions have decreased significantly since 2007, after an emission control system at LANSCE was repaired. Radioactive airborne emissions from point sources (i.e., stacks) during 2011 totaled approximately 328 curies, less than 1 percent of the annual projected radiological air emissions of 34,000 curies[11] in the 2008 SWEIS.

During CY 2011, emissions of criteria pollutants were well below 2008 SWEIS projections, except in the case of SOx. SOx emissions exceeded SWEIS projections due primarily to the operations of a generator at TA-33 for longer than usual in order to complete a project involving national security. All emissions of criteria pollutants were well below the NMAC, Title 20, Chapter 2, Part 73 limits.

In response to new federal regulations, LANS reported its greenhouse gas emissions from stationary combustion sources to the EPA for the second time in CY 2011. These stationary combustion sources emitted 59,308 metric tons of CO2e in CY 2011.

Since 1999, the total number of permitted outfalls under the IP was reduced from 55 identified in the 1999 SWEIS to 15 that were renewed in August 2007 to 11 in October 2011. In CY 2011, four industrial outfalls were deleted from the permit. As a result of these closures, there has been a significant decrease in flow over the past five years. In 2011, eight outfalls flowed. Calculated NPDES discharges totaled 164.1 million gallons in CY 2011, approximately 2.2 million gallons more than the CY 2010 total of 141.8 million gallons. However, this is still well under the 2008 SWEIS projected volume of 279.5 million gallons per year.

Water levels in wells penetrating into the regional aquifer continue to decline in response to pumping, typically by several feet each year. In areas where pumping has

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

been reduced, water levels show some recovery. In 2011, LANL installed one monitoring well in the perched/intermediate groundwater and five monitoring wells (with six screens) in the regional aquifer.

Wastes have been generated at levels below quantities projected in the SWEIS. The 2008 SWEIS combines TRU and mixed TRU waste into one waste category since they are both managed for disposal at WIPP. In CY 2011, total waste quantities from LANL operations were below SWEIS projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities. Waste quantities at Key and Non-Key Facilities that exceeded the SWEIS levels were one-time, non-routine events.

In CY 2011, DOE/NNSA removed 61 structures. Of these structures, 50 were demolished, nine were salvaged, and two were transferred to Santa Clara Pueblo. This eliminated a total of 425,343 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 seven previous years. For example, the 1999 SWEIS projection for annual water consumption was 759 million gallons compared to the greatly reduced 2008 SWEIS projection of 417.8 million gallons. Water consumption for CY 2011 was 427.8 million gallons. The 10 million gallon water consumption exceedance represents the first time LANL has exceeded utility projections from either the 1999 or the 2008 SWEIS. Electricity consumption for CY 2011 was 449 gigawatt-hours compared to the 2008 SWEIS projection of 582 gigawatt-hours. Gas consumption for CY 2011 was 1.08 million decatherms compared to the 2008 SWEIS projection of 1.20 million decatherms. The Laboratory is committed to increasing energy efficiency and will continue to make improvements towards that goal in the future.

Radiological exposures to LANL workers were well within the levels projected in the SWEIS. The TED equivalent for the LANL workforce was 127.4 person-rem in 2011, which is much lower than the 280 person-rem workforce dose projected in the 2008 SWEIS. In 2011, there were approximately 164 recordable cases of occupation injury and illness; this represents a 13 percent increase from CY 2010. Also, approximately 43 cases resulted in DART duties per year, representing a 2 percent reduction in cases from CY 2010. 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 11,672 employees at the end of CY 2011 represent no significant change compared to the 11,609 total employees reported in the 2010 Yearbook. The total number of employees in CY 2011 is 14 percent lower than 2008 SWEIS projections.

Measured parameters for ecological resources and groundwater were similar to SWEIS projections, and measured parameters for cultural resources and land resources were below SWEIS projections. For land use, the 2008 SWEIS projected the disturbance of 41 acres of new land at TA-54 because of the need for additional disposal cells LLW. (The 1999 SWEIS projected that 15 prehistoric sites would be affected by the expansion of Area G into Zones 4 and 6 at TA-54.) As of 2011, this expansion had not become necessary. From 2001 to 2011, approximately 2,440 acres of land were transferred to the Department of Interior 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 2011.

Ecological and cultural resources remained protected in CY 2011. Ecological resources include biological resources such as protected sensitive species, ecological processes, and biodiversity. No excavation occurred of sites at TA-54 or anywhere else on LANL. Twenty historic buildings were demolished in fiscal year (FY) 2011.

In conclusion, LANL operations data for CY 2011 mostly fell within the 2008 SWEIS projections. Operation levels for four LANL facilities exceeded the 2008 SWEIS capability projections –LANSCE, SRCW, MSL and Radiochemistry Facilities. However, none of these capability increases caused exceedances in waste generation, radioactive air emissions, or NPDES discharge. Several facilities exceeded the SWEIS levels for waste generation quantities; however, all were one-time, non-routine events that do not reflect the day-to-day operations of the Laboratory. In addition, total site-wide waste generation quantities were below SWEIS projections for all waste types, reflecting the overall levels of operations at both the Key and Non-Key Facilities. Although gas and electricity consumption have remained within the 2008 SWEIS limits for utilities, water consumption exceeded the 2008 SWEIS projections by 10 million gallons in CY 2011.

LANL operations over the past five years have also fallen for the most part below the 1999 and 2008 SWEIS projections. Environmental effects of operations levels that exceeded the SWEIS levels, with the exception of utilities, were one-time, non-routine events that do not represent the day-to-day operations of the Laboratory.

Utility consumption over the past five years has been trending upward. DOE/NNSA will continue to make improvements towards reducing energy and water consumption in the future. Energy reduction initiatives like night setbacks, lighting retrofits, HVAC upgrades, and HPSBs are being implemented. In addition, improvements to the SERF-E in CY 2012 are expected to lead to increased use of recycled effluent in the cooling towers in CY 2013, thereby significantly reducing the amount of potable water consumed. Details can be found in LANL's Site Sustainability Plan (LANL 2011a).

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

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

Capability	2008 SWEIS Projections	2011 Operations
Analytical Chemistry	Support actinide research and processing activities by processing approximately 7,000 samples/year.	Analytical Chemistry received approximately 1,800 samples during CY 2011 and conducted more than 7,200 analytical processes involving microgram quantities of nuclear material.
Uranium Processing	Recover, process, and store LANL's highly enriched uranium inventory.	No activity to recover or process highly enriched uranium occurred in 2011. Some storage and inventory activities did take place.
Destructive and Nondestructive Analysis (Design Evaluation Project)	Evaluate up to 10 secondary assemblies/year through destructive/nondestructive analyses and disassembly.	No activity in CY 2011. Project has not been active since 1999.
Nonproliferation Training	Conduct nonproliferation training using special nuclear material (SNM).	No nuclear measurement schools were conducted in CY 2011. 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 microstructural/chemical analysis and compatibility testing of actinides were performed in CY 2011. 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.	Activities continued in 2011.
	Analyze TRU waste disposal related to validation of WIPP performance assessment models.	Project was completed in 2001. No activity in CY 2011.
	Perform TRU waste characterization.	No TRU waste characterization activities occurred in 2011.
	Analyze gas generation as could occur in TRU waste during transportation to WIPP.	No activity in CY 2011.
	Demonstrate actinide decontamination technology for soils and materials.	No activity in CY 2011.

Capability	2008 SWEIS Projections	2011 Operations
	Develop actinide precipitation method to reduce mixed wastes in LANL effluents.	No activity in CY 2011.
	Process up to 400 kg of actinides/year between TA-55 and the CMR building.	No activity in CY 2011.
Fabrication and Processing	Process up to 5,000 curies of neutron sources/year (both plutonium-238 and beryllium and americium-241 and beryllium sources).	Project was terminated in CY 1999. No process activity in CY 2011.
	Process neutron sources other than sealed sources.	No process activity in CY 2011.
	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 in 2011 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 process activity in CY 2011.
	Separate fission products from irradiated targets.	No process activity in CY 2011.
	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).	Casting furnace capability was removed in 1999. No enriched uranium solution processing was conducted in CY 2011.
Large Vessel Handling[b]	Process up to two large vessels from the Dynamic Experiments Program annually.	No vessels processed in CY 2011.

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	2011 Operations
Radioactive Air Emissions			
Total Actinides[b]	Ci/yr	7.60E-4	2.48E-5
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	0
Wastes			
Chemical	kg/yr	10,886	952.80
LLW	m^3/yr	1,835	445.32
MLLW	m^3/yr	19	4.49
TRU	m^3/yr	42[d]	3.12
Mixed TRU	m^3/yr	[d]	0.21

a. Ci/yr = curies per year; MGY = million gallons per year; kg/yr = kilograms per year; m^3/yr = cubic meters per year.
b. Includes plutonium -239
c. These radionuclides are not considered to be significant to off-site 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	2011 Operations
Research and Development on Materials Fabrication, Coating, Joining, and Processing	Fabricate items from metals, ceramics, salts, beryllium, enriched and depleted uranium, and other uranium isotope mixtures.	Capability maintained as projected in the SWEIS.
Characterization of Materials	Perform research and development on properties of ceramics, oxides, silicides, composites, and high-temperature materials.	Totals of 250 assignments and 1,000 specimens were characterized in CY 2011.
	Analyze up to 36 tritium reservoirs/year.	Total of zero tritium reservoirs analyzed in CY 2011.
	Develop a library of aged non-SNM material from stockpiled weapons and develop techniques to test and predict changes. Store and characterize up to 2,500 non-SNM component samples, including uranium.	Approximately 1,250 non-SNM materials samples and 1,250 non-SNM component samples stored in library.

Capability	2008 SWEIS Projections	2011 Operations
Fabrication of Metallic and Ceramic Items	Fabricate stainless steel and beryllium components for up to 80 pits/year.	Fabricated approximately 48 stainless steel and specialty alloy pit components.
	Fabricate up to 200 reservoirs for tritium/year.	Fewer than five reservoirs fabricated in CY 2011.
	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 in CY 2011.
	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 in CY 2011.
	Fabricate beryllium targets.	Provided material for the production of inertial confinement fusion targets and fabricated fewer than two targets in CY 2011.
	Fabricate targets and other components for accelerator production of tritium research.	On hold in 2011.
	Fabricate test storage containers for nuclear materials stabilization.	Produced approximately 20 containers.

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

Parameter	Units	2008 SWEIS Projections	2011 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	0.84
Wastes			
Chemical	kg/yr	9,979	63,552.97[b]
LLW	m^3/yr	994	18.33
MLLW	m^3/yr	4	0
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 which require monitoring.
b. Chemical waste generation at Sigma Complex exceeded the 2008 SWEIS projection due to disposal of contaminated soil from an automated gate installation construction project .This accounted for 96% (61,236 kg) of total 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	2011 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 in the 2008 SWEIS.
	Support up to 100 hydrodynamic tests/year.	Fewer than 20 hydrodynamic tests were supported in CY 2011.
	Manufacture up to 50 joint test assembly sets/year.	Fewer than 10 joint test assembly sets were manufactured in CY 2011.
	Provide general laboratory fabrication support as requested.	Activity performed as projected in the 2008 SWEIS.
Fabrication Utilizing Unique Materials	Fabricate items using unique and unusual materials such as depleted uranium and lithium.	Fabrication with unique materials was conducted at levels below those projected in the 2008 SWEIS.
Dimensional Inspection of Fabricated Components	Perform dimensional inspection of finished components. Perform other types of measurements and inspections.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.

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

Parameter	Units	2008 SWEIS Projections	2011 Operations
Radioactive Air Emissions			
Uranium isotopes[a]	Ci/yr	1.50E-04	8.81E-08
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	474,002	3,424.87
LLW	m^3/yr	604	8.62
MLLW	m^3/yr	0	0
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

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

b. 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	2011 Operations
Materials Processing	Support development and improvement of technologies for materials formulation. Support development of chemical processing technologies, including recycling and reprocessing techniques to solve environmental problems.	Capability was maintained as projected in the 2008 SWEIS.
Mechanical Behavior in Extreme Environments	Study fundamental properties of materials and characterize their performance, including research on the ageing of weapons.	Capability was maintained as projected in the SWEIS and additional activities were continued to be expanded as projected in the SWEIS. Cold mock-up of weapons assembly and processing as well as other technologies continued to be expanded in CY 2011. Fabrication, assembly, and prototype experiments were expanded in CY 2011.
	Develop and improve techniques for these and other types of studies.	Improvements were accomplished in the conduct of dynamic load and crack testing and measurement.

Capability	2008 SWEIS Projections	2011 Operations
Advanced Materials Development	Synthesize and characterize single crystals and nanophase and amorphous materials.	Capability was maintained as projected in 2008 SWEIS and improved. Single crystal growth, amorphous alloy research, powder processing, and materials characterization were expanded in CY 2011.
	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.	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.	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.	Capability was maintained as projected in the 2008 SWEIS. 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	2011 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not measured[a]
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	590	15,975.85[b]
LLW	m^3/yr	0	0
MLLW	m^3/yr	0	0
TRU	m^3/yr	0[c]	0
Mixed TRU	m^3/yr	0[c]	0

a. Emissions levels from this site are below EPA levels which require monitoring.
b. Chemical waste generation at MSL exceeded the 2008 SWEIS projection due to a roofing project at TA-03-1698. Asbestos from the project was disposed of as chemical waste and handled by New Mexico Special Waste. This accounted for more than 70% (11,702.88 kg) of total chemical waste generated at MSL.
c. 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

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

Capability	2008 SWEIS Projections	2011 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.	Capability was maintained as projected in the 2008 SWEIS.

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

Parameter	Units	2008 SWEIS Projections	2011 Operations
Radioactive Air Emissions	Ci/yr	Not projected[b]	Not measured[a]
NPDES Discharge			
03A-027	MGY	13.6	14.0[b]
Wastes			
Chemical	kg/yr	0	0
LLW	m^3/yr	0	0
MLLW	m^3/yr	0	0
TRU	m^3/yr	0[c]	0
Mixed TRU	m^3/yr	0[c]	0

a. No radiological operations occur at this site.
b. Outfall discharge amounts exceeded 2008 SWEIS projections. SERF expected to greatly reduce discharge amounts.
c. 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

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

Capability	2008 SWEIS Projections	2011 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.	In CY 2011, less than 2,400 pounds of high explosives and less than 600 pounds of mock explosives material were used in the fabrication of test components for internal and external customers.
High Explosives Synthesis and Production	Perform high-explosives synthesis and production research and development. Produce new materials for research, stockpile, security interest, and other applications. Formulate, process test, and evaluate explosives.	The high-explosives synthesis and production operations were below limits projected in the 2008 SWEIS.
High Explosives and Plastics Development and Characterization	Evaluate stockpile returns and materials of specific interest. Develop and characterize new plastics and high explosives for stockpile, military, and security interest improvements. Improve predictive capabilities. Research high-explosives waste treatment methods.	High-explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected in the SWEIS. Plastics research and development is currently being performed at other facilities.
High Explosives and Plastics Fabrication	Perform stockpile surveillance and process development. Supply parts to the Pantex Plant for surveillance and stockpile rebuilds and joint test assemblies. Fabricate materials for specific military, security interest, hydrodynamic, and environmental testing.	Fewer than 1,000 parts were fabricated in support of the weapons program in CY 2011, 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.

Capability	2008 SWEIS Projections	2011 Operations
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.	W/WX Division provided fewer than 100 major assemblies for Nevada Test Site subcritical and joint environmental test programs.
Safety and Mechanical Testing	Conduct safety and environmental testing related to stockpile assurance and new materials development. Conduct up to 15 safety and mechanical tests/year.	W/WX Division performed fewer than 15 stockpile related safety and mechanical tests during CY 2011.
Research, Development, and Fabrication of High-Power Detonators	Continue to support stockpile stewardship and management activities. Manufacture up to 40 major product lines/year. Support DOE-wide packaging and transport of electro-explosive devices.	High-power detonator activities by Nuclear Component Operations (NCO) Division resulted in the manufacture of fewer than 40 product lines in CY 2011.

