DOE/EA-1422-SA-01

Supplement Analysis for the Final Site-Wide Environmental Assessment for Sandia National Laboratories/California

[September 2012]

U.S. Department of Energy
National Nuclear Security Administration
Sandia Site Office

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COVER SHEET

RESPONSIBLE AGENCY: U.S. DEPARTMENT OF ENERGY/NATIONAL NUCLEAR SECURITY ADMINISTRATION

TITLE: Supplement Analysis for the Final Site-Wide Environmental Assessment for Sandia National Laboratories/California (DOE/EA-1422-SA-01)

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Abstract: This Supplement Analysis (SA) determines whether the 2003 Final Site-Wide Environmental Assessment (SWEA) for Sandia National Laboratories/California (SNL/CA) remains adequate in characterizing potential environmental impacts from the current operation of SNL/CA, and anticipated operation over the next 5 years. The U.S. Department of Energy issued a Finding of No Significant Impact in March 2003 under any of the alternatives evaluated. For this SA, a screening review was performed for each resource area presented in the SWEA, evaluating new or modified projects or proposals, changed circumstances, and new regulations, to determine whether impacts remain within the envelope of consequences established in the SWEA. Within the screening review, values used for the SWEA Maximum Operations Alternative serve as the primary basis for comparison. Detailed analysis was required for a storm water-related issue – specifically, the amount of impervious surface. It was discovered that the number of acres of impervious surface was underestimated in the SWEA; however, conditions have changed little if any since the SWEA was produced, and no substantial impacts have been observed.

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ACRONYMS AND ABBREVIATIONS

µg	microgram
µm	micrometers
ABL	Applied Biosciences Laboratory
BSL	Biosafety Level
CAGR	compound annual growth rate
CFC	chlorofluorocarbon
CFR	*Code of Federal Regulations*
CRC/VB	Combustion Research Computational/Visualization Building
CRF	Combustion Research Facility
dBA	A-weighted decibels
DOE	U.S. Department of Energy
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FONSI	Finding of No Significant Impact
ft	feet
FY	fiscal year
kg	kilogram
L	liter
LLNL	Lawrence Livermore National Laboratory
LVOC	Livermore Valley Open Campus
M	Million
MANTL	Micro- and Nano- Technologies Laboratory
MCL	maximum contaminant level
MMCF	Million cubic feet
MWh	megawatt-hour
NEPA	*National Environmental Policy Act*
NNSA	National Nuclear Security Administration
person-rem	unit of population dose; the average dose per individual expressed in rems times the population affected.
$PM_{2.5}$	particulate matter 2.5 µm in diameter and smaller

PM_{10}	particulate matter 10 μm in diameter and smaller
POD	Performance Optimized Datacenter
R&D	research and development
SA	Supplement Analysis
SNL	Sandia National Laboratories
SNL/CA	Sandia National Laboratories/California
SWEA	Site-Wide Environmental Assessment

METRIC CONVERSION CHART

TO CONVERT FROM U.S. CUSTOMARY INTO METRIC			TO CONVERT FROM METRIC INTO U.S. CUSTOMARY		
If you know	**Multiply by**	**To get**	**If you know**	**Multiply by**	**To get**
Length					
inches	2.540	centimeters	centimeters	0.3937	inches
feet	30.48	centimeters	centimeters	0.03281	feet
feet	0.3048	meters	meters	3.281	feet
yards	0.9144	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.6214	miles
Area					
square inches	6.452	square centimeters	square centimeters	0.1550	square inches
square feet	0.09290	square meters	square meters	10.76	square feet
square yards	0.8361	square meters	square meters	1.196	square yards
acres	0.4047	hectares	hectares	2.471	acres
square miles	2.590	square kilometers	square kilometers	0.3861	square miles
Volume					
fluid ounces	29.57	milliliters	milliliters	0.03381	fluid ounces
gallons	3.785	liters	liters	0.2642	gallons
cubic feet	0.02832	cubic meters	cubic meters	35.31	cubic feet
cubic yards	0.7646	cubic meters	cubic meters	1.308	cubic yards
Weight					
ounces	28.35	grams	grams	0.03527	ounces
pounds	0.4536	kilograms	kilograms	2.205	pounds
short tons	0.9072	metric tons	metric tons	1.102	short tons
Temperature					
Fahrenheit (°F)	subtract 32, then multiply by 5/9	Celsius (°C)	Celsius (°C)	multiply by 9/5, then add 32	Fahrenheit (°F)
Kelvin (°k)	subtract 273.15	Celsius (°C)	Kelvin (K)	Multiply by 9/5, then add 306.15	Fahrenheit (°F)
Note: 1 sievert = 100 rems					

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SUMMARY

The U.S. Department of Energy's (DOE's) *National Environmental Policy Act* (NEPA) Implementing Procedures require evaluation of its site-wide NEPA documents at least every 5 years by preparation of a supplement analysis (SA), or similar document, for site-wide environmental assessments (SWEAs). Based on the SA, a determination is made as to whether the existing NEPA document remains adequate, or whether preparation of a new site-wide NEPA document, supplement to the existing site-wide NEPA document, or a site-wide environmental impact statement is appropriate. This SA evaluates whether the 2003 *Final Site-Wide Environmental Assessment for Sandia National Laboratories/California* (SNL/CA), referred to as the SWEA, should be supplemented, a new SWEA should be prepared, or no further NEPA documentation is required.

DOE issued the SWEA in January 2003. The SWEA assessed impacts relative to each area of the human and natural environment potentially affected by operations performed at SNL/CA through 2012. The SWEA evaluated activities associated with SNL's mission of National Security, Energy Resources, Environmental Quality, Science and Technology, and Work for Others.

DOE issued a Finding of No Significant Impact in March 2003 under any of the three alternatives evaluated: No Action Alternative, Planned Utilization and Operations Alternative, and Maximum Operations Alternative. Under the Maximum Operations Alternative, specific facilities at SNL/CA were analyzed as operating with two shifts, with changes to some current land uses and construction of two new facilities. "Balance of Operations" activities (activities at facilities not selected for detailed analysis, site support services, and routine maintenance and administrative services) were also projected to increase. Environmental impacts evaluated under this alternative provided a bounding analysis against which to track changes to SNL/CA operations.

Review of emissions, waste generation, and operational information indicates that operations at SNL/CA remain within the bounds of analyses conducted within the SWEA. While there have been increases in some activities, these have been offset by decreases in others to the extent that environmental outputs have not changed substantially and are in all cases well below those analyzed for the Maximum Operations Alternative.

Analytical Approach

A three-step review and analysis approach was used in developing this SA. These steps are summarized as follows:

1. Perform a screening review of new or modified projects or proposals, changed circumstances, and new regulations. This screening review determined, without further detailed analysis, which resource areas clearly remain within the limits of environmental consequences established in the SWEA (i.e., that operations continue to have no significant environmental impacts).

2. Perform more detailed analyses of resource areas that did not pass the screening criteria (Step 1) to determine whether the combined impacts remain within the envelope of consequences established in the SWEA.

3. For those impacts that were outside the envelope of consequences established in the SWEA, determine whether the conditions and environmental consequences are substantially different from those in existence at the time the SWEA was prepared.

Based on the screening review, all but one parameter fell within the values analyzed in the SWEA. One parameter – the total impervious surface at the facility – was greater than the value analyzed in the SWEA.

New and/or Modified Facilities and Information

A requirement for additional NEPA analysis could be prompted by changes in site activities (e.g., new or modified site missions) that could result in changes in environmental impacts, the characteristics of SNL/CA or its environs, or regulatory requirements or guidance. Therefore, this SA describes the current status of those areas and identifies any changes since the SWEA.

The SA identifies substantive changes in existing SNL/CA facilities and operations (from those analyzed in the SWEA), and projected new or expanded facilities and operations. The specific changes are as follows:

- Construction of the Combustion Research Computational/Visualization Building, a recently completed 8,400-square-foot building that includes a computer room, visualization and collaboration workspace rooms, and supporting work areas and administrative space.
- Anticipated increases in specific research and development activities, including:
  - Explosive synthesis work, primarily associated with the Micro and Nano Technologies Laboratories
  - Research and development activities involving the use of engineered nanoparticles
  - High-performance computing activities, including predictive modeling and simulations of combustion
  - Hydrogen fuel research
  - Reinstating hydrogen storage research involving use of low quantities of depleted uranium
  - Tritium material science research
  - Biofuels research, including algae cultivation
  - Biodefense research, including sequencing methods, bioforensics, medical surveillance, and biodetection
  - Use of whole-body imaging systems for research and testing
- Proposed placement of up to two Performance Optimized Datacenters onsite, each contained within a trailer approximately the size of a standard 18-wheel tractor-trailer, with self-contained cooling systems
- Proposed demolition of the Redwood Center
- Construction of a classified secure facility within the limited area

- Re-purposing of buildings 927 (repurposed for use in property management and reapplication) and 928 (repurposed for use by the Cyber Defenders group, including minor remodeling and upgrades to the existing building).
- East entrance road realignment
- Energy/east utility infrastructure improvements
- Moving of fences to allow public access to buildings 916, 919, 929, MO50, and MO51
- Proposed acquisition of greenhouse gas mobile laboratory trucks, based at SNL/CA, for offsite use

Detailed Consequence Analysis

One parameter did not pass the initial screening and required additional analysis. The amount of impervious surface present at the site, which can affect storm water volume, was found to be greater in 2010 than the value analyzed in the SWEA. However, review of aerial and satellite photographs of the site taken in 2001 and 2010 revealed that there has been little change in the actual impervious surface, and that the number of acres of impervious surface was underestimated in the SWEA. No substantial impacts associated with storm water have been observed since the SWEA was issued.

Cumulative Impacts

Past and present actions associated with SNL/CA are described in the SWEA, and updated with new and modified projects described in this SA. Reasonably foreseeable future actions for the region around SNL/CA were also reviewed and included in the analysis. Impacts associated with SNL/CA operations and construction completed since the SWEA, especially any off-site impacts, remain within the bounds of the original SWEA analysis. Projected impacts through 2015 also remain within the bounds of the Maximum Operations Alternative. Therefore, no changes in cumulative impacts are anticipated to result from continued operations through 2015.

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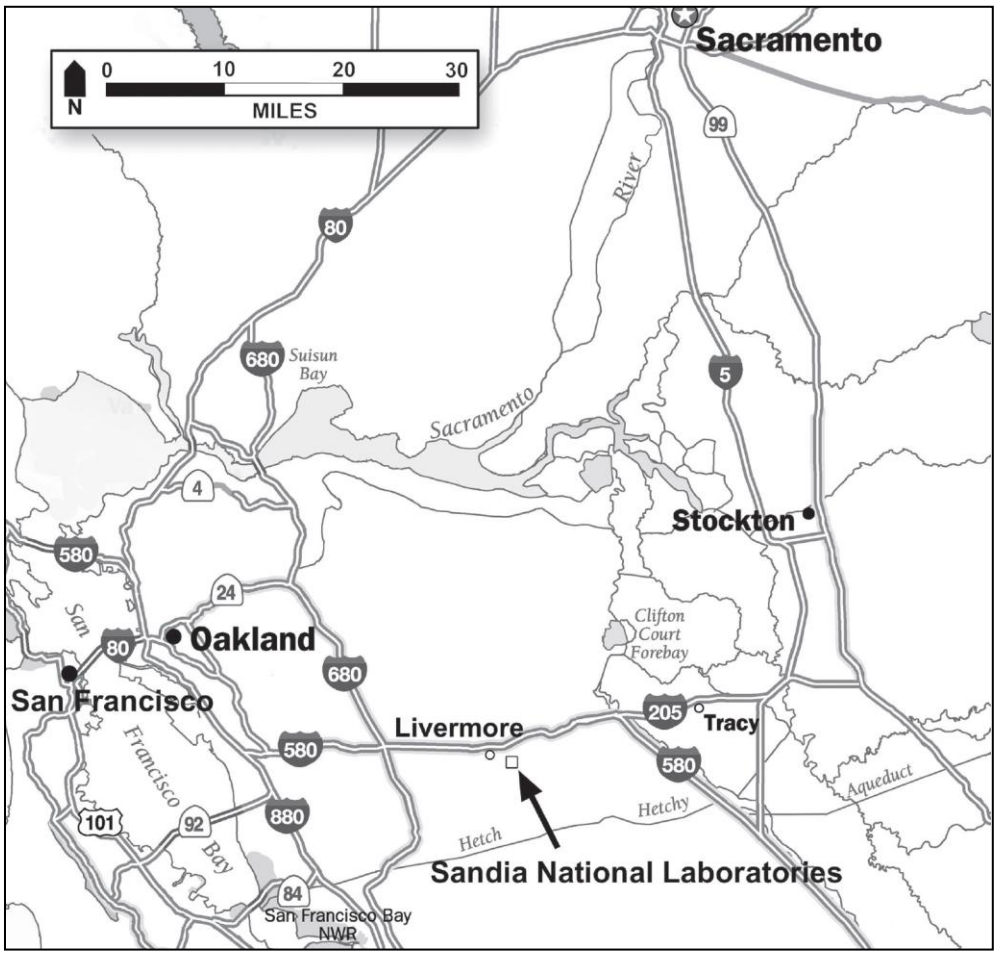
1.0 INTRODUCTION