*. 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 (TA-08, TA-09, TA-11, TA-16, TA-22, and TA-37)/Operations Data

Parameter	Units	2008 SWEIS Projections	2011 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

Parameter	Units	2008 SWEIS Projections	2011 Operations
03A-130 (TA-11)[b]	MGY	[c]	0
05A-055 (TA-16)	MGY	[c]	0
Wastes			
Chemical	kg/yr	13,154	11,785.66
LLW	m^3/yr	15	0.93
MLLW	m^3/yr	<1	0
TRU	m^3/yr	0[d]	0
Mixed TRU	m^3/yr	0[d]	0

a. LANS does not measure these non-point (diffuse) emissions at their source; rather LANS uses ambient air measurements at public receptor locations to evaluate compliance from diffuse emissions.
b. Outfall 03A-130 was removed from the NPDES Permit (NM0028355) in October 2011.
c. The 2008 SWEIS did not calculate individual flow per outfall.
d. 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

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

Capability	SWEIS Projections	2011 Operations
Volume of Materials Required*	Conduct about 1,800 experiments per year.	HET operations were scaled back in 2011 with the consolidation of operations primarily within TA-14, 15, and 36.
	Use up to 6,900 pounds (3,130 kg) of depleted uranium in experiments annually.	Less than 10 kg of depleted uranium were expended in 2011.
Hydrodynamic Tests	Develop containment technology. Conduct baseline and code development tests of weapons configuration. Conduct 100 major hydrodynamic test/yr.	3 hydrodynamic tests were conducted in 2011
Dynamic Experiments	Conduct dynamic experiments to study properties and enhance understanding of the basic physics and equation of state and motion for nuclear weapons materials, including some SNM experiments.	Dynamic experiments for 2011 were conducted below 2008 SWEIS projected levels
Explosives Research and Testing	Conduct tests to characterize explosive materials.	Explosives research and testing experiments for 2011 were conducted below 2008 SWEIS projected levels

Capability	SWEIS Projections	2011 Operations
Munitions Experiments	Support the U.S. Department of Defense with research and development of conventional munitions. Conduct experiments to study external-stimuli effects on munitions.	Munitions experiments for 2011 were conducted below 2008 SWEIS projected levels
High-Explosives Pulsed-Power Experiments	Conduct experiments using explosively driven electromagnetic power systems.	High-Explosives Pulsed-Power experiments for 2011 were conducted below 2008 SWEIS projected levels
Calibration, Development, and Maintenance Testing	Perform experiments to develop and improve techniques to prepare for more involved tests.	Calibration, Development, and Maintenance testing 2011 were conducted below 2008 SWEIS projected levels
Other Explosives Testing	Conduct advanced high-explosives or weapons evaluation studies.	Other explosives testing for 2011 were conducted below 2008 SWEIS projected levels

*. 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 (TA-14, TA-15, TA-36, TA-39, and TA-40) Operations Data

Parameter	Units	2008 SWEIS Projections	2011 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	<1000
Beryllium	kg/yr	90	<1
Copper[c]	kg/yr	45,630	<10
Depleted Uranium	kg/yr	3,931.4	<30
Iron[c]	kg/yr	30,210	<1
Lead	kg/yr	241.4	<1
Tantalum	kg/yr	450	<1
Tungsten	kg/yr	390	<2
NPDES Discharge			
03A–185 (TA-15)[d]	MGY	2.2	0
Wastes			

Parameter	Units	2008 SWEIS Projections	2011 Operations
Chemical	kg/yr	35,380	13,114.55
LLW	m^3/yr	918	173.78
MLLW	m^3/yr	8	0.05
TRU[f]	m^3/yr	<1[e]	0
Mixed TRU	m^3/yr	[e]	0

a. The isotopic composition of depleted uranium is approximately 72% uranium-238, approximately 1% uranium-235, and approximately 27% uranium-234. Because there are no historic measurements of emissions from these sites, projections are based on estimated release fractions of the materials used in tests.

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

c. The quantities of copper, iron, and aluminum involved in these tests are used primarily in the construction of support structures. These structures are not expended in the explosive tests and, thus, do not contribute to air emissions.

d. Outfall 03A-185 was removed from the NPDES Permit (NM0028355) in October 2011.

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

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

Capability	2008 SWEIS Projections	2011 Operations
High-Pressure Gas Fills and Processing	Handle and process tritium gas in quantities of about 100 grams approximately 65 times/year.	No high-pressure gas fills/processing operations were performed in CY 2011.
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.	Gas boost tests were performed within SWEIS projections less than 35 times/year.
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 diffusion and membrane research was performed in CY 2011.
Metallurgical and Material Research	Conduct metallurgical and materials research and applications studies and tritium effects and properties research and development. Small amounts of tritium would be used for these studies.	Activities were conducted within SWEIS projections in CY 2011.
Gas Analysis	Measure the composition and quantities of gases (in support of tritium operations).	Gas analysis operations were conducted within SWEIS projections during CY 2011.

Capability	2008 SWEIS Projections	2011 Operations
Calorimetry	Perform calorimetry measurements in support of tritium operations.	Calorimetry activities were conducted within SWEIS projections during CY 2011.
Solid Material and Container Storage	Store about 1,000 grams of tritium inventory in process systems and samples, inventory for use, and waste.	Inventory was stored and maintained within SWEIS projections in CY 2011.
Hydrogen Isotopic Separation	Perform research and development of tritium gas purification and processing in quantities of about 200 grams of tritium per test.	No separations were performed in CY 2011.
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 in CY 2011[*]

*. TSFF and TSTA were put into Surveillance and Maintenance Mode in 2008 and demolished in CY 2010.

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

Parameter	Units	2008 SWEIS	2011 Operations
Radioactive Air Emissions			
TA-16/WETF, Elemental tritium	Ci/yr	3.00E+2	2.22E+01
TA-16/WETF, Tritium in water vapor	Ci/yr	5.00E+2	4.05E+01
NPDES Discharge			
02A-129 (TA-21)[a]	MGY	17.4	0
Wastes			
Chemical	kg/yr	1,724	4.55
LLW	m^3/yr	482	10.01
MLLW	m^3/yr	3	0.51
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a. Outfall 02A-129 was removed from the NPDES Permit (NM0028355) in October 2011

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

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

Capability	2008 SWEIS Projections	2011 Operations
Precision Machining and Target Fabrication	Provide targets and specialized components for approximately 12,400 laser and physics tests/year.	Provided targets and specialized components for about 25 tests.
	Perform approximately 100 high-energy-density physics tests/year.	Provided components to WX and P divisions for less than 12 high-energy-density physics tests annually.
	Analyze up to 36 tritium reservoirs/year.	Did not support high-explosive pulsed-power tests at levels identified in the SWEIS.
Polymer Synthesis	Produce polymers for targets and specialized components for approximately 12,400 laser and physics tests/year.	Produced polymers for targets and specialized components for about 10 laser and physics tests.
	Perform approximately 100 high-energy-density physics tests/year.	Did not support high-explosive pulsed-power tests or high-energy-density physics tests at levels identified in the 2008 SWEIS.
Chemical and Physical Vapor Deposition	Coat targets and specialized components for about 12,400 laser and physics tests/year. Support approximately 100 high-energy-density physics tests/year. Support plutonium pit rebuild operations.	Coated targets and specialized components for about 20 tests. Did not support high-explosive pulsed-power tests or high-energy-density physics tests at levels identified in the SWEIS.

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

Parameter	Units	2008 SWEIS	2011 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not measured[a]
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	3,810	1,308.21
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 which require monitoring.
b. 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

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

Capabilities	SWEIS ROD	2011 Operations (FTEs)[a]
Biologically Inspired Materials and Chemistry	Determine formation and structure of biomaterials for bioenergy. Synthesize biomaterials. Characterize biomaterials.	Activities performed as projected in the SWEIS. (7 FTEs)
Cell Biology	Study stress-induced effects and responses on cells. Study host-pathogen interactions. Determine effects of beryllium exposure.	Activities performed as projected in the SWEIS. (5 FTEs)
Computational Biology	Collect, organize, and-manage information on biological systems. Develop computational theory to analyze and model biological systems.	Number and types of work for others (WFO) programs are increasing. (20 FTEs)
Environmental Microbiology	Study microbial diversity in the environment; collect and analyze environmental samples. Study biomechanical and genetic processes in microbial systems.	Activities performed as projected in the SWEIS. (14 FTEs)
Genomic Studies	Analyze genes of living organisms such as humans, animals, microbes, viruses, plants, and fungi.	Decrease in DOE support, growth in WFO. (28 FTEs)
Genomic and Proteomic Science	Develop and implement high-throughput tools. Perform genomic and proteomic analysis. Study pathogenic and nonpathogenic systems.	Activities performed as projected in the SWEIS. (14 FTEs) Steady level of effort.
Measurement Science and Diagnostics	Develop and use spectroscopic tools to study molecules and molecular systems. Perform genomic, proteomic, and metabolomic studies.	Slight decrease in activity. (12 FTEs)
Molecular Synthesis and Isotope Applications	Synthesize molecules and materials. Perform spectroscopic characterization of molecules and materials. Develop new molecules that incorporate stable isotopes. Develop chem-bio sensors and assay procedures. Synthesize polymers and develop applications for them.	Steady level of effort. (11 FTEs)

Capabilities	SWEIS ROD	2011 Operations (FTEs)[a]
	Utilize stable isotopes in quantum computing systems.	
Structural Biology	Research three-dimensional structure and dynamics of macromolecules and complexes. Use various spectroscopy techniques.	Slight decrease in activity. (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 in the SWEIS. (4 FTEs)
Biothreat Reduction and Bioforensics	Analyze samples for biodefense and national security purposes. Identify pathogen strain signatures using DNA sequencing and other molecular approaches.	Steady level of effort. (17 FTEs)
InVivo Monitoring[b]	Performs whole-body scans as a service to the LANL personnel monitoring program, which supports operations with radioactive materials conducted elsewhere at LANL.	In CY 2011, the IVML conducted 649 lung and whole body client counts and 1,357 other counts (detector studies, quality assurance, etc.). (3 FTEs)

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

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

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

Parameter	Units	2008 SWEIS	2011 Operations
Radioactive Air Emissions	Ci/yr	Not estimated	Not measured[a]
NPDES Discharge		No outfalls	No outfalls
Wastes			
Chemical	kg/yr	13,154	745.75
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	2011 Operations
Radionuclide Transport Studies	Conduct 80 to 160 actinide transport, sorption, and bacterial interaction studies/year.	During CY 2011, operations continued at approximately twice the levels identified in the SWEIS[a].
	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.	During CY 2011, operations continued at approximately half the levels identified in the SWEIS.
	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.	Level of operations decreased during CY 2011.
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.	Comparable quantities of alpha-emitting radionuclides used in operations.
Isotope Production	Conduct target preparation, irradiation, and processing to recover medical and industrial application isotopes to support approximately 150 off-site shipments/year.	Approximately 185 off-site shipments/year, 20% increase over levels identified in the SWEIS[a].
Actinide and TRU Chemistry	Perform radiochemical operations involving alpha-emitting radionuclides.	Approximately the same as levels identified in the SWEIS.
Data Analysis	Re-examine archive data and measure nuclear process parameters of interest to weapons radiochemists.	Below levels projected in the SWEIS.

Capability	2008 SWEIS Projections	2011 Operations
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.	Comparable to levels projected in the SWEIS.
Structural Analysis	Perform synthesis and structural analysis of actinide complexes at current levels.	Comparable to levels projected in the SWEIS.
	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.	During CY 2011, sample processing was expanded[a].
Hydrotest Sample Analysis	Measure beryllium contamination from simulated nuclear weapons hydrotesting.	Capability active at levels projected in the SWEIS.

a. This capability level exceeded 2008 SWEIS projections; however, radioactive air emissions, outfall discharge, and waste quantities for the Radiochemistry Facility were well below SWEIS projections.

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

Parameter	Units	2008 SWEIS Projections	2011 Operations
Radioactive Air Emissions			
Mixed Fission Products[a]	Ci/yr	1.5E-4	Not measured[a]
Plutonium-239	Ci/yr	1.2E-5	None detected[b]
Uranium isotopes	Ci/yr	4.8E-7	4.66E-09
Arsenic-72	Ci/yr	1.2E-4	6.37E-05
Arsenic-73	Ci/yr	2.5E-3	7.62E-06
Arsenic-74	Ci/yr	1.3E-3	6.18E-06
Beryllium-7	Ci/yr	1.6E-5	None detected[b]
Bromine isotopes[c]	Ci/yr	9.3E-4	4.40E-05
Germanium-68[d]	Ci/yr	8.9E-3	7.08E-03
Rubidium-86	Ci/yr	3.0E-7	None detected[b]
Selenium-75	Ci/yr	3.8E-4	1.64E-04
Other Activation Products[e]	Ci/yr	5.5E-6	1.15E-04Ci Hg-197m
NPDES Discharge		No outfalls	No outfalls
Wastes			
Chemical	kg/yr	3,311	502.42
LLW	m^3/yr	268	75.73
MLLW	m^3/yr	4	0.39
TRU	m^3/yr	0[f]	0
Mixed TRU	m^3/yr	0[f]	0

a. Emission categories of "mixed fission products" and "mixed activation products" are no longer used. Instead, where fission or activation products are measured, they are reported as specific radionuclides, e.g., cesium-137 or cobalt-60.

b. Although stack sampling systems were in place to measure these emissions, any emissions were sufficiently small to be below the detection capabilities of the sampling systems.

c. Bromine isotopes that were measured areBr-76 and Br-77.

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

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

f. 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	2011 Operations
Waste Transport, Receipt, and Acceptance	Collect radioactive liquid waste from generators and transport it to the RLWTF at TA-50.	Activities performed as projected in the SWEIS.
	Support, certify, and audit generator characterization programs.	Activities performed as projected in the SWEIS.
	Maintain the waste acceptance criteria for the RLWTF.	Activities performed as projected in the SWEIS.
	Send approximately 250,000 liters of evaporator bottoms to an off-site commercial facility for solidification/year. (Approximately 20 m^3 of solidified evaporator bottoms would be returned/year for disposal as LLW at TA-54 Area G.)	87,000 liters of evaporator bottoms were shipped during 2011. No solidified bottoms were returned for disposal at Area G.
	Transport annually to TA-54 for storage or disposal: -250 m^3 of LLW -2 m^3 of mixed LLW -10 m^3 of TRU waste -400 kg of hazardous waste	Transported to Area G for storage or disposal in 2011: -137 m^3 of LLW -0.7 m^3 of mixed LLW -0 m^3 TRU waste -31 kg of hazardous waste
Radioactive Liquid Waste Treatment	Pretreat 110,000 liters/year of liquid TRU waste.	Zero liters of TRU radioactive liquid waste were treated.
	Solidify, characterize, and package 12 m^3/year of TRU waste sludge.	0.4 m^3 (41 drums) of cemented sludge were created.
	Treat 15 million liters/year of liquid LLW.	Processed 3.2 million liters of liquid LLW.
	Dewater, characterize, and package 50 m^3/year of LLW sludge.	2.7 m^3 LLW sludge was packaged during 2011.
	Process 1 million liters/year of secondary liquid waste generated by the RLWTF treatment processes through the RLWTF evaporator.	Processed 955,000 liters through the evaporator.
	Discharge treated liquids through an NPDES outfall.	Discharged 3.5 million liters in 2011.

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

Parameter	Units	2008 SWEIS Projections	2011 Operations
Radioactive Air Emissions			
Americium-241	Ci/yr	Negligible	None detected
Plutonium-238	Ci/yr	Negligible	6.18E-09
Plutonium-239	Ci/yr	Negligible	None detected
Thorium-228	Ci/yr	Negligible	None detected
Thorium-230	Ci/yr	Negligible	None detected
Thorium-232	Ci/yr	Negligible	None detected
Uranium-238	Ci/yr	Negligible	7.91E-08
NPDES Discharge			
051	MGY	4.0	0
Wastes			
Chemical	kg/yr	399	229.75
LLW	m^3/yr	252	227.29
MLLW	m^3/yr	2	0.18
TRU	m^3/yr	10[a]	0
Mixed TRU	m^3/yr	[a]	0

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

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

Capability	2008 SWEIS Projections	2011 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 hrs). The H+ beam current would be 1,250 microamperes; the H- beam current would be 200 microamperes.	In 2011, the linac beam was operated with in 2008 SWEIS projections. H+ beam was delivered to the Isotope Production Facility for 3,468.1 of 3,845.2 scheduled hours at an average current of 223.0 microamperes with 90.2% reliability. H- beam was delivered as follows: (a) to the Lujan Center for 2,872.5 of 3,358.0 scheduled hours at an average current of 94.4 microamperes with 85.5% total availability; (b) to WNR Target 2 for 540.2 of 649.1 scheduled hours in a “pulse on-demand” mode of operation with 83.0% total availability; (c) to WNR Target 4 for 501.8 of 539.1 scheduled hours at an average current of 1.36 microamperes with 93.1% total availability; (d) through Line X to Line B (ultracold neutron) for 1,199.4 of 1,323.3 scheduled hours in a “pulse on demand” mode of operation with 90.6% total availability; (e) through Line X to Line C (proton radiography [pRad]) for 782.3 of 922.5 scheduled hours in a “pulse on Accelerator Beam Delivery, Maintenance, and Development demand” mode of operation with 84.8% total availability.
	Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.	No major upgrades to the beam delivery complex.
Experimental Area Support	Provide support to ensure availability of the beam lines, beam line components, handling and transport systems, and shielding, as well as radio-frequency power sources.	Support activities were conducted at levels projected in the SWEIS.