1.1 OVERVIEW OF SANDIA NATIONAL LABORATORIES/CALIFORNIA

Sandia National Laboratories (SNL) is one of several national laboratories that support the U.S. Department of Energy/National Nuclear Security Administration's (DOE/NNSA's) statutory responsibilities for nuclear weapons research and design, development of other energy technologies, and basic scientific research. SNL is composed of four geographically separate facilities: Albuquerque, New Mexico; Tonopah, Nevada; Kauai, Hawaii; and Livermore, California. This Supplement Analysis (SA) focuses on the Livermore facility, known as Sandia National Laboratories/California (SNL/CA).

SNL/CA is a government-owned, contractor-operated facility owned by the DOE/NNSA, and managed and operated by Sandia Corporation. Operational oversight is performed by the DOE/NNSA Sandia Site Office, Albuquerque, New Mexico. The site encompasses 410 acres owned by DOE, and is bounded by the City of Livermore to the west, Lawrence Livermore National Laboratory (LLNL) to the north, and privately-owned rural and agricultural land to the south and east. Figure 1-1 illustrates the location of SNL/CA.



Source: DOE/NNSA 2003a

Figure 1-1. Sandia National Laboratories/California, and Surrounding Region

1.2 DESCRIPTION OF THE 2003 SNL/CA SITE-WIDE ENVIRONMENTAL ASSESSMENT

In January 2003, the DOE published the SNL/CA Site-Wide Environmental Assessment (SWEA), examining the environmental impacts of three alternatives for the continued operation of the facility:

- **No Action Alternative**—continuation of ongoing NNSA and interagency programs and activities at planned levels as reflected in DOE/NNSA management plans for 2002 through 2012.

- **Planned Utilization and Operations Alternative**—a 13-percent increase in the level of operations over the No Action Alternative, in addition to infrastructure improvements, new construction, and modification of some land uses.

- **Maximum Operations Alternative**—activities as described in the Planned Utilization and Operations alternative with an increase in activity level to two shifts at some facilities, in addition to new construction projects and an increase in "balance of operations" activities (activities at facilities not selected for detailed analysis, site support services, and routine maintenance and administrative services).

To complete the *National Environmental Policy Act* (NEPA) process, DOE issued a Finding of No Significant Impact (FONSI) in March 2003, applicable to any of the alternatives evaluated (DOE/NNSA 2003b).

1.3 SNL MISSION

SNL provides support for DOE mission lines, programs, and projects in five areas.

- *Nuclear Weapons*, ensuring the stockpile is safe, secure, reliable, and can support the United States' deterrence policies.
- *Energy and Infrastructure Assurance*, enhancing the surety of energy and other critical resources.
- *Nonproliferation*, reducing proliferation of weapons of mass destruction and enhancing the surety of critical infrastructures.
- *Defense Systems and Assessments*, addressing new threats to national security.
- *Homeland Security and Defense*, helping to protect the nation against terrorism.

SNL's Science, Technology, and Engineering program conducts a large variety of research and development (R&D) activities that support these five mission lines.

1.4 SCOPE OF THIS DOCUMENT

Under its NEPA regulations (10 *Code of Federal Regulations* [CFR] 1021.330(d)), DOE must evaluate site-wide NEPA documents at least every 5 years to determine whether they remain adequate (i.e., continue to address the environmental impacts of site operations), if a new document should be prepared, or if a supplement to the existing document is needed. DOE/NNSA has prepared this SA in accordance with this requirement.

This SA uses information collected through NEPA checklists, interviews with SNL/CA personnel, and planning documents for new facilities. No environmental assessments or SAs have been prepared for activities or projects at SNL/CA since completion of the SWEA in 2003. Activities reviewed since that time have been found to be either a) categorically excluded from the need to prepare an environmental assessment or environmental impact statement, or b) analyzed in a previous NEPA document – in most cases, the 2003 SWEA.

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2.0 NEW AND/OR MODIFIED OPERATIONS AND INFORMATION

2.1 INTRODUCTION

The purpose of this SA is to determine the need for additional NEPA analysis beyond that presented in the 2003 SNL/CA SWEA. A requirement for additional NEPA analysis could be prompted by changes in site facilities or activities that could result in changes in environmental impacts, changes in the characteristics of the SNL/CA site or its environs, or changes in regulatory requirements or guidance. This chapter describes the current status of those areas and identifies any changes since the SWEA, and provides the technical basis for the evaluations presented in Chapters 3 and 4. For this evaluation, the baseline year is 2010; data from calendar year 2010 are used unless data are not available, or they do not present an accurate picture of recent and future trends. All years referred to in this SA are calendar years unless specifically noted as fiscal year (FY).