Capability	2008 SWEIS Projections	2011 Operations
	Perform remote handling and packaging of radioactive material, as needed.	Remote handling and packaging was performed at the Isotope Production Facility. Revitalization of the A-6 remote handling capabilities is on-going to restore this capability for future missions.
Neutron Research and Technology[a]	Conduct 1,000 to 2,000 experiments/year using neutrons from the Lujan Center and WNR facility.	263 experiments were conducted at the Lujan Center and 50 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 experiments were conducted at WNR in CY 2011.
Materials Test Station	Irradiate materials and fuels in a fast-neutron spectrum and in a prototype temperature and coolant environment.	No activity in CY 2011.
Subatomic Physics Research	Conduct 5 to 10 physics experiments/year at Manuel Lujan Center and WNR facility.	No experiments were conducted at Manuel Lujan Center and 1 experiment was conducted at WNR facility in CY 2011.

Capability	2008 SWEIS Projections	2011 Operations
	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 gun powder. -Contained experiments using small to moderate quantities of high explosives similar to those discussed under Neutron Research and Technology.[a]	57 high-explosive experiments were conducted with SWEIS projections in CY 2011.
	Conduct research using ultracold neutrons; operate up to 10 microamperes/year of negative beam current.	During CY 2011 Ultracold Neutron Research focused on accelerator data gathering during the entire run cycle.
Medical Isotope Production	Irradiate up to 120 targets/year for medical isotope production at the Isotope Production Facility.	A total of 58 targets were irradiated in CY 2011
High-Power Microwaves and Advanced Accelerators	Conduct research and development in high-power microwaves and advanced accelerators in areas including microwave research for industrial and environmental applications.	Research and development were conducted within SWEIS projections in CY 2011.
Radioactive Liquid Waste Treatment (Solar Evaporation at TA-53)	Treat about 520,000 liters/year of radioactive liquid waste.	The TA-53 RLWTF received 476,030 (189,940 from TA-53 and 287,090 from other sites) liters of radioactive liquid waste into its holding tanks and discharged 566,120 liters into the evaporation tanks during CY 2011[b].

a. 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.

b. Radioactive liquid waste treatment amounts exceeded 2008 SWEIS projections due to the contributions of radioactive liquid waste received from RLWTF and from the TA-21 remediation work.

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

Parameter	Units	2008 SWEIS Projections	2011 Operations
Radioactive Air Emissions			
Argon-41	Ci/yr	8.87E+2	1.72E+01
Particulate & Vapor Activation Products	Ci/yr	Not projected[a]	3.56E-03
Carbon-10	Ci/yr	2.65E+0	2.88E-01
Carbon-11	Ci/yr	2.25E+4	1.27E+02
Nitrogen-13	Ci/yr	3.10E+3	3.48E+01
Oxygen-15	Ci/yr	3.88E+3	4.67E+01
Tritium as Water	Ci/yr	Not projected[a]	2.45E+01
NPDES Discharge			
Total Discharges	MGY	28.2	23.7
03A-048	MGY	Not projected [b]	22.9
03A-113	MGY	Not projected [b]	0.8
Wastes			
Chemical	kg/yr	16,783	54,443.63[c]
LLW	m^3/yr	1,070	33.63
MLLW	m^3/yr	1	0
TRU	m^3/yr	0[d]	0
Mixed TRU	m^3/yr	0[d]	0

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

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

c Chemical Waste generation at LANSCE exceeded 2008 SWEIS projections due to a diesel leak from a product diesel tank. Fitting on the product diesel tank came loose leaking product diesel on to the asphalt. The diesel then leached into the soil below, which was then excavated and placed into roll-off bins. This accounted for 98% (53,524.8 kg) of the total chemical waste generated at LANSCE.

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

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

Capability	2008 SWEIS Projections	2011 Operations
Waste Characterization, Packaging, and Labeling	Characterize 420 cubic meters of newly generated TRU waste.	Characterized 157 cubic meters in CY 2011.
	Characterize 8,400 cubic meters of legacy TRU waste.	Characterized approximately 663 cubic meters of TRU waste in CY 2011.
	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	Characterized 37 cubic meters of MLLW from environmental remediation activities in CY 2011.
	Ventilate TRU waste retrieved from belowground storage.	No activity in CY 2011.
	Perform coring and visual inspection of a percentage of TRU waste packages.	Performed visual examinations on 72 TRU waste packages in CY 2011; no drums were cored in 2011.
	Overpack and bulk small waste, as required.	Activity performed as projected in the SWEIS.
	Support, certify, and audit generator characterization programs.	Activity performed as projected in the SWEIS.
	Maintain waste acceptance criteria for LANL waste management facilities.	Activity performed as projected in the SWEIS.
	Maintain waste acceptance criteria for off-site treatment, storage, and disposal facilities.	Activity performed as projected in the SWEIS.
	Maintain WIPP waste acceptance criteria compliance and liaison with WIPP operations.	Activity performed as projected in the SWEIS.
	Characterize approximately 2,400 cubic meters of contact-handled and 100 cubic meters of remote handled legacy TRU waste retrieved from belowground storage.	No activity in CY 2011.
Waste Transport, Receipt, and Acceptance	Ship 320 cubic meters/year of newly generated TRU waste to WIPP.	Shipped 79 cubic meters of newly generated TRU waste to WIPP in CY 2011.

Capability	2008 SWEIS Projections	2011 Operations
	Ship 8,400 cubic meters/year of legacy TRU waste to WIPP.	Shipments to WIPP began 3/26/1999. Shipped 154 cubic meters of legacy TRU waste to WIPP in CY 2011.
	Ship LLW to off-site disposal facilities.	Activity performed as projected in the SWEIS.
	Ship 55 cubic meters of MLLW for off-site treatment and disposal in accordance with EPA land disposal restrictions.	Approximately 60[b] cubic meters of MLLW were shipped for off-site treatment and disposal from the Solid Radioactive and Chemical Waste Facility in CY 2011.
	Ship 6,400 metric tons of chemical wastes for off-site treatment and disposal in accordance with EPA land disposal restrictions.	Approximately 1,211 metric tons of chemical waste was shipped for off-site treatment and disposal from the Solid Radioactive and Chemical Waste Facility.
	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.	Activity performed as projected in the SWEIS.
	Collect chemical and mixed wastes from LANL generators and transport to Consolidated Remote Storage Sites and TA-54.	Collected and transported chemical and mixed wastes.
	Receive, on average, 5 to 10 shipments/year of LLW and TRU waste from off-site locations.	No activity in CY 2011.
	Ship approximately 2,340 cubic meters of contact-handled and 100 cubic meters of remote-handled legacy TRU waste to WIPP	No activity in CY 2011.
Waste Storage	Stage chemical and mixed wastes before shipment for off-site treatment, storage, and disposal.	Chemical and mixed wastes were staged before shipment.
	Store TRU waste until it is shipped to WIPP.	Activity performed as projected in the SWEIS.
	Store MLLW pending shipment to a treatment facility.	Activity performed as projected in the SWEIS.

Capability	2008 SWEIS Projections	2011 Operations
	Store LLW uranium chips until sufficient quantities are accumulated for stabilization campaigns.	No uranium chips were stored for stabilization in CY 2011.
	Store TRU waste generated by DD&D and remediation activities.	No TRU generated from DD&D and remediation activities in CY 2011.
	Manage and store sealed sources for the OSRP at increased types and quantities.	Activity performed as projected in the SWEIS.
Waste Retrieval	Retrieve remaining legacy TRU waste 2,400 cubic meters of contact-handled and 100 cubic meters of remote-handled from belowground storage in TA-54 Area G, including: Pit 9, above Pit 29, Trenches A-D, and Shafts 200-232, 235-243, 246-253, 262-266, and 302-306.	No retrieval occurred in CY 2011.
Waste Treatment	Compact up to 2,300 cubic meters/year of LLW.	No LLW was compacted in CY 2011.
	Process 2,300 cubic meters of TRU waste through size reduction at the Decontamination and Volume Reduction System (DVRS).	No waste was processed at the DVRS.
	Demonstrate treatment (e.g., electrochemical) of liquid MLLW.	No activity in CY 2011.
	Stabilize 870 cubic meters of uranium chips.	No activity in CY 2011.
	Process newly generated TRU waste through new TRU Waste Facility.	No activity in CY 2011.
Waste Disposal	Dispose 84 cubic meters of LLW in shafts, 23,000 cubic meters of LLW in pits, and small quantities of radioactively contaminated polychlorinated biphenyls in shafts in Area G/year.	Approximately 0.4 cubic meters of LLW were disposed of in shafts at Area G in CY 2011.
	Dispose additional LLW generated by DD&D and remediation activities.	No activity for CY 2011.
	Migrate operations in Area G to Zones 4 and 6, as necessary, to allow continued onsite disposal of LLW.	No activity in CY 2011.

Capability	2008 SWEIS Projections	2011 Operations
Decontamination Operations	Decontaminate approximately 700 personnel respirators and 300 air-proportional probes for reuse per month.	No activity in CY 2011.
	Decontaminate vehicles and portable instruments for reuse (as required).	No activity in CY 2011.
	Decontaminate precious metals for resale using an acid bath.	No activity in CY 2011.
	Decontaminate scrap metals for resale by sandblasting the metals.	No activity in CY 2011.
	Decontaminate 200 cubic meters of lead for reuse by grit blasting.	No activity in CY 2011.

a. Includes the construction of four new storage domes for the transuranic waste inspectable storage project (TWISP).

b. In CY 2011, MLLW shipped for off-site treatment and disposal exceeded the 2008 SWEIS projections by 5 cubic meters. The reason for the exceedance was because of 37 cubic meters of unexpected MLLW from the TA-21 DD&D/Remediation project.

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

Parameter	Units	2008 SWEIS Projections	2011 Operations
Radioactive Air Emissions[a]			
Tritium	Ci/yr	6.09E+1	Not monitored [a]
Americium-241	Ci/yr	2.87E-6	7.92E-10 [a]
Plutonium-238	Ci/yr	2.24E-5	4.60E-09 [a]
Plutonium-239	Ci/yr	8.46E-6	1.69E-09 [a]
Uranium-234	Ci/yr	8.00E-6	9.59E-10[a]
Uranium-235	Ci/yr	4.10E-7	None detected [a]
Uranium-238	Ci/yr	4.00E-6	None detected [a]
Other Radionuclides	Ci/yr	Negligible	1.88E-09
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes[b]			
Chemical	kg/yr	907	982.41[c]
LLW	m^3/yr	229	578.01[d]
MLLW	m^3/yr	8	3.48
TRU	m^3/yr	27[e]	1.06
Mixed TRU	m^3/yr	[f]	0

a. Data shown are measured emissions from Waste Characterization, Reduction, and Repackaging (WCRR) Facility and the Actinide Research and Technology Instruction Center (ARTIC) 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 a clean out and disposal of a number of old source test drums that were no longer in use from the RANT facility. This accounted for about 47% (459.5 kg) of total chemical waste generated at SRCW.

d. LLW generation at SRCW exceeded 2008 SWEIS projections due to the cleanout of approximately 5,000 empty drums before the end of FY 2011 to allow for construction of a Permacon starting in September 2012. The empty LLW drums were shipped via sealand containers. This accounted for about 66% (383.8 m^3) of total LLW generated at SRCW.

e 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 Projections	2011 Operations
Plutonium Stabilization	Recover, process, and store existing plutonium inventory.	Capability was performed as projected in the 2008 SWEIS. Highest priority items have been stabilized. The implementation plan has been modified between DOE and the Defense Nuclear Facilities Safety Board.
Manufacturing Plutonium Components	Produce nominally 20 plutonium pits/year.	Fewer than 20 qualified pits were produced in CY 2011.
	Fabricate parts and samples for research and development activities, including parts for dynamic and subcritical experiments.	Research and development of plutonium materials continued at levels projected in the SWEIS.
Surveillance and Disassembly of Weapons Components	Disassemble, survey, and examine up to 65 plutonium pits/year.	Fewer than 65 pits were disassembled during CY 2011. Fewer than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in CY 2011.
Actinide Materials Science and Processing Research and Development	Perform plutonium (and other actinide) materials research, including metallurgical and other characterization of samples and measurements of mechanical and physical properties.	Research and development of plutonium (and other actinide) materials continued at levels projected in the SWEIS.
	Operate the 40-millimeter Impact Test Facility and other test apparatus.	The 40-millimeter Impact Test Facility was operated as projected in the SWEIS.
	Develop expanded disassembly capacity and disassemble up to 200 pits/year.	Fewer than 200 pits were disassembled/converted in CY 2011. Fewer than 12 pits were processed through tritium separation in CY 2011.
	Process up to 5,000 curies of neutron sources (including plutonium and beryllium and americium-241 and beryllium).	Neutron sources were not processed in CY 2011.
	Process neutron sources other than sealed sources.	Continued processing neutron sources other than sealed sources as projected in the SWEIS.
	Process up to 400 kg/yr of actinides between TA-55 and the CMR Building.*	Fewer than 400 kg of actinides were processed in CY 2011.

Capability	2008 SWEIS Projections	2011 Operations
	Process pits through the Special Recovery Line (tritium separation).	Continued processing of pits through the Special Recovery Line as projected in the SWEIS.
	Perform oralloy decontamination of 28 to 48 uranium components per month.	In CY 2011, fewer than 48 uranium components were decontaminated per month.
	Conduct research in support of DOE actinide cleanup activities and on actinide processing and waste activities at DOE sites.	Research supporting DOE actinide cleanup activities continued at low levels.
	Fabricate and study nuclear fuels used in terrestrial and space reactors.	The DOE/Office of Nuclear Energy Advanced Fuel Cycle and Mixed Oxide Fuel Initiative is fabricating actinide nitride fuels for irradiation in a reactor environment.
	Fabricate and study prototype fuel for lead test assemblies.	The DOE/Office of Nuclear Energy Advanced Fuel Cycle and Mixed Oxide Fuel Initiative is fabricating actinide nitride fuels for irradiation in a reactor environment.
	Develop safeguards instrumentation for plutonium assay.	Continued support of safeguards instrumentation development during CY 2011.
	Analyze samples.	Analysis of actinide samples at TA-55 continued in CY 2011 in support of actinide reprocessing and research and development activities.
Fabrication of Ceramic-Based Reactor Fuels	Make prototype mixed oxide (MOX) fuel.	Research and development activities occurred in CY 2011.
	Build test reactor fuel assemblies.	No assembly or fabrication of fuel assemblies were conducted in CY 2011
	Continue research and development on other fuels.	Research and development activities occurred in CY 2011 as projected in the SWEIS.
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 were processed, evaluated, and/or tested in CY 2011.
	Recover, recycle and blend up to 18 kg/yr plutonium-238.	Less than 18 kg of plutonium-238 were recovered, recycled and blended in CY 2011.

Capability	2008 SWEIS Projections	2011 Operations
Storage, Shipping, and Receiving	Provide interim storage of up to 6.6 metric tons of the LANL SNM inventory, mainly plutonium.	SNM storage, shipping, and receiving continue to be performed at the Plutonium Facility (Building 55-4).
	Store working inventory in the vault in Building 55-4; ship and receive SNM as needed to support LANL activities.	Building 55-4 vault levels remained approximately constant at levels identified during preparation of the SWEIS.
	Provide temporary storage of Security Category I and II materials removed in support of TA-18 closure, pending shipment to the Nevada National Security Site and other DOE Complex locations.	Continued temporary storage for TA-18 Category I and II material as projected in the SWEIS.
	Store sealed sources collected under DOE's OSRP.	Continued temporary storage of OSRP sealed sources as projected in the SWEIS.
	Store MOX fuel rods and fuel rods containing archive and scrap metals from MOX fuel lead assembly fabrication.	Continued storage of MOX fuel rods until a shipping container is available to transport the material to another DOE site where the fuel rods will be evaluated.

*. 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	2011 Operations
Radioactive Air Emissions			
Plutonium-239[a]	Ci/yr	1.95E-5	4.14E-09
Tritium in Water Vapor	Ci/yr	7.50E+2	1.14E+01
Tritium as a Gas	Ci/yr	2.50E+2	2.03E+00
NPDES Discharge			
03A–181	MGY	4.1	1.2
Wastes			
Chemical	kg/yr	8,618	14,678.60[b]
LLW	m^3/yr	757	185.36
MLLW	m^3/yr	15	10.89
TRU	m^3/yr	336[c]	50.78
Mixed TRU	m^3/yr	[c]	78.26

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

b. Chemical waste generated at the Plutonium Complex exceeded the 2008 SWEIS projection due to the disposal of unused/unspent Portland cement. Portland cement is stored in an elevated silo adjacent to TA-55-0004 and used for waste treatment operations. The silo was overfilled with Portland cement, exceeding the seismic rating of the silo; therefore, the excess Portland cement had to be removed from the silo and disposed of. This accounted for almost 50% (7,257.6kg) of the total chemical waste generated at the Plutonium Complex.

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.

Capability	Examples
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	2011 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	124.5
001	MGY	[b]	[c]
013	MGY	[b]	111.2[c]
03A-160	MGY	28.5	0.3
03A-199	MGY	[b]	13.0
Wastes			
Chemical	kg/yr	651,000	392,543.12
LLW	m^3/yr	1,529	178.60
MLLW	m^3/yr	31	0.37
TRU	m^3/yr	23[d]	7.90
Mixed TRU	m^3/yr	[d]	0

a. Stack emissions from previously active facilities (TA-33 and TA-41); these stacks have been shut down. Does not include non-point sources.

b. The 2008 SWEIS did not calculate individual flow per outfall. Three outfalls in Sandia Canyon are projected to discharge 172.4 MGY.

c. Discharge totals for Outfalls 001 and 013 have been combined.

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

Appendix B:
Chemical Usage and Estimated Emissions Data

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Key Facility	Toxic Air Pollutants	CAS Number	Units	2011 Usage	2011 Estimated Air Emissions
CMR Building	Arsenic, elemental and inorganic ,excluding Arsine, as As	7440-38-2	kg/yr	0.70	0.25
CMR Building	Hydrogen Bromide	10035-10-6	kg/yr	0.75	0.26
CMR Building	Hydrogen Chloride	7647-01-0	kg/yr	60.54	21.19
CMR Building	Hydrogen Fluoride, as F	7664-39-3	kg/yr	1.48	0.52
CMR Building	Nitric Acid	7697-37-2	kg/yr	39.68	13.89
CMR Building	Sulfuric Acid	7664-93-9	kg/yr	36.80	12.88
CMR Building	Tin numerous forms	7440-31-5	kg/yr	1.00	0.01
CMR Building	Uranium (natural), soluble and insoluble compounds as U	7440-61-1	kg/yr	4.75	1.66
Biosciences	Acetone	67-64-1	kg/yr	1.97	0.69
Biosciences	Chloroform	67-66-3	kg/yr	0.74	0.26
Biosciences	Ethanol	64-17-5	kg/yr	51.28	17.95
Biosciences	Ethanolamine	141-43-5	kg/yr	0.51	0.18
Biosciences	Ethyl Acetate	141-78-6	kg/yr	0.45	0.16
Biosciences	Hydrogen Chloride	7647-01-0	kg/yr	10.21	3.57
Biosciences	Hydrogen Peroxide	7722-84-1	kg/yr	87.22	30.53
Biosciences	Iso-Amyl Alcohol	123-51-3	kg/yr	0.40	0.14
Biosciences	Isopropyl Alcohol	67-63-0	kg/yr	22.39	7.84
Biosciences	Methyl Alcohol	67-56-1	kg/yr	17.41	6.09
Biosciences	Potassium Hydroxide	1310-58-3	kg/yr	0.76	0.26
Biosciences	Propyl Alcohol	71-23-8	kg/yr	0.81	0.28
Biosciences	Toluene	108-88-3	kg/yr	0.87	0.30
High Explosives Processing	Acetic Acid	64-19-7	kg/yr	2.89	1.01
High Explosives Processing	Acetone	67-64-1	kg/yr	76.62	26.82

Key Facility	Toxic Air Pollutants	CAS Number	Units	2011 Usage	2011 Estimated Air Emissions
High Explosives Processing	Acetonitrile	75-05-8	kg/yr	0.79	0.27
High Explosives Processing	Chloroform	67-66-3	kg/yr	29.66	10.38
High Explosives Processing	Cyclohexene	110-83-8	kg/yr	2.03	0.71
High Explosives Processing	Ethanol	64-17-5	kg/yr	18.66	6.53
High Explosives Processing	Ethyl Acetate	141-78-6	kg/yr	82.83	28.99
High Explosives Processing	Formic Acid	64-18-6	kg/yr	0.61	0.21
High Explosives Processing	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	1.98	0.69
High Explosives Processing	Hydrogen Chloride	7647-01-0	kg/yr	8.90	3.12
High Explosives Processing	Isopropyl Alcohol	67-63-0	kg/yr	0.79	0.27
High Explosives Processing	Magnesium Oxide Fume	1309-48-4	kg/yr	1.50	0.53
High Explosives Processing	Methyl Alcohol	67-56-1	kg/yr	16.70	5.84
High Explosives Processing	Methylene Chloride	75-09-2	kg/yr	13.27	4.64
High Explosives Processing	Nitric Acid	7697-37-2	kg/yr	1.53	0.53
High Explosives Processing	Nitrobenzene	98-95-3	kg/yr	1.20	0.42
High Explosives Processing	Propane	74-98-6	kg/yr	0.56	0.00
High Explosives Processing	Propionic Acid	79-09-4	kg/yr	0.99	0.35
High Explosives Processing	Sulfuric Acid	7664-93-9	kg/yr	4.60	1.61
High Explosives Processing	Tetrahydrofuran	109-99-9	kg/yr	4.45	1.56

Key Facility	Toxic Air Pollutants	CAS Number	Units	2011 Usage	2011 Estimated Air Emissions
High Explosives Processing	Toluene	108-88-3	kg/yr	6.94	2.43
High Explosives Processing	Tributyl Phosphate	126-73-8	kg/yr	3.89	1.36
High Explosives Testing	Acetic Acid	64-19-7	kg/yr	0.52	0.18
High Explosives Testing	Acetone	67-64-1	kg/yr	9.31	3.26
High Explosives Testing	Acetonitrile	75-05-8	kg/yr	13.36	4.67
High Explosives Testing	Chloroform	67-66-3	kg/yr	1.48	0.52
High Explosives Testing	Ethanol	64-17-5	kg/yr	108.14	37.85
High Explosives Testing	Hydrogen Chloride	7647-01-0	kg/yr	0.24	0.08
High Explosives Testing	Isopropyl Alcohol	67-63-0	kg/yr	26.71	9.35
High Explosives Testing	Methyl Alcohol	67-56-1	kg/yr	3.96	1.38
High Explosives Testing	Methylene Chloride	75-09-2	kg/yr	1.33	0.46
High Explosives Testing	Naphtalene	91-20-3	kg/yr	0.25	0.09
High Explosives Testing	Nitric Acid	7697-37-2	kg/yr	0.76	0.27
High Explosives Testing	Potassium Hydroxide	1310-58-3	kg/yr	1.51	0.53
High Explosives Testing	Sulfur Hexafluoride	2551-62-4	kg/yr	92.26	32.29
High Explosives Testing	Sulfuric Acid	7664-93-9	kg/yr	10.12	3.54
LANSCE	1,3,5-Trimethylbenzene	108-67-8	kg/yr	2.70	0.95
LANSCE	Acetic Acid	64-19-7	kg/yr	5.25	1.84
LANSCE	Acetone	67-64-1	kg/yr	15.80	5.53

Key Facility	Toxic Air Pollutants	CAS Number	Units	2011 Usage	2011 Estimated Air Emissions
LANSCE	Acetonitrile	75-05-8	kg/yr	0.79	0.27
LANSCE	Acetylene	74-86-2	kg/yr	39.12	0.00
LANSCE	Aniline and Homologues	62-53-3	kg/yr	0.36	0.13
LANSCE	Chloroform	67-66-3	kg/yr	5.93	2.08
LANSCE	Copper	7440-50-8	kg/yr	0.41	0.00
LANSCE	Dimethyl Amine	124-40-3	kg/yr	1.41	0.50
LANSCE	Ethanol	64-17-5	kg/yr	66.71	23.35
LANSCE	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	2.64	0.92
LANSCE	Hydrogen Chloride	7647-01-0	kg/yr	36.80	12.88
LANSCE	Isopropyl Alcohol	67-63-0	kg/yr	6.28	2.20
LANSCE	Methyl Alcohol	67-56-1	kg/yr	26.91	9.42
LANSCE	Methyl Silicate	681-84-5	kg/yr	0.50	0.18
LANSCE	Methylene Bisphenyl Isocyanate (MDI)	101-68-8	kg/yr	0.50	0.18
LANSCE	Nitroethane	79-24-3	kg/yr	0.50	0.18
LANSCE	Pentane (all isomers)	109-66-0	kg/yr	2.50	0.88
LANSCE	Propane	74-98-6	kg/yr	1.54	0.00
LANSCE	Sulfuric Acid	7664-93-9	kg/yr	4.60	1.61
LANSCE	Tetrahydrofuran	109-99-9	kg/yr	5.34	1.87
LANSCE	Tungsten as W insoluble compounds	7440-33-7	kg/yr	0.40	0.00
LANSCE	Xylene (o-,m-,p-Isomers)	1330-20-7	kg/yr	1.12	0.39
Machine Shops	Acetone	67-64-1	kg/yr	1.58	0.55
Machine Shops	Acetylene	74-86-2	kg/yr	4.27	0.00
Machine Shops	Propane	74-98-6	kg/yr	0.37	0.00
Materials Science Laboratory	Acetone	67-64-1	kg/yr	1.97	0.69
Materials Science Laboratory	Ethanol	64-17-5	kg/yr	7.13	2.50

Key Facility	Toxic Air Pollutants	CAS Number	Units	2011 Usage	2011 Estimated Air Emissions
Materials Science Laboratory	Isopropyl Alcohol	67-63-0	kg/yr	9.43	3.30
Materials Science Laboratory	Methyl Alcohol	67-56-1	kg/yr	10.29	3.60
Plutonium Facility Complex	Acetylene	74-86-2	kg/yr	41.09	0.00
Plutonium Facility Complex	Ethanol	64-17-5	kg/yr	12.74	4.46
Plutonium Facility Complex	Hydrogen Chloride	7647-01-0	kg/yr	309.22	108.23
Plutonium Facility Complex	Methylene Chloride	75-09-2	kg/yr	0.66	0.23
Plutonium Facility Complex	Nitric Acid	7697-37-2	kg/yr	22.89	8.01
Plutonium Facility Complex	Potassium Hydroxide	1310-58-3	kg/yr	350.01	122.50
Plutonium Facility Complex	Propane	74-98-6	kg/yr	69.66	0.00
Radiochemistry	Acetic Acid	64-19-7	kg/yr	4.72	1.65
Radiochemistry	Acetone	67-64-1	kg/yr	184.44	64.56
Radiochemistry	Acetonitrile	75-05-8	kg/yr	9.11	3.19
Radiochemistry	Aluminum numerous forms	7429-90-5	kg/yr	0.34	0.00
Radiochemistry	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.50	0.18
Radiochemistry	Benzene	71-43-2	kg/yr	1.75	0.61
Radiochemistry	Bromine	7726-95-6	kg/yr	0.78	0.27
Radiochemistry	Cadmium, elemental and compounds, as Cd	7440-43-9	kg/yr	2.16	0.76
Radiochemistry	Carbon Disulfide	75-15-0	kg/yr	0.32	0.11
Radiochemistry	Carbon Tetrachloride	56-23-5	kg/yr	11.16	3.91
Radiochemistry	Chlorobenzene	108-90-7	kg/yr	1.11	0.39
Radiochemistry	Chloroform	67-66-3	kg/yr	1.48	0.52

Key Facility	Toxic Air Pollutants	CAS Number	Units	2011 Usage	2011 Estimated Air Emissions
Radiochemistry	Chromium, metal and Cr III compounds, as Cr	7440-47-3	kg/yr	0.90	0.32
Radiochemistry	Cobalt, elemental and inorganic compounds, as Co	7440-48-4	kg/yr	1.12	0.01
Radiochemistry	Copper	7440-50-8	kg/yr	1.12	0.01
Radiochemistry	Ethanol	64-17-5	kg/yr	7.10	2.49
Radiochemistry	Ethyl Acetate	141-78-6	kg/yr	25.66	8.98
Radiochemistry	Ethyl Ether	60-29-7	kg/yr	19.25	6.74
Radiochemistry	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	51.52	18.03
Radiochemistry	Hydrogen Bromide	10035-10-6	kg/yr	6.38	2.23
Radiochemistry	Hydrogen Chloride	7647-01-0	kg/yr	269.58	94.35
Radiochemistry	Hydrogen Fluoride, as F	7664-39-3	kg/yr	31.09	10.88
Radiochemistry	Hydrogen Peroxide	7722-84-1	kg/yr	33.76	11.82
Radiochemistry	Hydrogen Sulfide	7783-06-4	kg/yr	0.33	0.11
Radiochemistry	Isopropyl Alcohol	67-63-0	kg/yr	12.57	4.40
Radiochemistry	Isopropyl Ether	108-20-3	kg/yr	0.36	0.13
Radiochemistry	Lead, elemental and inorganic compounds, as Pb	7439-92-1	kg/yr	1.41	0.01
Radiochemistry	Methyl Alcohol	67-56-1	kg/yr	40.36	14.13
Radiochemistry	Methylene Chloride	75-09-2	kg/yr	23.35	8.17
Radiochemistry	n,n-Dimethylformamide	68-12-2	kg/yr	1.99	0.70
Radiochemistry	Nickel, metal (dust) or soluble and inorganic compounds	7440-02-0	kg/yr	1.11	0.39
Radiochemistry	Nitric Acid	7697-37-2	kg/yr	676.79	236.88
Radiochemistry	Pentane (all isomers)	109-66-0	kg/yr	3.76	1.32
Radiochemistry	Phosphoric Acid	7664-38-2	kg/yr	1.83	0.64
Radiochemistry	Phosphorus	7723-14-0	kg/yr	0.29	0.10
Radiochemistry	Potassium Hydroxide	1310-58-3	kg/yr	1.76	0.61

Key Facility	Toxic Air Pollutants	CAS Number	Units	2011 Usage	2011 Estimated Air Emissions
Radiochemistry	Propane	74-98-6	kg/yr	120.09	0.00
Radiochemistry	Propionic Acid	79-09-4	kg/yr	0.99	0.35
Radiochemistry	Pyridine	110-86-1	kg/yr	1.86	0.65
Radiochemistry	Sulfuric Acid	7664-93-9	kg/yr	2.76	0.97
Radiochemistry	Tetrahydrofuran	109-99-9	kg/yr	14.01	4.90
Radiochemistry	Toluene	108-88-3	kg/yr	10.92	3.82
Radioactive Liquid Waste Treatment Facility	Hydrogen Chloride	7647-01-0	kg/yr	417.83	146.24
Radioactive Liquid Waste Treatment Facility	Potassium Hydroxide	1310-58-3	kg/yr	0.30	0.11
Sigma Complex	2-Butoxyethanol	111-76-2	kg/yr	1.80	0.63
Sigma Complex	Acetic Acid	64-19-7	kg/yr	2.62	0.92
Sigma Complex	Acetone	67-64-1	kg/yr	165.96	58.09
Sigma Complex	Diethylene Triamine	111-40-0	kg/yr	1.44	0.50
Sigma Complex	Ethanol	64-17-5	kg/yr	116.82	40.89
Sigma Complex	Furfuryl Alcohol	98-00-0	kg/yr	1.13	0.40
Sigma Complex	Isopropyl Alcohol	67-63-0	kg/yr	113.90	39.86
Sigma Complex	Methyl Alcohol	67-56-1	kg/yr	3.17	1.11
Sigma Complex	m-Phenylenediamine	108-45-2	kg/yr	1.07	0.37
Sigma Complex	Phosphoric Acid	7664-38-2	kg/yr	1.83	0.64
Sigma Complex	Propane	74-98-6	kg/yr	42.17	0.00
Solid Radioactive and Chemical Waste Facility	Acetylene	74-86-2	kg/yr	0.34	0.00
Solid Radioactive and Chemical Waste Facility	Ethanol	64-17-5	kg/yr	91.95	32.18
Solid Radioactive and Chemical Waste Facility	Propane	74-98-6	kg/yr	89.30	0.00

Key Facility	Toxic Air Pollutants	CAS Number	Units	2011 Usage	2011 Estimated Air Emissions
Target Fabrication Facility	1,4-Dioxane	123-91-1	kg/yr	1.03	0.36
Target Fabrication Facility	Acetone	67-64-1	kg/yr	26.52	9.28
Target Fabrication Facility	Aluminum, numerous forms	7429-90-5	kg/yr	1.00	0.01
Target Fabrication Facility	Ethanol	64-17-5	kg/yr	8.96	3.14
Target Fabrication Facility	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	2.64	0.92
Target Fabrication Facility	Hexylene Glycol	107-41-5	kg/yr	1.75	0.61
Target Fabrication Facility	Isopropyl Alcohol	67-63-0	kg/yr	13.75	4.81
Target Fabrication Facility	Methyl Alcohol	67-56-1	kg/yr	30.07	10.53
Target Fabrication Facility	Methylene Chloride	75-09-2	kg/yr	1.33	0.46
Target Fabrication Facility	Nitric Acid	7697-37-2	kg/yr	4.58	1.60
Target Fabrication Facility	Propyl Alcohol	71-23-8	kg/yr	0.40	0.14
Target Fabrication Facility	Tetrahydrofuran	109-99-9	kg/yr	21.34	7.47
Target Fabrication Facility	Toluene	108-88-3	kg/yr	0.87	0.30
Target Fabrication Facility	Xylene (o-,m-,p-Isomers)	1330-20-7	kg/yr	4.00	1.40

Appendix C:
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. Forker LASO Safety Basis Team Leader	03/01/2011 Date
[illegible] 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:
DOE 2011 Pollution Prevention Awards for LANL

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The DOE Headquarters, in conjunction with NNSA, sponsor annual P2 awards programs. The programs provide recognition to personnel who implement P2 projects. LANS submits nominations for the DOE/NNSA awards each year. During the 2011 P2 awards, LANS received six awards for P2 projects, including two Best-in-Class awards. The winning projects are described below.