2.2 SNL/CA FACILITIES AND OPERATIONS

To differentiate among the three alternatives analyzed, the SWEA evaluated detailed information on current and future activities at 13 facilities:

- Combustion Research Facility (CRF)
- Building 910 – Weapons research and development
- Building 914 – Weapons test assembly and machine shop activities
- Building 916 – Materials chemistry research and development
- Building 927 – Nuclear and classified materials storage and subsystem assembly
- Micro- and Nano-Technologies Laboratory (MANTL)
- Chemical and Radiation Detection Laboratory, now known as the Applied Biosciences Laboratory (ABL) (note that the name change reflects activities in this facility that are largely unchanged since the SWEA analysis)
- Area 8 Facilities
- Explosive Storage Area
- Hazardous and Radioactive Waste Storage Facilities
- Lithographie Galvanoformung and Abformung (LIGA) Technologies Facility (this facility was in the planning stages at the time of SWEA preparation but was never constructed)
- Distributed Information Systems Laboratory (this facility was in the planning stages at the time of SWEA; construction was completed in 2004)
- Glass Furnace Combustion and Melting Laboratory (this facility, which was part of the CRF, was in the planning stages at the time of SWEA preparation but was never constructed)

In addition to information from these facilities, the SWEA evaluated the "balance of operations," activities that take place at other facilities and locations throughout SNL/CA.

2.2.1 CHANGES IN OPERATIONS

Most of the facilities evaluated in the SWEA continue to operate with types of activities that are largely unchanged since the SWEA analysis. Through interviews with SNL/CA managers and other personnel (SNL 2010b), the following proposed notable activities or anticipated changes to the nature and/or level of activities through 2015 were identified:

- Increases in specific R&D activities, including
  - Explosive synthesis work, primarily associated with the MANTL
  - R&D activities involving the use of engineered nanoparticles
  - High-performance computing activities, including predictive modeling and simulations of combustion
  - Hydrogen fuel research
  - Reinstating hydrogen storage research involving use of low quantities of depleted uranium
  - Tritium material science research
  - Biofuels research, including algae cultivation
  - Biodefense research, including sequencing methods, bioforensics, medical surveillance, and biodetection
  - Use of whole-body imaging systems for research and testing
- Placement of up to two Performance Optimized Datacenters (PODs) onsite, each contained within a trailer approximately the size of a standard 18-wheel tractor-trailer, with self-contained cooling systems
- Demolition of the Redwood Center
- Construction of a classified secure facility within the limited area
- Re-purposing of buildings 927 and 928
- East entrance road realignment
- East end energy and utility infrastructure improvements
- Moving of fences to allow public access to buildings 916, 919, 929, MO50, and MO51
- Acquisition of greenhouse gas mobile laboratory trucks, based at SNL/CA, for offsite use

In addition, SNL/CA has seen an increase in "one-off" types of activities that are difficult to project, but with environmental effects that are compatible with SWEA analyses.

2.2.2 NEW AND PLANNED FACILITIES

2.2.2.1 Livermore Valley Open Campus

The proposed development of the Livermore Valley Open Campus (LVOC) is intended as a step toward achieving the Secretary of Energy's stated goals of re-energizing the national laboratories as "centers of

great science and innovation," and to "create an effective mechanism to integrate national laboratory, university, and industry activities." Specifically the LVOC would meet three needs:

- **Mission**. To meet NNSA's and DOE's national security mission objectives—which broadly include nuclear security, international security, energy and environment security, and economic security through science, technology and engineering innovation—by substantially increasing laboratory engagement with the private sector and academic community.
- **Science, Technology, and Engineering**. To stay at the forefront of science, technology, and engineering by increasing national and international academic and industry engagement.
- **Workforce**. To ensure the workforce of the future for both classified and unclassified national security programs by providing a mechanism to attract highly qualified workers.

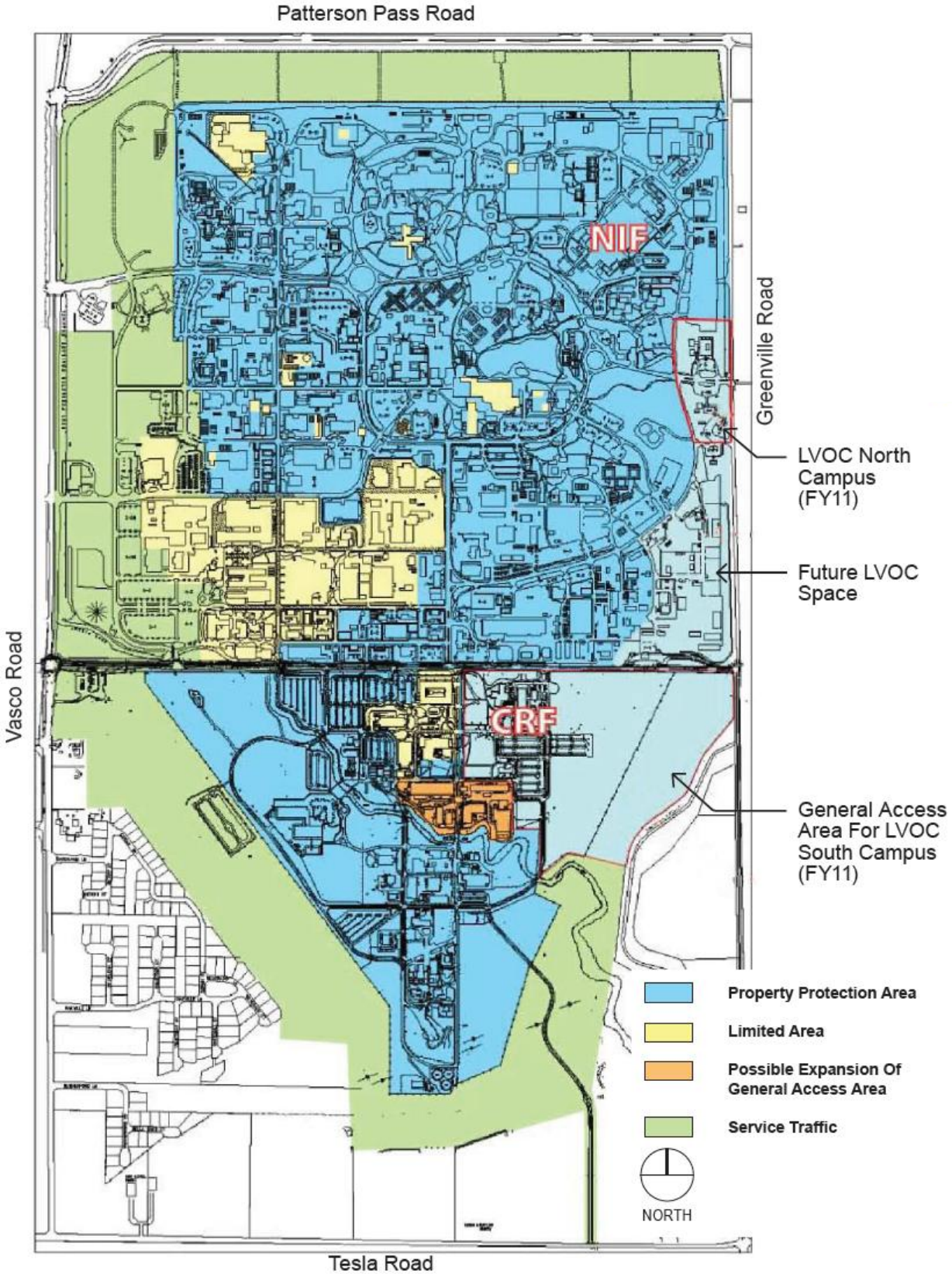
Construction associated with the LVOC initiative would cover areas of both SNL/CA and LLNL (Figure 2-1). At SNL/CA, structures would be built to support research related to the SNL mission. Site access would be modified to allow public entry of vehicles to the LVOC from Greenville Road. Security fences would also be moved. Construction would be done in phases over a number of years. The area available for the initiative could accommodate 2.9 million square feet (M ft^2) of floor space spread over LLNL and SNL/CA; this SA assumes only Phase I would be constructed by 2015, with a total of approximately 770,000 square feet (ft^2) of floor space, 260,000 ft^2 of which would be sited on SNL/CA. Over the next 5 years, the construction of three buildings at SNL/CA is projected, all contained within Phase I of the LVOC plan: Commons Building, Collaboration/Visitors Center, and Engineering Innovation Collaboration Center. LVOC-related buildings scheduled for construction through 2015 are examined in this SA to determine whether their completion would cause impacts to exceed those examined in the 2003 SWEA. Construction planned through 2015 would include two buildings and associated infrastructure, with a total of approximately 3 acres to be developed during this time.

2.2.2.2 Combustion Research Computational/Visualization Building

The Combustion Research Computational/Visualization Building (CRC/VB) is a recently completed 8,400-square-foot building that includes a computer room, visualization and collaboration workspace rooms, and supporting work areas and administrative space (SNL 2009b). This facility provides computational capabilities to complement work conducted in the CRF. Construction and operation of the CRC/VB was categorically excluded from the need to prepare an environmental assessment or environmental impact statement in 2009.

2.2.2.3 Building 916 Replacement

Activities conducted in Building 916 include R&D in ceramics, semiconductors, organic polymers, and metals. The proposed replacement for current Building 916 would increase floor space from the current 42,000 ft^2 to approximately 84,000 ft^2. Under the current proposal, activities focused on materials studies would expand, and a second shift would increase staffing from 46 to 91 employees. This project was analyzed in the Maximum Operations Alternative of the SWEA (DOE/NNSA 2003a).



Source: Flad Architects 2010

Figure 2-1. Location of Proposed Livermore Valley Open Campus Initiative

2.3 BALANCE OF OPERATIONS

Activities at numerous SNL/CA facilities not described in Section 2.2 were discussed in the SWEA as "balance of plant." Changes to balance-of-plant activities since the SWEA are documented in NEPA checklists that have been completed since 2003. Environmentally relevant parameters associated with these activities are found in annual Site Environmental Reports (SNL 2009a, 2010a). Individual screening reviews for each resource area in Chapter 3 of this SA summarize these parameters.

2.4 OPERATIONAL PARAMETERS

Table 2-1 summarizes data for selected operational parameters at SNL/CA to be used in the screening reviews presented in Chapter 3 of this SA. Unless otherwise noted, parameter values from 2010 are used as a baseline for projecting 2015 values. The 2015 values incorporate projected changes to SNL/CA facilities and operations described in Section 2.2. Because the SWEA FONSI was applicable to any of the alternatives evaluated, values from the SWEA Maximum Operations Alternative are considered to represent a "bounding" scenario, providing the most expansive set of SNL/CA operations evaluated in the 2003 SWEA for which no potential significant environmental impacts were identified.

Table 2-1. Comparison of Selected Operational Parameters Used in SWEA Analyses

PARAMETER	VALUE		
	SWEA MAXIMUM OPERATIONS ALTERNATIVE	2010	2015
LAND USE/VISUAL RESOURCES			
Extent of DOE land available	410 acres	410 acres	410 acres
Area designated for potential new construction	93 acres	93 acres	93 acres
Change in scenic qualities	No	No	No
GEOLOGY AND SOILS			
Construction of buildings not conforming to establish seismic design criteria	No	No	No
Increase in areas with >10% slope or potential slope destabilizing activities	No	No	No
Increase in likelihood of hazardous materials spills or releases	No (industry-accepted controls in place)	No	No
WATER RESOURCES AND HYDROLOGY			
Increase in likelihood of groundwater contamination or activities affecting rate of attenuation of existing groundwater contamination	No	No	No
Use of groundwater	No	No	No
Size of impervious area	76.9 acres	92 acres	95.35 acres[a]
Increase in likelihood of or evidence of surface water contamination from site runoff	No	No	No
BIOLOGICAL RESOURCES			