- ***Sustainable Projects for a Sustainable Future:*** Several coordinated activities introduced at LANL during the 2010 Earth Week laid the foundation for sustainable practices that have maintained momentum in 2011. The Third Annual Energy Town Hall highlighted innovative projects surrounding energy issues and facilitated discussions relating to energy at the Laboratory. The LANL Environmental Protection, Institutional Facilities and Central Services, and Utilities and Infrastructure Divisions launched an organic vegetable garden to demonstrate the importance of locally grown and sustainable food and the concept of "slow food." The overall goal of using the produce from the garden for dishes served at the Otowi Cafeteria was also a success. The events of Earth Week encouraged a greater awareness at LANL of recycling, public transportation, waste minimization, and energy use.
- ***Sigma Electroplating Discharge Reduction:*** Replacement of a vacuum pump used in a rinse water recycle system and elimination of the steam heating of the electroplating baths resulted in significant energy, water, and waste savings for LANL's Sigma Electroplating Laboratory.
- ***Video Teleconferencing Cuts Travel Costs and Reduces Greenhouse Gas Emissions:*** An unclassified video teleconference center was established in the Chemistry and Metallurgy Research Replacement Project Office. This teleconference center allows for live, interactive, and efficient communications without involving travel. It is estimated that one meeting alone saves approximately $10,000 in travel costs while simultaneously reducing carbon emissions.
- ***Integration of SSP Goals and the EMS:*** The flow-down of new sustainability goals late in the FY tested the ability of the environmental management system (EMS) to respond with meaningful objectives and targets for the upcoming FY. The Laboratory's mature EMS provided a reasonable, cogent response that covered the scope of the Site Sustainability Plan requirements within the time-frame required. This resulted in the Laboratory being recognized as the only site in the DOE complex to successfully integrate the EMS and the Site Sustainability Plan.

- ***Algal Biofuels Consortium Development:*** The Laboratory's Algal Biofuels Consortium Development Team continues to provide leadership in renewable energy research focused on innovative technologies that will help bring biofuels to a commercial reality. The Team formed the National Alliance for Advanced Biofuels and Bioproducts (NAABB) consortium. The Alliance secured funding from DOE to develop innovative technologies for cost-effective production of algal biomass and lipids, economically viable fuels and co-products, and a framework for a sustainable biofuels industry.

- ***New Plutonium Removal Technique Means Less Waste:*** The introduction of a variation on an analytical technique significantly reduced or eliminated problematic waste and improved worker safety. The new process uses a miniature column separation technique coupled with gas pressurized extraction chromatography to separate plutonium from the trace impurities for inductively coupled plasma spectroscopy analysis. This new technique eliminates 90 percent of the TRU liquid waste and all of the TRU solid waste and LLW generated by the previously employed gravity column separation and elution methods. This new process is also amenable to other applications where chromatographic separation of actinides is required for sample preparation.

Appendix E:
Fiscal Year 2011 Actions Taken in Response to the Las Conchas Fire

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LA-UR 11-05877

Title: **FISCAL YEAR 2011 ACTIONS TAKEN IN RESPONSE TO THE LAS CONCHAS FIRE AT LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO**

APRIL 2012

Preparers: Marjorie A. Wright, Hallie E. Mahowald, and Jennifer E. Payne, Environmental Protection Division, Environmental Stewardship Group (ENV-ES)

Prepared for the U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Site Office

Los Alamos NATIONAL LABORATORY EST. 1943

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ACRONYM List

AEI	Area of Environmental Interest
ASPECT	Airborne Spectral Photometric Environmental Collection Technology
BA	Biological Assessment
BMPs	Best Management Practices
BNM	Bandelier National Monument
CAMNET	Continuous Air Monitoring Network
CX	Categorical Exclusion
DBH	diameter at breast height
DOE	Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENV-ES	Environmental Stewardship Group
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPO	LASO Environmental Projects Office
FONSI	Finding of No Significant Impact
FRS	Flood Retention Structure
FY	Fiscal Year
HMP	Habitat Management Plan
HPAL	Health Physics Analytical Laboratory
IFRAT	Interagency Flood Risk Assessment Team
IWMT	Interagency Wildfire Management Team
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LANSCE	Los Alamos Neutron Science Center
LASO	Los Alamos Site Office
MAFFS	Modular Airborne Firefighting System
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
MOU	Memorandum of Understanding
MSS	Maintenance and Site Services
NEPA	National Environmental Policy Act
NM	New Mexico
NMCF	New Mexico Community Foundation
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NPS	National Park Service
PRS	Potential Release Site

RACER	Risk Analysis, Communication, Evaluation, and Reduction
RAP	Radiation Assistance Program
RMT	Resources Management Team
ROD	Record of Decision
SEA	Special Environmental Assessment
SHPO	State Historic Preservation Office
SMA	Site Monitoring Area
SR	State Road
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
TAL	Target Analyte List
T&E	Threatened and Endangered
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

1.0 Executive Summary

The Las Conchas fire began June 26, 2011 (Photograph 1). The fire spread quickly, driven by strong winds and extremely dry conditions, burning 43,000 acres (17,401 ha) on the first day. By the time it was fully contained on August 1, 2011, the Las Conchas fire had burned 156,593 acres (63,371 ha), making it the largest wildfire in New Mexico history (Figure 1). Fortunately, no lives were lost because of the Las Conchas fire. Approximately 133 acres (52 ha) of Los Alamos National Laboratory (LANL or the Laboratory) and Department of Energy (DOE)/National Nuclear Security Administration (NNSA) property were burned by the Las Conchas fire and related back burns. Approximately 131 acres were intentionally back burned to help limit the spread of the wild fire, a small spot fire in TA-49 burned about one acre, and a small wildlife-related fire burned another acre (Figure 2). Between 2000 and 2011, LANL and the Los Alamos Site Office (LASO) worked together to complete many fire/fuels mitigation projects, which limited the ability of the fire to cross onto LANL property. Although the fire burned only a small area of LANL, it affected areas above the Laboratory, which created areas with little or no vegetation, increasing the risk of flooding and erosion at the Laboratory and to surrounding communities.

Photograph 1. The Las Conchas fire burns in the Jemez Mountains above LANL.

The majority of the actions taken in response to the Las Conchas fire were related to erosion control, fuel mitigation, and fire suppression. These activities and the associated National Environmental Policy Act (NEPA) coverage for them are discussed here.

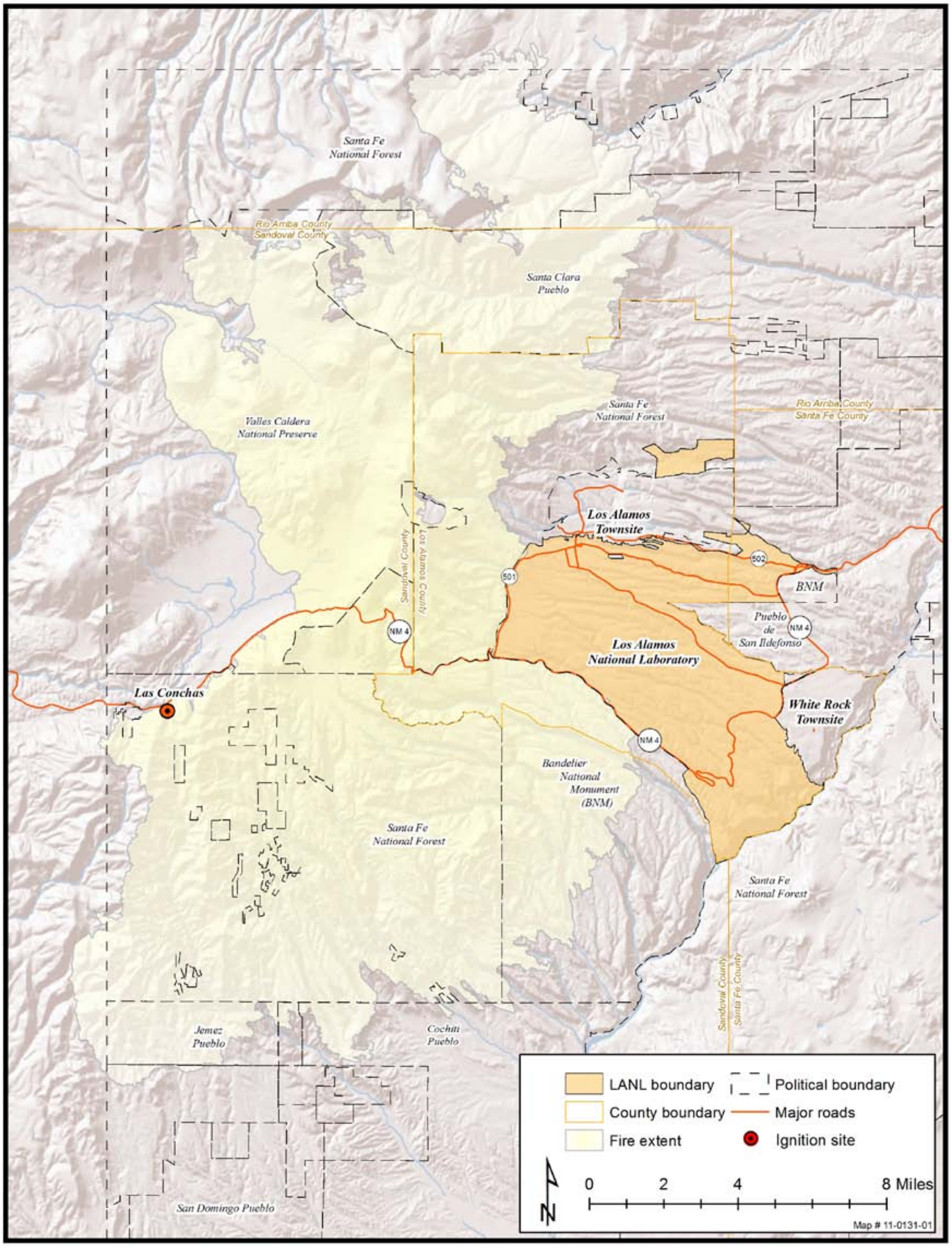

Figure 1. Extent of the Las Conchas fire and LANL boundary.

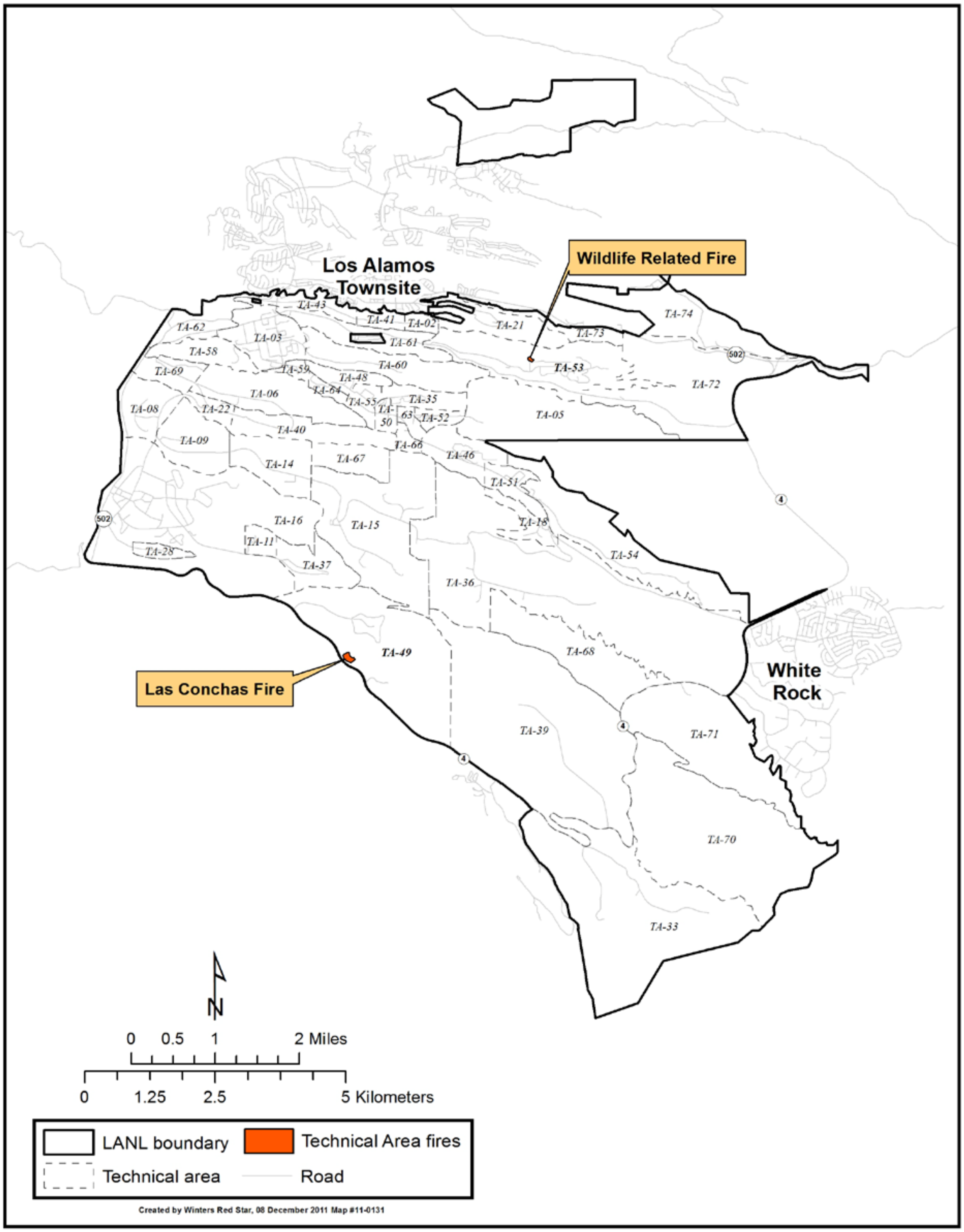

Figure 2. Locations of two small, one-acre or less, fires that occurred at LANL during the Las Conchas fire.

2.0 Las Conchas Fire

The Las Conchas fire began on June 26, 2011, as the result of a wind-thrown tree striking and shorting out an electrical power line. The fire burned southwest, west, north, and northwest of the town of Los Alamos, New Mexico (Figure 1). It began on private property and impacted Sandoval, Los Alamos, and Rio Arriba counties, Santa Clara Pueblo, Jemez Pueblo, Cochiti Pueblo, Santo Domingo Pueblo, Bandelier National Monument (BNM or Bandelier), Santa Fe National Forest, Valles Caldera National Preserve, DOE, and other state and private lands.

Voluntary evacuations of the Los Alamos and White Rock communities began June 26, 2011 and a mandatory evacuation order for Los Alamos was issued on Monday, June 27, 2011. LANL was closed from June 27 to July 6, 2011 and the Emergency Operations Center (EOC) was activated on June 26. Teams from Type 1 Incident Management Team, a federally or state-certified team with the highest level of training and experience, were activated, due, in part, to the fire's rapid growth. A Type 1 Team is activated for the most complicated fires. More than 1,200 firefighters from Los Alamos, neighboring communities, and across the country came to northern New Mexico to fight the Las Conchas fire (Photographs 2 and 3).

Photograph 2. Las Conchas fire team preparing for next firefight.

Photograph 3. Vale Hotshots sing the National Anthem the morning of July 4, 2011.

On LANL property administered by DOE, only one acre of land burned as a result of the wild fire, one acre burned as a result of wildlife accident, and approximately 131 additional acres burned through intentional back burns. The fire burned small areas on LANL/DOE property. A one-acre spot fire along the south boundary of Technical Area (TA)-49 occurred when the fire crossed State Road (SR) 4 onto LANL property (Figure 2). This area had been subject to previous tree thinning measures and the fire was extinguished within an hour. This fire occurred only on the mesa top and not in the canyon. On July 2, 2011, a wildlife-related fire occurred at TA-53, the Los Alamos Neutron Science Center (LANSCE) (Figure 2). This small fire was started when a squirrel touched contacts in an electrical substation's transformer. The transformer sparked a small fire, which the Los Alamos Fire Department extinguished within a short period of time. About 131 acres of DOE administered lands were burned during prescribed back burns along New Mexico (NM) 501, SR 4, and in Rendija Canyon.

More than 150,000 acres burned along the mountain range above LANL, to the south, and to the north of LANL. Bandelier and Santa Clara Pueblo sustained major impacts from the fire. The Las Conchas fire was the most destructive wildfire in recorded New Mexico history. With such large areas of burned vegetation, including areas of bare ash along the steep slopes and canyon sides above LANL, there was a very high risk for flooding within the LANL facility and in residential communities downstream all the way to the Rio Grande.