PARAMETER	VALUE		
	SWEA MAXIMUM OPERATIONS ALTERNATIVE	2010	2015
Disturbance of California red-legged frog habitat	No	No longer designated critical habitat onsite	No critical habitat; will continue to follow requirements outlined in the biological opinion
Construction outside existing footprint or 93 acres designated for future development	No	No	No
CULTURAL RESOURCES			
Known cultural resources on site	No	No	No
AIR QUALITY			
Annual emissions of:			
Volatile organics (VOCs)	2,534 kg	1,975 kg	2,469 kg
Nitrogen dioxide	5,066 kg	2,440 kg	3,050 kg
Carbon monoxide	612 kg	414 kg	518 kg
Total air toxics	2,880.16 kg	1,075 kg	1,344 kg
Radioactive	0	0	0
Greenhouse gases	N/A	21,438 metric tons CO2 E	25,642 metric tons CO2 E
INFRASTRUCTURE			
Water use	91.8 M gal/yr	60.04 M gal	58.7 M gal
Wastewater discharge	29.1 M gal/yr	25.4 M gal	12 M gal
Electrical use	48,800 MWh/yr	37,054 MWh	46,690 MWh
Natural gas use	94 MMCF/yr	81.6 MMCF	73.86 MMCF
Any substantial improvements to, or new constraints on, infrastructure?	No	No	No
TRANSPORTATION			
Commuter vehicles	1,530/day	1,133/day	1,416/day
Materials (Annual shipments, radioactive, chemical, and explosives)	33	23	32 / yr or 8 / qtr
Waste shipments (includes hazardous and radioactive)	116	32	52 / yr (1 / wk)
SNL/CA weekly hazardous materials transports (excluding waste)	50	109	115
Supplier weekly hazardous material transports	150	229 (every work day)	229
Sanitary waste (shipments)	80	32	52
WASTE GENERATION			
Total radioactive waste	8,811 kg/yr	98 kg	100 kg

PARAMETER	VALUE		
	SWEA MAXIMUM OPERATIONS ALTERNATIVE	2010	2015
Total hazardous waste	133,820 kg/yr	59,741 kg	60,000 kg
Biohazardous waste	843 kg/yr	109 kg	136 kg (accounts for 25% increase in site population)
Municipal solid waste	378.7 metric tons/yr	92 metric tons	134 metric tons
NOISE			
Ambient background noise levels in adjacent community	No change	No change	No change
HUMAN HEALTH AND WORKER SAFETY			
Collective involved worker dose	1.35 person-rem	0.20 person-rem	0.20 person-rem
Total recordable cases of accident or injury	79/yr	14/yr	18/yr
Lost workday cases	19/yr	8/yr	10/yr
SOCIOECONOMICS			
Personnel	1,931	1,076	1,345
Expenditures	$262 M	$252.6 M	$316 M
ENVIRONMENTAL JUSTICE			
Change in demographics of surrounding area	—	No	No
ACCIDENTS			
Consequences of bounding accident	No impact to offsite public	No impact to offsite public	No impact to offsite public

Sources: DOE/NNSA 2003a; Flad Architects 2010; Larsen 2010, 2011; SNL 2011a

[a] For purposes of this conservative analysis, completion of Phase I of LVOC was assumed, with one-third of impervious surface allocated to SNL/CA

2.5 ENVIRONMENTAL CONDITIONS

This section identifies major changes and new information regarding the environmental conditions for areas occupied by or surrounding SNL/CA since the issuance of the SWEA. In this context, the term "environment" is taken to mean both the natural environment (e.g., soil, water, biological, and ecological resources) and the human environment (e.g., population, demographics).

2.5.1 NATURAL ENVIRONMENT

There have been no substantial changes to the natural environment since the SWEA. A redesignation of California red-legged frog critical habitat in 2006 delisted areas of SNL/CA that had previously been considered critical habitat (71 *Federal Register* 19243). With implementation of U.S. Environmental Protection Agency (EPA) standards issued on December 17, 2004 and modified in April 2005 for particulate matter 2.5 micrometers (μm) in diameter and smaller ($PM_{2.5}$), Alameda County is now designated as a non-attainment area for $PM_{2.5}$.

2.5.2 HUMAN ENVIRONMENT

The human environment within and surrounding SNL/CA is largely unchanged since the SWEA, although new housing has been built along the western edge of SNL/CA. This housing is similar in character (home size and value) to other nearby neighborhoods.

2.6 REGULATIONS

Table 2-2 presents changes in Federal laws and regulations; State of California regulations; and select environment, health, and safety DOE directives that have occurred since publication of the SWEA and that are applicable to SNL/CA through the Management and Operating Contract.

Table 2-2. Changes to Laws, Regulations, and Other Requirements since Publication of the SWEA

LAW/REGULATION/ REQUIREMENT	EFFECTIVE DATE	SUMMARY
FEDERAL STATUTES AND REGULATIONS		
Clean Air Act	September 2006	Established $PM_{2.5}$ measurement standards for particles with an aerodynamic diameter of 2.5 micrometers or less.
Clean Air Act	June 15, 2005	Revisions issued by Bay Area Air Quality Management District to prevent significant increase in health risks from new sources of toxic air contaminants.
40 CFR 112	February 17, 2006	EPA's revised oil storage regulations that encompass equipment and containers with a capacity of 55 gallons (previously 660 gallons) or more.
Endangered Species Act	July 26, 2004	California tiger salamander listed as threatened species.
Endangered Species Act	December 8, 2004	U.S. Fish and Wildlife Service issued a biological opinion for SNL/CA site operations that establishes requirements for monitoring, reporting, and protecting threatened species and critical habitat.
Endangered Species Act	April 2006	U.S. Fish and Wildlife Service issued final rule for critical habitat for the California red-legged frog.
Energy Policy Act of 2005	August 2005	Revision of Energy Act of 1992 that establishes aggressive new goals for Federal energy efficiency and requires the purchase of Energy Star equipment.
Clean Water Act	May 2, 2008	Statewide general waste discharge requirements for sanitary sewer systems.
Clean Water Act	July 1, 2010	Construction General Permit (Order No. 2009-0009-DWQ) specifying California storm-water discharge requirements.