About 36 percent of the annual precipitation for the Los Alamos area falls in the form of rain, primarily during intense thunderstorms that occur in July and August each year, but may occur as late as October. Temporary, semi-permanent, and permanent flood control measures were undertaken during and after the fire to prevent the potential loss of life and property damage, and to protect sensitive cultural resources and potential habitat for federally listed threatened and endangered species present within floodplain areas. Until enough vegetation is established to cover the hillsides and canyons to act as a deterrent to soil erosion and flooding, the potential for flooding will continue for several years and possibly for decades in some locations.

3.0 National Environmental Policy Act (NEPA) Documentation

To date, all mitigation actions undertaken in response to the Las Conchas fire are covered under existing NEPA determinations (Table 1). NEPA analyses completed after the 2000 Cerro Grande fire provided NEPA coverage for most actions taken in response to the Las Conchas fire (DOE/SEA-03, DOE 2000b). Other routine type activities taken in response to the Las Conchas fire (e.g., culvert cleanouts, environmental monitoring) were covered under the 2008 Site-Wide Environmental Impact Statement (SWEIS; DOE 2008). LANL's Policy Document 400 requires all new and/or modified projects to be reviewed for potential environmental impacts. Actions taken in response to the Las Conchas fire were subjected to such reviews. In an August 9, 2011 letter, DOE/NNSA LASO directed LANS to prepare an environmental summary of the actions taken in response to the Las Conchas fire. In response to that request, LANS prepared and transmitted a final memorandum and environmental summary (Table 1, ESHQ 11-034) for LASO's Environmental Projects Office (EPO) to assist DOE in determining NEPA coverage for these mitigation activities. The summary table includes a comprehensive list of activities conducted for erosion/flood mitigation activities, fire mitigation activities, emergency measures, post-fire maintenance repair/response to potential flood events, additional environmental monitoring, and planned/anticipated activities. The table, included in this report as a reference, also includes existing NEPA coverage for the activities undertaken at LANL as well as dates associated with the activities. This appendix provides a more detailed description of these activities. No new NEPA coverage was necessary.

DOE and LANL learned a great deal during the 2000 Cerro Grande fire. After the Cerro Grande fire, DOE mitigated many fire-related effects and undertook several projects to help protect the Laboratory and its neighbors in case of subsequent wildfires (e.g., flood retention and detention structures, erosion controls, and tree thinning to create defensible space). DOE has worked diligently over the past decade to analyze projects related to potential wildfires and flood events, so that in case of an emergency, actions could be undertaken and the environmental impacts would already be analyzed and understood.

In response to the Las Conchas fire, emergency actions were taken to protect human life and property. During the fire, members of the Resources Management Team (RMT), within the Environment, Safety, Heath, and Quality Directorate at LANS, worked with fuels mitigation crews to avoid impacts to cultural and biological resources. Staff archaeologists worked ahead of crews to flag sites in areas planned for treatment and accompanied crews into areas that had not been previously surveyed. The RMT also worked with DOE/NNSA LASO, who notified the State Historic Preservation Office (SHPO) and the U.S. Fish and Wildlife Service (USFWS) of emergency actions being taken in response to the Las Conchas fire. Emergency actions are discussed in Section 5 below. There were no violations of federal or state laws that protect cultural and biological resources identified on DOE property during the Las Conchas fire.

Existing NEPA coverage relevant to the mitigations taken in response to the Las Conchas fire includes the 2008 SWEIS (DOE 2008), the 2000 Special Environmental Analysis (SEA; DOE 2000b), and the Environmental Assessments (EAs) for the Trails Management Program (DOE 2003), the Wildfire Hazard Reduction (DOE 2000a), and the Flood Retention Structure (DOE 2002). In accordance with the 2008 SWEIS Mitigation Action Plan (MAP), which includes mitigations associated with EAs, LANS committed to report post-fire mitigation actions in the Fiscal Year (FY) 2011 SWEIS Mitigation Action Plan Annual Report (MAPAR) and, if necessary, in the FY 2012 SWEIS MAPAR.

4.0 Cerro Grande Fire Mitigations

Following the 2000 Cerro Grande fire, which burned substantial areas of LANL, DOE issued the SEA (DOE 2000b) to document its assessment of impacts associated with emergency activities conducted at LANL during that fire. In 2000, DOE addressed many fire-related mitigations and undertook several projects to help protect LANL and its surrounding neighbors. The main goal of LANL rehabilitation efforts after the Cerro Grande fire was to reduce the risk of potential flooding and the movement of Cold War-era contaminants off-site. Actions were designed to stabilize ash and soil, reduce runoff, and improve infiltration. These flood control measures have been in place around the Los Alamos town site and LANL for the last 11 years. DOE, in partnership with the U.S. Army Corps of Engineers (USACE), undertook post-Cerro Grande fire construction actions, which have been analyzed for environmental impacts in a variety of documents. These post-fire construction actions included the following:

- Construction of rock gabion low-head weir structures in Los Alamos and Pueblo canyons to reduce transport of contaminates off-site,
- Reinforcement of Los Alamos Canyon Reservoir (also in coordination with Los Alamos County),
- Construction of the Pajarito Canyon Flood Retention Structure (FRS) to protect LANL facilities downstream from post-fire flooding,
- Reinforcement of three drainage crossings along SR 501, and
- Reinforcement of Anchor Ranch Road drainage crossing at Two-mile Canyon.

LANL implemented a multi-year fire safety improvement program, starting with an emergency Congressional appropriation shortly after the Cerro Grande fire. LANL purchased more than 35 new fire trucks, service vehicles, and pieces of heavy equipment; built a state-of-the-art EOC; conducted tree-thinning, cleared ground fuels, and constructed firebreaks and roads; built a new interagency fire center with a helicopter base and water dip tanks at TA-49 (Photograph 4); enacted interagency agreements and training with the U.S. Forest Service (USFS), National Park Service (NPS), Los Alamos County, and the state of New Mexico; improved storm water runoff and erosion controls; planted more than 10,000 willows; and built structures to help prevent Cold War-era contaminants from flowing off-site.

Storm water control measures, known as best management practices (BMPs), were put in place to protect potential release sites (PRSs) that burned during the Cerro Grande fire. During the same time that the SEA was published, DOE issued an Environmental Assessment (EA) for the Wildfire Hazard Reduction and Forest Health Improvement Program at LANL (DOE/EA-1329). This EA addressed the immediate needs of the Laboratory to: (1) reduce the risk of damage and injury to property, human life and health, and resources from high-intensity wildfires and (2) enhance forest health.

In the 11 years since the Cerro Grande fire, LANL has implemented a Wildland Fire Management Plan, successfully creating defensible space buffers around all facilities, performing tree thinning to remove hazard trees and dense understory vegetation, and constructing new fire roads and firebreaks to facilitate access for fire suppression vehicles in the event of a wildfire. These mitigation activities proved critical and minimized the amount of LANL/DOE property that burned during the Las Conchas fire. There will also be lessons learned from the Las Conchas fire, which will provide information and help to improve LANS/DOE responses to future emergency events.

Photograph 4. Helicopter bucket refills at TA-49.

5.0 Mitigation Actions Taken in Response to the Las Conchas Fire

All DOE/NNSA and LANS fire activities were coordinated through the EOC (Photographs 5 and 6). At the EOC, representatives from LANS, DOE/NNSA, Los Alamos County, the State of New Mexico, the Environmental Protection Agency (EPA), the NPS, USFS, and others participated in briefings and updates. The following sections describe mitigation actions taken in response to the Las Conchas fire.

5.1 Erosion/Flood Mitigation Activities

The Las Conchas fire burned in watersheds above or immediately adjacent to LANL sufficient to have significant impact on slope and soil stability and to create conditions favorable for generation of large damaging floods. Affected watersheds include Los Alamos, Pajarito/Two-mile, Water Canyon/Canon de Valle, Frijoles, and Guaje Canyons. As part of the Laboratory’s mitigation activities, several priority actions were taken to reduce the consequences associated with post-fire flooding (Photograph 7).

5.1.1 Los Alamos Canyon Low-Head Weir

The potential for large floods generated from burned areas was present even while the fire was still active. The Los Alamos watershed was one of the watersheds most affected by the Las Conchas fire. The Los Alamos Canyon low-head weir was installed near the downstream boundary of the Laboratory after the Cerro Grande fire to collect sediments mobilized by floodwaters and to reduce the transport of contaminated sediments off-site (DOE 2002).

In anticipation of increased sediment loads following rain events after the Las Conchas fire, approximately 1,200 cubic yards of sediment were removed from the weir and staged in Los Alamos Canyon in a borrow pit approximately one mile (1.6 kilometers) from the weir and 400 feet (121.9 meters) south of the active stream channel and floodplain. The staging area was lined with reinforced polypropylene plastic liner before the sediment was emplaced. This activity was performed from July 8 to 11, 2011 (Photograph 8). This sediment removal is part of an on-going, annual maintenance activity that was accelerated in schedule to ensure adequate capacity for potential sediment flow after the Las Conchas fire.

To prevent potential overtopping of the weir by floodwaters, more of the discharge standpipe at the base of the weir was exposed to increase the flow rate through the weir (Photograph 9). This activity was performed in conjunction with the sediment-removal activities described above. At the request of the New Mexico Environment Department (NMED), the standpipe was returned to its original configuration and wrapped with filter fabric on August 18, 2011 (LANL 2011b; Photograph 9).

Photograph 5. Fire Chief Doug Tucker briefs management at the LANS EOC.

Photograph 6. Senator Tom Udall (second from right) and Laboratory Director Charlie McMillan (center) discuss issues with Tony Stanford (right), Andrew Erickson (second from left), and Tim Walker-Foster (left) at the EOC.

Photograph 7. Flooding in Canyon on LANL property after the Las Conchas fire.

Photograph 8. Crews using heavy machinery to remove sediment from the Los Alamos Canyon Weir to restore its storage capacity.

Photograph 9. Crews expose discharge standpipe and wrap it with filter fabric.

5.1.2 Removal of Contamination and Waste from LANL Canyons

Crews removed and disposed of legacy contamination and waste from the canyon systems, including Los Alamos, Pajarito, and Water Canyons. Waste removal is a standard LANL activity that was completed in response to the potential threat of post-fire flooding (DOE 2008). More than 100 drums, eight roll-off bins, and more than 13,000 gallons of investigation-derived waste (waste from collecting environmental samples) from 40 poly-tanks were removed and disposed of (Photograph 10).

5.1.3 Los Alamos Canyon Retention Basins

In anticipation of increased sediment loads following rain events after the Las Conchas fire, sediments were removed from upper Los Alamos Canyon retention basins (Los Alamos Solid Waste Monitoring Unit (SWMU)-2, LA SMA-2) to restore their storage capacity. Crews removed and disposed of approximately 25–30 cubic yards of contaminated sediments. Sediment removal is a standard, on-going LANL activity; basins are maintained and cleaned regularly. However, the removal activity was accelerated in schedule to ensure that the maximum capacity of existing structures was available in case of post-fire flooding events (DOE 2002; DOE 2008; Photograph 11).

Photograph 10. Crews remove sediments and waste from canyon.

Photograph 11. Los Alamos Canyon retention basin.

5.1.4 Armoring Utility Infrastructure, Wellheads, and Sediment Collection Systems

LANS crews placed armoring (concrete barriers) around utility infrastructure, groundwater monitoring wells, and sediment collection systems in Los Alamos and Water Canyons as necessary, to protect these structures from potential floods and damage by floating debris (Photographs 12 and 13). Crews from Los Alamos County placed concrete barriers around the Los Alamos Ice Rink in order to protect it from the fire and associated flooding (DOE 2008; Photograph 14).

Photographs 12 and 13. Armoring at groundwater wellhead (left) and armoring of a sediment collection system (right).

Photograph 14. Armoring at the Los Alamos County Ice Rink.

5.2 Fire Mitigation Activities

During the Las Conchas fire, LANS personnel conducted several fuels mitigation projects. The coordination between LANS Emergency Management, Maintenance and Site Services (MSS), and the RMT was an example of successful collaboration during the fire. Crews were deployed to several areas to complete fuels thinning and to improve existing fire roads and firebreaks. Crews used industrial-sized mowers and large-vegetation mulching machines, known as *masticators,* to reduce grasses, shrubs, and small trees to help prevent the spread of the fire (Photographs 15 and 16).

In accordance with LANS' Cultural Resources Management Plan (LANL 2006) and in consultation with LASO, LANS archaeologists were part of these crews. An archaeologist was assigned to each crew and marked archaeological sites in areas scheduled for thinning so that the sites could be avoided and not impacted by these activities.

Photograph 15. Mowers work to create firebreaks along Pajarito Road.

Photograph 16. Ellen McGehee, LANS cultural resources specialist, with a masticator.

LANS biologists were also on call during the fire; however, the Biological Resources Management Plan does not require a biologist to accompany these crews. In consultation with LASO, emergency notifications were made to the USFWS to inform them of the work that was being conducted.

5.2.1 Firebreaks, Mastication, and Mowing

Crews created permanent firebreaks at TA-33 and TA-70. Firebreak construction resulted in soil disturbance and potential increased risk of soil erosion. Crews also graded the existing fire road and mowed alongside the road at Cañada del Buey and Pajarito Road near TA-54.

During the fire, crews reduced fuels at TA-54 along the LANL perimeter and along Pajarito Road using a masticator (Photograph 17). A major area of public concern was Area G, a 63-acre site that stores containers of transuranic waste awaiting transport to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico (Photograph 18). Area G is the site of the Laboratory's only active disposal pit for radioactive low-level waste (e.g., clothing or tools contaminated by exposure to radioactive materials). The risk of fire at Area G, however, is low since it is paved and ground fuels have been removed. Daily inspections were conducted at the site, which is surrounded by groundwater monitoring wells, air-monitoring stations, sensors, and radiation alarms. The Las Conchas fire did not impact Area G.

Mastication was also conducted to create fuel breaks at TA-71 and Rendija Canyon and to reduce fuel under power lines along NM 501 and SR 4 (Photographs 19 and 20).

Along with the mastication work, crews reduced fuel along Pajarito Road by mowing. Masticated material was left on-site to provide soil stability and erosion control.

Photograph 17. A masticator works to complete tree thinning along the LANL perimeter.

Photograph 18. Aerial view of TA-54, Area G, on June 29, 2011.

Photograph 19. Preparing a fire line along SR 4 during the Las Conchas fire.

Photograph 20. Tree thinning and mastication along SR 4; evidence of the fire can be seen on the left side.

5.2.2 Tree Thinning

Tree thinning occurred in Los Alamos Canyon from the Los Alamos County Ice Rink to the western DOE boundary. This work was completed by Los Alamos County workers and volunteers. Trees with a diameter of nine inches and greater when measured at 4.5 feet (1.4 meters) were cut, which would have been a violation of LANL's Habitat Management Plan (HMP). However, LASO conducted an emergency consultation with the USFWS regarding the tree thinning in Los Alamos Canyon and the USFWS determined that no violation of the HMP occurred. The HMP, a comprehensive site-wide management plan that addresses the management of federally protected species, was prepared by LANL and approved by the USFWS in 1999. The plan details how threatened and endangered (T&E) species and their habitats are managed at LANL. Included in the plan are specific work controls for any LANL activities that occur in or near T&E species habitat.

Photograph 21. Tree thinning along the LANL perimeter during the Las Conchas fire.

Photograph 22. Hand thinning.

LANS crews cleared brush and thinned trees along the LANL perimeter of TA-54 (Photographs 21 and 22). When the Las Conchas fire shifted farther north and east, DOE/NNSA directed LANS to conduct fire mitigation activities in Rendija Canyon to limit the ability of the fire to move into the Los Alamos residential areas of Barranca Mesa. Aggressive tree thinning and mastication was conducted from July 1 to July 12, 2011 (Photograph 23). The environmental impacts associated with tree thinning at LANL were analyzed in DOE's Environmental Assessment of Wildfire Hazard Reduction (DOE 2000a).

Photograph 23. An aerial view of fuels mitigation activities in Rendija Canyon.

5.2.3 Back Burning and Pre-Burns Conducted by the U.S. Forest Service

During the Las Conchas fire, fire crews lit a series of back burns/controlled burns in areas adjacent to and on DOE property to prevent the spread of the wildfire (Photograph 24). These burns accounted for most of the acreage (about 131 acres) that burned on LANL/DOE property during the fire. No resources were impacted as a result of these back burns. The environmental impacts associated with conducting controlled burns at LANL were analyzed in DOE's Environmental Assessment of Wildfire Hazard Reduction (DOE 2000a). A Finding of No Significant Impact (FONSI) was issued for this EA on October 18, 2004.

Photograph 24. Area of back burn along LANL's western boundary, NM 501.

5.2.4 Impacts to Biological and Cultural Resources

Biological Resources. LANS biologists completed a floodplain/wetland assessment for areas scheduled for mitigation actions situated within a floodplain or wetland. The assessment was issued on June 29 and published online on July 13, 2011. The assessment stated, "fires will be fought as they occur and any suppression in sensitive habitat will have storm water protection and will be restored as soon as emergency conditions will allow." In anticipation of fires entering LANL property, firebreaks were installed in Pajarito and Los Alamos Canyons, as well as in the canyons surrounding TA-54 (Area G). "Installation of these breaks in the floodplains in Pajarito and Los

Alamos Canyons temporarily increased run off and erosion" (LANL 2011c). Firebreak construction resulted in soil disturbance and potential increased risk of soil erosion. Erosion controls and rehabilitation measures have been implemented since the fire and these sites will be monitored to ensure their recovery. During the Las Conchas fire, fuels mitigation activities mowed less than one acre of the Pajarito wetlands. LANS biologists assessed the wetlands and determined that the impacts to the wetlands are temporary and biologists will continue monitoring the wetlands to document their recovery.

There is habitat as well as two occupied breeding territories for the Mexican Spotted Owl (*Strix occidentalis lucida*) at LANL (Figure 3). A Biological Assessment (BA) assessed the direct, indirect, and cumulative effects of the Las Conchas fire mitigations including a proposed redelineation of the Los Alamos Canyon Mexican Spotted Owl Area of Environmental Interest (AEI) at LANL. The BA was transmitted to LASO in September 2011 (LANL 2011a) and LASO was to transmit the BA to the USFWS in October 2011. LASO awaits a determination. The BA concluded that the impacts of the emergency mitigation activities conducted by Los Alamos County workers and volunteers in Los Alamos Canyon did impact the Mexican Spotted Owl AEI. Due to impacts from the fire mitigations in the upper end of the Los Alamos Canyon AEI, along with cumulative impacts of planned recreational access and activities involving this area, LANS biologists determined that an upper section of the Los Alamos Canyon AEI is no longer suitable habitat for Mexican Spotted Owl and propose to remove that area from the AEI. The result will be a reduction of 805.33 acres (325.90 ha) in the size of core and 1,322.97 acres (535.39 ha) in the size of the buffer for the Los Alamos Canyon AEI. USFWS will make the final determination in their response to the BA.

LANL's HMP identifies habitat for the Southwestern Willow Flycatcher (*Empidonax trailii extimus*) at LANL. Fire mitigations impacted 5.43 acres (2.20 ha) of buffer and 0.35 acres (0.14 ha) of core Southwestern Willow Flycatcher habitat. However, LANS recommends application of reasonable and prudent measures such that these actions may affect, but are not likely to adversely affect, the Southwestern Willow Flycatcher. Again, USFWS will make the final determination in their response to the BA.

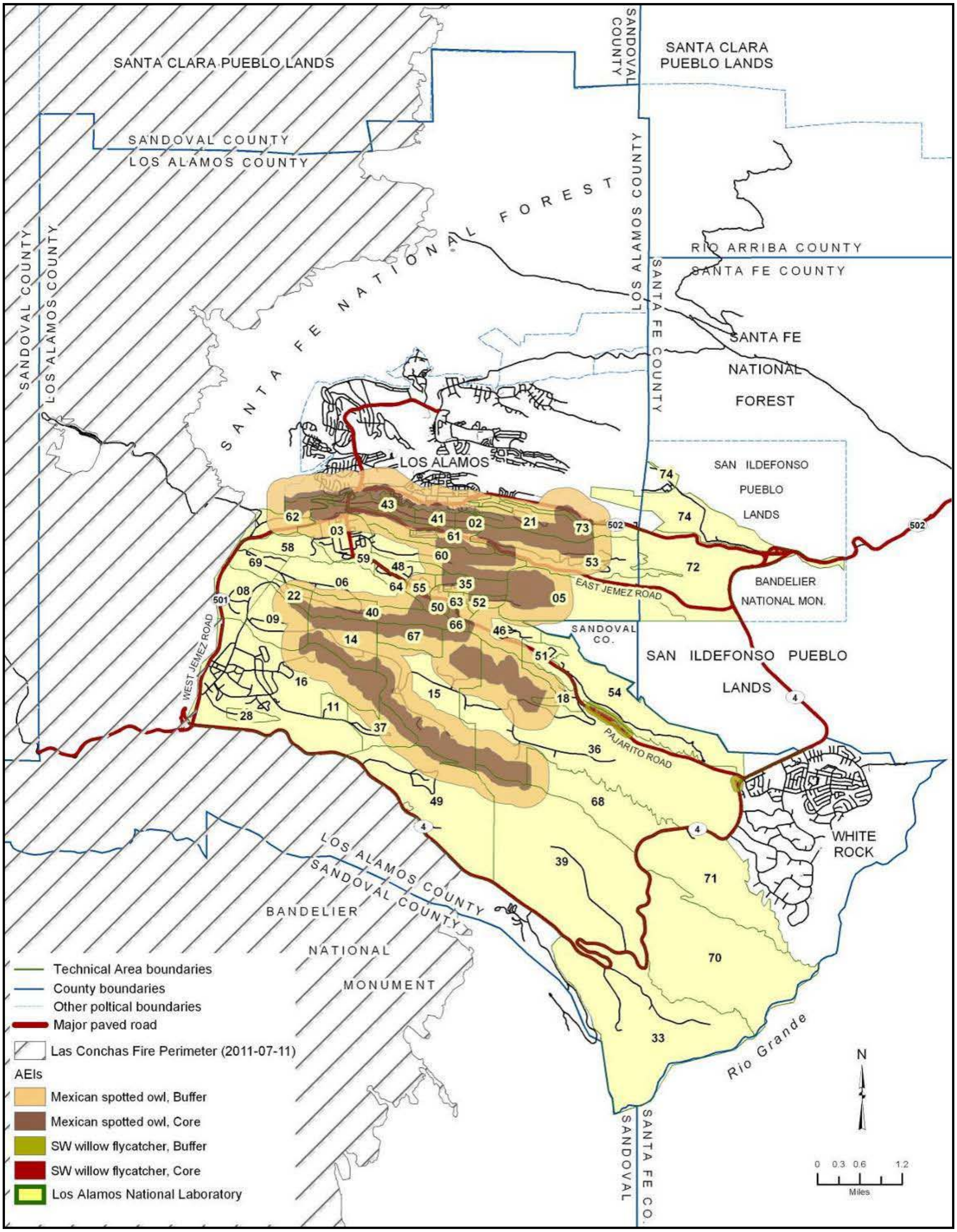

Figure 3. Mexican Spotted Owl and Southwestern Willow Flycatcher habitat (LANL 2011a).

Cultural Resources. During the fire, LANS archaeologists worked with the fuels mitigation crews to mitigate potential impacts to any identifiable cultural resources. Archaeological sites are not always clearly visible, so having cultural resource experts, trained to recognize and evaluate sites, working with fuels mitigation crews was essential to support LANL's mission, to maintain compliance with federal and state laws and regulations, and to protect these resources during the Las Conchas fire. Cultural resources were flagged in areas subject to back burns along SR 4 and West Jemez Road and potential archaeological sites were marked that could be impacted by potential future flood mitigation activities as well. Surveyed areas included a dozer cut that encircled and contained the spot fire in TA-49 and masticator/dozer lines placed in TA-54, TA-70, and TA-71 that were used as firebreaks to prevent the fire from progressing into these areas. Also surveyed were masticated areas located along the north side of SR 4 in TA-36. Field assessments of the areas treated between June 26 and July 8, 2011, have been completed, and no impacts to cultural resources by any fire suppression activities were identified.

5.3 Emergency Measures

5.3.1 LANL Road Closures

The Laboratory was closed from June 27 through July 6, 2011, to non-essential employees. The EOC, however, was in full operation around the clock beginning June 26, 2011, and certain employees were instructed to report to the EOC. All employees entered onto Laboratory property through staffed guard gates and were required to check in at the EOC. A voluntary evacuation for Los Alamos and White Rock was issued on June 26, 2011. A mandatory evacuation for the Los Alamos town site was issued Monday, June 27, 2011, which was initially enforced by the Los Alamos Police Department and NM State Police. The U.S. Army National Guard and the Air Guard were also called in to enforce the evacuation and closures (Photograph 25). Los Alamos reopened to residents on July 3, 2011.

West Road, NM 501, and SR 4 were closed temporarily during the fire. In late July and August, during the monsoon rains, post-fire flooding caused the closure of West Road and NM 501. As of September 30, 2011, West Road remains closed and will be reopened when the damage has been assessed and mitigated and there is no risk of flooding.

Photograph 25. The U.S. Army National Guard enforced road closures during the fire.

5.3.2 Fire Suppression

LANS workers used water trucks (Photograph 26) to spray down areas subject to tree thinning, mastication, and fuels mitigation along SR 4 on the southern LANL boundary to prevent spot fires and hold the fire line. A mesa-top spot fire did occur on LANL property on June 27, 2011. The fire was approximately one acre in size, located along the southern boundary of TA-49 (Photographs 27 and 28).

Fire suppression activities on LANL property included creation of fire lines and the use of helicopter water and slurry drops (Photographs 29, 30, and 31). LANS employees were not engaged in firefighting activities; firefighters specializing in wildland fires conducted those activities. Water drops by C-130 aerial attack occurred near DOE property in Rendija Canyon (Photograph 32). The C-130, Modular Airborne Fire Fighting System (MAFFS), is a self-contained aerial firefighting system that can discharge 3,000 gallons of water or fire retardant in less than five seconds, drawing lines of containment that can cover an area one-quarter of a mile long by 60 feet wide. Once the load is discharged, the MAFFS system can be refilled in less than 12 minutes.

Fire suppression activities may have resulted in increased soil erosion potential. Information on the aerial application of wildland fire retardant and its associated NEPA analysis can be found on the USFS website: http://www.fs.fed.us/fire/retardant/.

A regional Interagency Wildfire Management Team (IWMT) was formed in 1996 to provide fire control advice and a forum to exchange expertise and information among land stewards in the East Jemez region. The IWMT has representatives from the Laboratory, DOE, Los Alamos County, the USFS, the NPS, the Pueblo of San Ildefonso, the State of New Mexico, and other interested parties. The IWMT fostered consultations between agencies and developed information for evaluating wildfire problems, proposing optimal mitigation strategies, and undertaking implementation. The IWMT collaborated on the fuel break activities along NM 501 and the fire cache/heliport development at TA-49.

Under an Interagency Memorandum of Understanding (MOU) between NPS, DOE, and the USFS, prior to the Las Conchas fire as part of a Cerro Grande fire follow-up, DOE authorized the NPS to construct a single permanent structure at TA-49. The facility also includes a helipad and dip tank. These dip tanks were used during the Las Conchas fire to refill the helicopter water buckets allowing emergency personnel to quickly extinguish the one acre fire that burned on Laboratory property.

Photograph 26. LANS worker stands in front of a water truck (aka a water buffalo).

Photograph 27. Aerial view of the burned area at TA-49 five days after the fire was extinguished.

Photograph 28. Burned area at TA-49 two months after fire was extinguished.

Photograph 29. Skycrane Helicopter at Los Alamos Airport.

Photograph 30. A helicopter makes a slurry drop.

Photograph 31. A helicopter makes a water drop at TA-49.

Photograph 32. A Modular Airborne Fire Fighting System (MAFFS) C-130 #7, U.S. Air Force, flying over the Las Conchas fire.

5.3.3 Trail Closures

LANL was closed during the Las Conchas fire and reopened on July 6, 2011. Trails situated on LANL/DOE property were also closed and remained closed in the interest of public safety. Environmental impacts associated with recreational trails use were analyzed in the 2003 EA for the proposed Trails Management Program and its mitigated FONSI (DOE 2003). Signs were posted at trailheads during and after the fire (Photograph 33).

On July 28, 2011, most trails, with the exception of trails that access Los Alamos Canyon and those that are potentially affected by flooding between TA-3 and TA-16, were reopened. LANS' actions were consistent with measures taken by Los Alamos County, and trail users were reminded of the risks of trail use in burned areas. Risks included falling trees, uneven ground, displaced wildlife, and other safety issues.

Fire impacts did not affect the Los Alamos County trail system except for the Quemazon and Perimeter trails that were used by firefighters and for firebreaks. Three major watersheds (Alamo, Frijoles, and Capulin Canyons) at Bandelier were severely burned and rebuilding the trails into the backcountry canyons will require extensive work. The Tsankawi Unit at Bandelier has experienced a large increase in use, and parking adjacent to SR 4 may compromise/impact traffic safety. Bandelier has asked LANL and LASO to help address this situation. The most impacted trails in the Santa Fe National Forest above LANL were those in Water Canyon where trails were obliterated. Cañon de Valle was not as severely affected. The Caballo Mountain and Pajarito Canyon trails on USFS land were destroyed. The USFS will work with the Volunteer Task Force and others to resume trails maintenance on the Los Alamos Country trail system.

Photograph 33. Trail closure sign on trail into Los Alamos Canyon.

5.3.4 Emergency Fueling Station and Emergency Power at Pajarito Ski Hill

LANS crews set up an emergency fueling station at the parking lot at LANL's Wellness Center (TA-3-1163) to provide fuel to emergency vehicles and fire trucks (Photographs 34 and 35). No fuel spills occurred. LANS also provided emergency power to Pajarito Mountain during the fire. Because communications from Pajarito Mountain were being cut off by the loss of power due to the fire, LANS crews transported a LANL generator to Pajarito Tower, providing emergency power.

Photograph 34. Fueling vehicles at the emergency fueling station.

Photograph 35. A fire truck fuels up at the emergency fueling station.

5.4 Post-Fire Maintenance/Repair Response to Flood Events

5.4.1 Removal of Debris, Ash, and Sediment and Pumping Ash-laden Runoff

After the Las Conchas fire, the monsoon rains arrived. Flooding, erosion, and transport of debris, ash, and sediment became a significant issue at LANL. Post-fire flooding of roads and drainages created safety and environmental hazards (Photograph 36). In response, LANS crews acted quickly and removed post-fire debris, ash, and sediment from culvert inlets and outlets along NM 501 and Anchor Ranch Road. Crews pumped accumulated ash-laden runoff out of the area, removed debris, and re-established the flow of the culvert under NM 501 at the Water Canyon drainage crossing (DOE 2008). Blockage of storm water runoff and damming by debris also caused storm water to pond and ash to accumulate along NM 501 (Photographs 37 and 38). Ponding resulted from soil saturation, which then resulted in roadbed failure.

Since monsoon season in Los Alamos can persist into October, these activities and restoration of areas impacted by post-fire floods will continue for subsequent years.

Photograph 36. Post-fire flooding effects on NM 501.

Photograph 37. Ponding of ash and debris along NM 501.

Photograph 38. Ash accumulation at Water Canyon crossing and NM 501.

5.4.2 Planned/Anticipated Activities

As inspections of BMPs continue, erosion controls in Site Monitoring Areas (SMAs) are expected to need repair. As rain events persist, crews will continue to clean out culverts, as necessary, in Water Canyon, Pajarito Canyon, Cañon de Valle, and along NM 501 and Anchor Ranch Road (Photograph 39). Crews will repair roads damaged by flooding around LANL as necessary (Photograph 40).

Photograph 39. Cleaned out culvert along Anchor Ranch Road.

Photograph 40. Post-Las Conchas fire flooding impacts a road at LANL.

5.4.3 Fence Repair

LANS crews repaired a security fence at TA-16 damaged by post-Las Conchas fire flooding in August 2011. A heavy rain event caused post-fire flooding in and around the Pajarito Canyon and Water Canyon drainages that flowed onto LANL, south of Pajarito Canyon and north of Cañon de Valle. The flow crossed Anchor Ranch Road and destroyed about 20 feet of fence (Photographs 41 and 42).

Photograph 41. Post-fire flooding at Anchor Ranch Road.

Photograph 42. Security fence at along Anchor Ranch Road damaged by flood event.

5.5 Additional Environmental Monitoring

5.5.1. Air Sampling

During the Las Conchas fire, there was considerable interest in radioactive and chemical air emissions. Samples of the smoke plume were collected and analyzed by DOE, LANL, EPA, and NMED for constituents naturally present in forest fire smoke and to evaluate whether materials associated with Laboratory operations were present. Preliminary results of air samples showed no radioactive materials from LANL operations or legacy waste in smoke from the Las Conchas fire.

AIRNET is a radiological ambient air sampling network in Los Alamos, Santa Fe, and Rio Arriba counties designed to measure levels of airborne radionuclides such as plutonium, tritium, and uranium that may be emitted from Laboratory operations. There were approximately 55 AIRNET stations in existence around the perimeter of the Laboratory at the start of the fire (Figure 4; Photograph 43). Eleven additional AIRNET high-volume air samplers were installed along the perimeter of the Laboratory. Five high-volume air samplers were installed by the Field Monitoring Team around LANL. Seven high-volume air samplers were installed by DOE's Radiological Assistance Program (RAP) in surrounding communities including Chimayo, El Valle, Socorro, Taos, Embudo, and Las Vegas. These high-volume air samplers were temporary. Four Continuous Air Monitoring Network (CAMNET) stations were installed in surrounding communities including Santa Fe, El Rancho, San Ildefonso and Espanola.