EXECUTIVE ORDERS		
Strengthening Federal Environmental, Energy, and Transportation Management (EO 13423)	January 24, 2007	Strengthens Federal environmental, energy, and transportation management.
Federal Leadership in Environmental, Energy, and Economic Performance (EO 13514)	October 5, 2009	Requires Federal agencies to measure, manage, and reduce greenhouse gas emissions; reduce vehicle fleet petroleum use and water use; recycle and divert waste; follow sustainability requirements for procurements and contracts; and implement zero-net energy use in new Federal buildings.
DOE POLICIES, MANUALS, AND ORDERS		
DOE Order 151.1C, Comprehensive Emergency Management System	November 2, 2005	This order establishes policy and assigns and describes roles and responsibilities for the DOE Emergency Management System.
DOE Manual, 231.1-1A, Change 1 and Change 2, Environment, Safety, and Health Reporting Manual	Change 1: September 9, 2004 Change 2: June 12, 2007	This manual supplements DOE Order 231.1A and provides detailed requirements for DOE reporting, including time schedules for reporting and data elements to be reported.
DOE Manual 231.1-2, Occurrence Reporting and Processing of Operations Information	August 19, 2003	This manual provides detailed information for reporting occurrences and managing associated activities at DOE facilities, including NNSA facilities. It complements DOE Order 231.1A, Environment, Safety, and Health Reporting and its use is required by that Order.
DOE Order 414.1C, Quality Assurance	June 17, 2005	The order seeks to ensure that DOE, including NNSA, products and services meet or exceed customers' expectations through the implementation of a quality assurance management system.
DOE Order 430.2B, Departmental Energy, Renewable Energy, and Transportation Management	February 27, 2008	Requirements for efficient and effective management of energy, water, and vehicle fleets at DOE facilities.
DOE Order 443.1A, Protection of Human Subjects	December 20, 2007	The order establishes DOE procedures and responsibilities for implementing Federal policy and requirements for protection of human subjects during research development, testing, and evaluation investigations.
DOE Order 450.1A, Environmental Protection Program	June 4, 2008	Through use of Environmental Management Systems at DOE sites, implement sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by DOE operations, and cost-effectively meet or exceed compliance with applicable environmental, public health, and resource protection laws, regulations, and DOE requirements.
DOE Order 460.1C, Packaging and Transportation Safety	May 14, 2010	This order establishes safety requirements for proper packaging and transportation of DOE/NNSA offsite shipments and onsite transfers of hazardous materials.
DOE Order 460.2A, Departmental Materials Transportation and Packaging Management	December 22, 2004	This order establishes requirements and responsibilities for management of DOE/NNSA materials transportation and packaging to ensure the safe, secure, efficient packaging and transportation of materials, both hazardous and non-hazardous.

DOE Order 470.4-1, Change 1, Safeguards and Security Program Planning and Management	March 7, 2006	This order establishes nine objectives concerning assurance of appropriate levels of protection against unauthorized access, theft, espionage, and other hostile acts that may cause adverse impacts on national security, health and safety, or the environment.
STATE REQUIREMENTS		
Certified Appliance Recycling Act	January 1, 2006	This act controls the recycling of discarded major appliances. Under the law, before disposal of major appliances, it is required that special materials such as refrigeration fluid (CFCs), used oil, and mercury be removed. The law also established a certification program for individuals and businesses that process major appliances for scrap.
Electronic Waste Recycling Act	February 8, 2006	This act provides requirements for universal waste management and disposal.
Assembly Bill 32	September 2006	This bill requires monitoring and reduction of greenhouse gas emissions.
California Code of Regulations Title 22	February 4, 2009	Consolidation of Universal Waste Regulations and Authorized Treatment of Electronic Hazardous Waste.

Sources: DOE/NNSA 2006; Larsen 2011; SNL/CA 2005, 2006a, 2006b, 2007, 2008, 2009, 2010; State Water Resources Control Board 2010

3.0 SCREENING REVIEW

Chapter 2 provides a discussion of changes in site activities that could result in changes in environmental impacts, changes in the characteristics of the SNL/CA or its environs, and changes in legal and regulatory requirements or guidance. This chapter describes the process for performing the screening review and discusses those resource areas for which detailed analysis is not necessary to determine if the potential impacts of new and modified projects are within the scope of the impacts analysis of the 2003 SNL/CA SWEA.

3.1 METHODOLOGY

A three-step review and analysis approach was used in developing this SA:

1. Perform a screening review of activities, changed circumstances, and new regulations, as described in Chapter 2. This screening review will determine, without further detailed analysis, which specific impact areas clearly remain within the scope of environmental consequences established in the SWEA (i.e., that no adverse impacts currently exist or will exist based on projected activities through 2015). This chapter presents the screening reviews for each resource area evaluated in the SWEA, along with a discussion of intentional destructive acts (not evaluated in the SWEA).

2. Perform more detailed analyses of impact areas, if any, that do not pass the screening criteria (Step 1) to determine whether the impacts remain within the envelope of consequences established in the SWEA.

3. For those impacts that were outside the envelope of consequences established in the SWEA, determine whether the conditions and environmental consequences are substantially different from those in existence at the time the SWEA was prepared.

The following sections present the screening review, as described in Step 1, for each resource area analyzed in the SWEA.

3.2 LAND USE AND VISUAL RESOURCES

3.2.1 LAND USE

Land use designations within SNL/CA boundaries have remained essentially the same as those described in the SWEA. Since publication of the SWEA, the total acreage of land available for use at SNL/CA is unchanged at 410 acres.

Construction of the LVOC would convert up to 45 acres of grassland in the northeastern portion of SNL/CA to developed land with buildings, walkways, roads, parking lots, courtyards, and landscaping. Development would be of higher-density than that currently present at the SNL/CA campus (Flad Architects 2010). While the LVOC was not identified in the SWEA, the land in this portion of SNL/CA was designated for development in both the Planned Utilization and Operations and Maximum Operations Alternatives.