The equipment was used heavily during the Las Conchas fire to monitor any possible radiochemical release (Photograph 44). Data were also obtained by the EPA's Airborne Spectral Photometric Environmental Collection Technology (ASPECT). Each sample collected during the fire was split into two samples and sent to the Health Physics Analytical Laboratory (HPAL) at LANL for fast preliminary results (24-hour turnaround) and to ALS Laboratory in Colorado for expedited conventional analysis. These results enabled Laboratory managers to update the public on air quality data during the fire. Filters from the AIRNET and high-volume samplers were analyzed at ALS for americium-241, plutonium-238, plutonium-239, uranium-234, uranium-235, uranium-238, gross alpha and beta, a suite of gamma emitters, Target Analyte List (TAL) metals, beryllium, and mercury. LANS also analyzed high-volume filters on site at the HPAL for gross alpha and a suite of gamma emitters. The results from the preliminary testing performed at HPAL are posted in the New Mexico Community Foundation (NMCF)'s Risk Analysis, Communication, Evaluation and Reduction (RACER) database at http://racernm.com. On June 29, LANL made the following statement, "Preliminary results of air samples taken at Los Alamos National Laboratory boundaries show no radioactive materials from Laboratory operations or legacy waste in smoke from the Las Conchas fire." The air quality monitoring data showed that the observed constituents were typical of any wildland fire, they were consistent with those measured during the Cerro Grande fire (DOE 2000b), and indicated no measurable contamination from LANL.

The complete set of data was reported in the RACER database and will be discussed in the Environmental Report for 2011 (formerly the Environmental Surveillance Report).

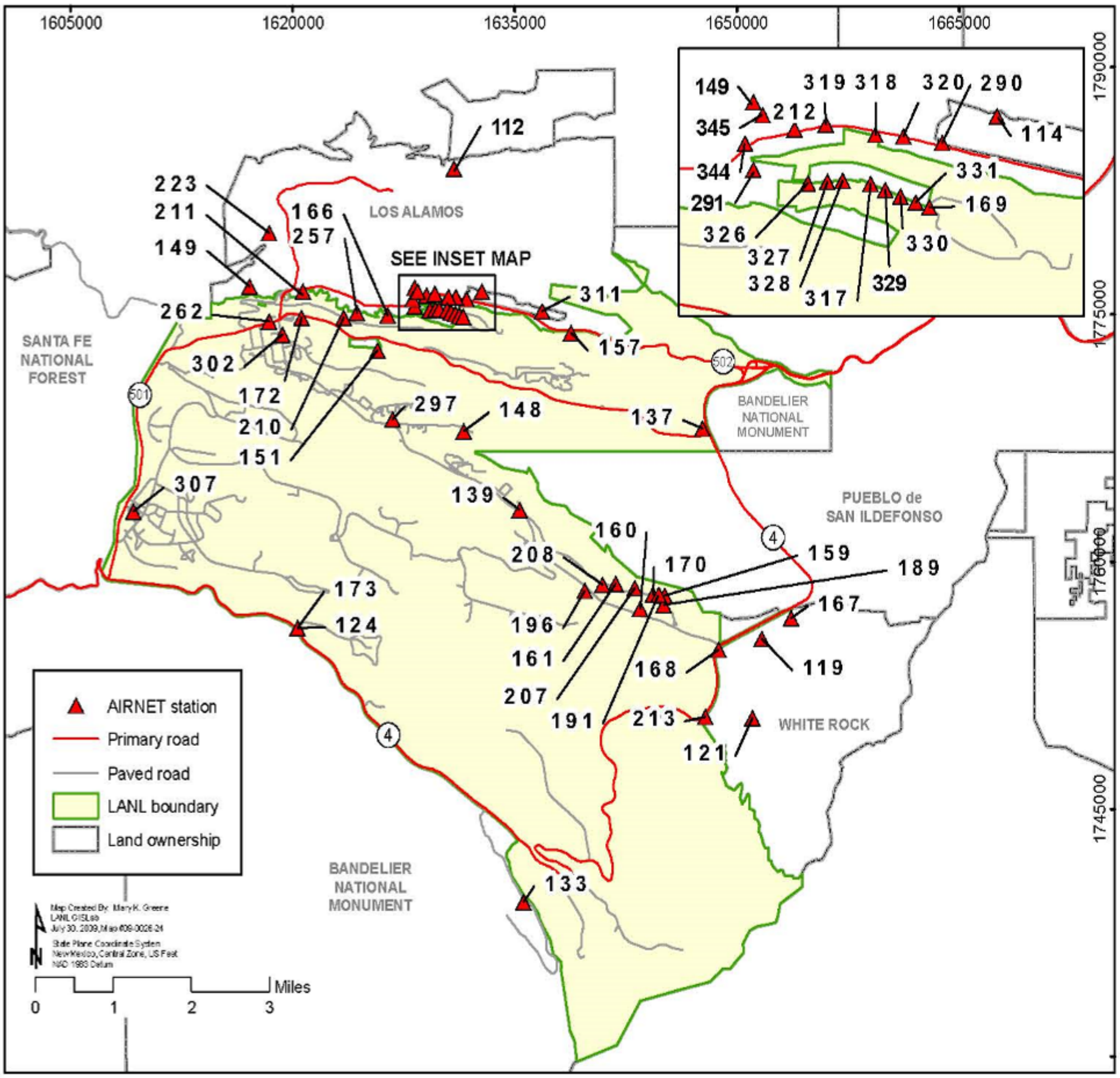

Figure 4. LANL AirNet Stations (NMCF, RACER database).

Photograph 43. Air monitoring equipment bordering TA-21.

Photograph 44. AIRNET Station being checked during the fire.

5.5.2 Water Monitoring

During the Las Conchas fire, 17 water monitoring stations were identified around LANL for quick turnaround water sampling. In addition, crews inspected rain gauge and sampler notification systems around LANL. Water monitoring results will be published in the RACER database at http://racernm.com.

Surface Water. Following initial startup activities and implementation of the first-priority mitigation actions described above, the Laboratory began implementation of a comprehensive storm water monitoring plan designed to provide data to support a regional-scale post-fire risk assessment. The Interagency Flood Risk Assessment Team (IFRAT) was initiated in late summer 2011 and is being conducted as a multi-agency effort led by the New Mexico Department of Health and includes participation by LANL, DOE, NMED, the City of Santa Fe's Buckman Direct Diversion Project, and the Albuquerque water utility. Storm water samples will continue to be collected from runoff events at gage stations located around the LANL region to measure water quality for runoff flowing onto and off of Laboratory property. All post-fire storm water data has been loaded into the RACER database. Surface water monitoring results will be published and available to the public in the RACER database as well.

Groundwater. Alluvial groundwater wells will continue to be monitored to determine the movement or transport of contaminants on and off Laboratory property. Groundwater monitoring results will be published and available to the public in the RACER database.

5.5.3 Biota Sampling

In addition to LANL's standard contaminant monitoring program, LANS biologists collected biota samples upstream and downstream along the Rio Grande after the Las Conchas fire. Biota samples were also collected from Cochiti Lake in August 2011 (Photographs 45 and 46). Results from the biota samples collected will be published in the 2011 Environmental Report (formerly the Environmental Surveillance Report).

Photograph 45 and 46. LANS biologists collecting biota samples on Cochiti Lake.

6.0 References

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6.1 Data Sources for Figures 1 - 4

TA Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published August 13, 2010.

LANL Areas Used and Occupied; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; 19 September 2007; as published August 13, 2010.

Fire extent (burnSeverityBARC_FINAL); various data sets created to support the emergency stabilization efforts of the Interagency DOI BAER Team responding to the Las Conchas fire, New Mexico in July 2011.

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Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published August 17, 2011.

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Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; as published August 13, 2010.

Ownership Boundaries Around LANL Area; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; as published August 13, 2010.

Drainages; Los Alamos National Laboratory, Environmental Protection, RCRA and Water Quality Permitting and Compliance; currently unpublished 2010 project data (08-0106).

Table 1. ESHQ 11-034. Summary of Las Conchas Fire Mitigation Activities at Los Alamos National Laboratory and Existing National Environmental Policy Act (NEPA) Coverage

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Erosion/Flood Mitigation Activities						
Los Alamos Canyon Low-Head Weir	Removal and disposing of 1200 cubic yards of sediments to restore capacity. On-going activity, the Los Alamos Canyon weir is maintained and cleaned out annually and as necessary.	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	DOE/EA-1408 Cerro Grande Fire Flood and Sediment Retention Structures, http://www.doeal.gov/EA-1408; DOE/SEA-03 Special Environmental Analysis: Actions Taken in Response to the Cerro Grande Fire SEA-03-2000.pdf	Activity part of baseline work executed earlier than planned as part of post-fire efforts. Clean sediment would be land applied or stockpiled as clean fill. Contaminated soil would be disposed of as part of LANL's routine waste operations.	Beneficial impact by reduction of potential damage from storm water runoff, erosion, and contaminant transport.
Los Alamos, Pajarito, and Water Canyons	Removal and disposal of contamination and waste from canyon system: • >100 drums • Eight (8) roll off bins • >13,000 gallons of investigation derived waste from 40 poly-tanks	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	Activity part of baseline work was executed earlier than planned to accommodate the post-fire efforts.	Beneficial impact by reduction of potential damage from contaminant transport.
Los Alamos Canyon Retention Basins	Removal and disposing of approximately 25-30 cubic yards contaminated sediments. On-going activity, these basins are maintained and cleaned out as necessary.	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	DOE/EA-1408 Cerro Grande Fire Flood and Sediment Retention Structures, http://www.doeal.gov/EA-1408;	None	Beneficial impact by reduction of potential damage from storm water runoff, erosion, and contaminant transport.
Los Alamos Canyon	Armoring (placement of concrete barriers) around utility infrastructure and wellheads	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Los Alamos, Pajarito, and Water Canyons	Armoring of sediment collection systems	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Los Alamos Canyon	Armoring (placement of concrete barriers) around the Los Alamos Ice Rink	6/27–7/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	This work was completed by Los Alamos County	Protection of existing structure.
Fire Mitigation Activities						
TA-33	Firebreak	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	Firebreak construction exposed mineral soils, potential increased soil erosion.
Los Alamos Canyon (TA-43)	Tree thinning (Los Alamos County Ice Rink to western DOE boundary) was completed by Los Alamos County workers and volunteers	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Trees >9 inches dbh were cut, however there was an emergency consultation with the USFWS about the tree thinning, so there was no violation of the HMP.	Degradation of Mexican Spotted Owl core habitat.
TA-49	Fuel reduction by masticator	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Masticated material was left onsite to provide soil stability and erosion control. RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
TA-54 along LANL perimeter	Tree thinning	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
Canada del Buey (TA-54)	Graded existing fire road; mowing	6/29–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
Pajarito Road from TA-54 to NM 4 (TA-36)	Fuel reduction by masticator; mowing	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Masticated material was left onsite to provide soil stability and erosion control. RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
TA-70	Firebreak	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Resource Management Team staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	Firebreak construction exposed mineral soils, potential increased soil erosion.

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
TA-71	Fuel break by masticator	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	EA-1431 Trails Management Program http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/EA-1431-FEA-2003.pdf	Masticated material was left on-site to provide soil stability and erosion control. RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	Some trail cleanup work needed; no permanent damage
LANL Western Boundary	Pre-burn by U.S Forest Service	6/29/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	10/18/2004 FONSI addressed controlled burning on LANL. Resource Management Team staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	Minor and temporary air and soil impacts; small-scale, temporary impacts to vegetation/habitat
Rendija Canyon	Fuel reduction by masticator	7/8–7/12/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	DOE/EIS-0293 Conveyance and Transfer of Certain Land Tracts http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/EIS-0293-FEIS-01-1999.pdf	Masticated material left on-site for soil stability and erosion control. Resource Management Team staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
NM 501 (East Side)	Fuel reduction under power lines by masticator	6/29/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Masticated material left on-site for soil stability and erosion control. RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
Emergency Measures						
LANL	LANL closed	6/27–7/04/2011 (Complete)	N/A	N/A	Temporary, no resource impacts	None
West Road	Road closure – the road will reopen when flooding is no longer an issue.	6/27 to present (On-going)	N/A	N/A	Temporary, no resource impacts	None
West Jemez Road (NM 501)	Road closure due to flooding danger	8/3/2011 (Complete)	N/A	N/A	Temporary, no resource impacts	None
NM 4 at West Jemez Road (NM 501)	Road closure	6/27–7/7/2011 (Complete)	N/A	N/A	Temporary, no resource impacts	None
NM 4 along Southern LANL boundary	Spraying of water for fire suppression	6/26–6/29/2011 (Complete)	2008 SWEIS considered wildfire as an accident, fire suppression used in outdoor burning explosives is covered by CX B1.12 and B1.2 has long been a "routine" part of LANL operations	N/A	Workers held fire line by spraying water along southern LANL boundary.	Erosion - negligible

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Along NM 4; Southern LANL boundary	Fire suppression activities	6/26–6/29/2011 (Complete)	2008 SWEIS considered wildfire as an accident; fire suppression used in outdoor burning explosives is covered by CX B1.12 and B1.2 has long been a "routine" part of LANL operations	N/A	Workers held fire line by spraying water along southern LANL boundary	None
TA-49	Fire suppression activities	6/27/2011 (Complete)	2008 SWEIS considered wildfire as an accident; fire suppression used in outdoor burning explosives is covered by CX B1.12 and B1.2 has long been a "routine" part of LANL operations	N/A	Fire suppression activities included fire lines, helicopter water drops, and slurry drops. For slurry ingredients go to: http://www.fs.fed.us/rm/fire/wfcs/index.htm	Fire suppression activities could cause minor soil erosion.
LANSCE (TA-53)	Fire suppression activities	7/2/2011 (Complete)	2008 SWEIS considered wildfire as an accident; fire suppression used in outdoor burning explosives is covered by CX B1.12 and B1.2 has long been a "routine" part of LANL operations	N/A	The TA-53 fire was not part of Las Conchas fire, but it did occur during the fire. This fire ignited when a squirrel touched contacts in electrical substation transformer. The transformer sparked a one-acre fire. The fire was extinguished by Los Alamos County firefighters using fire trucks and water.	Fire suppression activities could cause minor soil erosion.
LANL Trails	Trail closures	7/8-8/1/2011 (Complete)	EA for the Los Alamos National Laboratory Trails Management, Los Alamos, New Mexico (DOE EA- 1431) http://energy.gov/EA-1431	N/A	None	None
TA-3-1663 Parking Lot	Emergency fueling location	6/27-7/6/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	LANL provided an emergency fueling area for fire trucks. No fuel spills occurred.	None
Pajarito Ski Hill	LANL generator transported to Pajarito Tower to provide emergency power	Complete	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	Outside LANL/DOE boundary	None

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Post-fire maintenance/ repair- response to potential flood events						
NM 501/Anchor Ranch Road	Removal of post-fire debris, ash, and sediment from culvert inlets and outlets	8/4-8/9/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
Water Canyon at NM 501	Pumping of accumulated ash laden runoff, removal of debris, reestablishment of flow to culvert under NM 501. On-going activity, debris removal as necessary, routine road maintenance.	8/5-8/9/2011 (On-going)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	Storm water runoff and debris damming could cause storm water to pond.	Ponding could result in soil saturation, which could result in roadbed failure.
TA-16	Repair damaged security fence	8/4-8/9/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Additional Environmental Monitoring						
Los Alamos and White Rock	11 AIRNET High Volume Air Samplers	6/27-6/30/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
LANL	Five (5) High Volume Air Samplers installed by the Field Monitoring Team	6/27-7/1/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Surrounding communities (Santa Fe, El Rancho, San Ildefonso, Espanola)	Four (4) CAMNET installed	6/30-7/19/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Surrounding communities (Chimayo, El Valle, Socorro, Taos, Embudo Las Vegas)	Seven (7) High Volume Air Samplers by DOE's Radiological Assistance Program (RAP)	6/29-7/5/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
LANL	17 monitoring stations identified for quick turnaround water sample analysis. On-going, routine sampling, expedited analysis in response to the Las Conchas fire.	7/8/2011 to present (On-going)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
LANL	Inspections of rain gauge and sampler notification systems. On going, inspections and test of the notification system is part of routine maintenance.	7/5/2011 to present (On-going)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Rio Grande	Additional biota samples collected upstream and downstream along Rio Grande.	8/8-8/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Planned/Anticipated Activities						
LANL	Repair of baseline Best Management Practices (BMPs) controls in Site Monitoring Area (SMA)s/routine maintenance.	On-going	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Water and Pajarito Canyons; Canon de Valle, NM 501	Culvert cleanouts. On going, baseline, BMPs, and routine maintenance.	On-going	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
LANL	Road repair. On going, baseline, BMPs, and routine maintenance.	On-going	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Cochiti Lake	Additional biota samples collected from the lake in August 2011	9-10/2011 (On-going)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None

To obtain a copy of the SWEIS Yearbook – 2011, contact
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The 2011 Yearbook is available on the web through the
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