3.2.2 VISUAL RESOURCES

Visual resources include natural and man-made physical features that give a particular landscape its character and value. Criteria used in the analysis of visual resources include scenic quality, visual sensitivity, and distance and/or visibility zones from key public viewpoints.

SNL/CA is situated on mostly flat terrain that provides little or no public view of the site from locations a mile or more away; views of the site are limited to immediately adjacent areas.

No new facilities or operations conducted at SNL/CA since development of the SWEA have substantially altered the visual character of the site. The proposed SNL/CA portion of the LVOC would be constructed in a currently vacant area at the northeast corner of the property and would be visible to the public primarily from Greenville Road. Land use adjacent to and in the vicinity of the proposed construction is sparse and primarily commercial and agricultural. Design guidelines call for the LVOC to "have a strong visual and physical connection to the existing Lab program areas," but also plan "a higher level of density than currently exists at the LLNL and SNL campuses" (Flad Architects 2010). Other projected construction would be consistent in design with SNL/CA's campus-like setting.

3.2.3 SUMMARY

Construction not associated with the proposed LVOC would occur in previously developed areas within the current site boundaries. Little residential or other non-commercial/agricultural development exists in the vicinity of the proposed LVOC, and construction of the LVOC would not limit or otherwise affect use of adjacent land. While development of the LVOC would involve a somewhat greater density, buildings would be consistent with current development in terms of size and design. Based on the limited number of receptors, flatness of the land, and general similarity between existing and proposed development, environmental impacts to land use and visual resources are anticipated to be minimal and not substantially different from those evaluated in the SWEA.

3.3 GEOLOGY AND SOILS

The SWEA described the regional and local geologic setting and soils at the site. Based on interviews with site personnel and a cursory review of data, there is no new information that substantially changes these descriptions. No prime farmlands exist at or immediately adjacent to SNL/CA; the nearest prime farmlands are approximately 0.25 mile from the southernmost extent of the SNL/CA property.

Proposed LVOC construction could disturb up to 45 acres of previously designated construction area in the northeast portion of the site. With the exception of space needed to accommodate LVOC buildings, parking lots, utilities, drainage, and other permanent features, the site would be restored using native or adapted plant species. Other construction would take place within the existing developed area.

Since 2002, the only earthquake exceeding magnitude 4.1 on the Richter scale within 30 kilometers (18.6 miles) of SNL/CA was a magnitude 5.6 earthquake in 2007, centered approximately 17 miles south-southwest of SNL/CA (U.S. Geological Survey 2011).

Based on the distance between proposed construction activities and prime farmlands, impacts to prime farmland would likely not result from construction and changes in operations at SNL/CA. Soil disturbance would be limited to areas already designated for construction; therefore, impacts to soils

would be minimal and confined to the SNL/CA property, and would not differ substantially from those assessed in the SWEA.

3.4 WATER RESOURCES AND HYDROLOGY

3.4.1 GROUNDWATER QUALITY

SNL/CA personnel continue to sample groundwater at monitoring wells described in the SWEA except for well MW-11, which is now out of service. Two additional wells, FM-1 and FM-7, monitor the Fuel Oil Spill site (SNL 2010a). No current or planned future activities are expected to adversely impact groundwater quality.

Groundwater sampling conducted in 2008 and 2009 shows no constituents of concern above Federal or California maximum contaminant levels (MCLs) with the exception of carbon tetrachloride at well NLF-6 at the Navy Landfill (SNL 2009a, SNL 2010a). Concentrations detected in 2008, 2009, and 2010 were 0.88 microgram per liter (µg/L), 0.77 µg/L, and 1.2 µg/L, respectively, each exceeding the California MCL of 0.5 µg/L. Note that analytical results are compared to Federal or California MCLs only as a point of reference. MCLs are applicable for drinking water sources and as no wells at SNL/CA are used as a source of drinking water, MCLs are not standards applied to groundwater at the site.

3.4.2 GROUNDWATER QUANTITY

SNL/CA does not use groundwater for any portion of its water supply. No use of groundwater was identified in the SWEA.

3.4.3 SURFACE WATER QUALITY

There are no perennial streams or natural surface water bodies at SNL/CA. Arroyo Seco, an ephemeral stream, diagonally traverses the site from southeast to northwest. The arroyo typically flows only in very wet years, and for short periods of time during heavy storms. A seasonal wetland that is wet well into June, and sometimes July, is located in the streambed along the eastern part of the arroyo. Storm water runoff at SNL/CA is conveyed to Arroyo Seco through a system of storm drains and channels (SNL 2010a).

All storm water runoff from SNL/CA is conveyed to the Arroyo Seco, which discharges into Alameda Creek and eventually to the San Francisco Bay. Storm water that flows off buildings, material-handling areas, parking lots, and other impervious surfaces, may pick up pollutants, such as oil and grease, soil, litter, pesticides, and fertilizers. During heavy or continuing storms, runoff may transport pollutants to Arroyo Seco before the storm water has time to evaporate or infiltrate into the ground (SNL 2010a).

To assess the impact of site operations to storm water discharges, SNL/CA personnel collect samples of surface runoff at nine locations around the site. No constituents were detected at levels that indicate contamination from SNL/CA sources for samples collected during the 2008/2009 rainy season.

Construction of the LVOC would result in a minor increase in the impervious surface area at the site. Storm water runoff (with commensurate increases in the potential for surface water contamination) is not projected to increase as this project would be subject to the requirements of Section 438 of the *Energy Independence and Security Act* of 2007. This Act states "[t]he sponsor of any development or

redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."

3.4.4 SURFACE WATER QUANTITY

The SWEA estimated the increase in storm water runoff based on the increase in impervious surface area at SNL/CA. The SWEA estimated an additional 27.7 acres of impervious surface (over the 49.2 acres estimated at SNL/CA in the year 2000) for a total of 76.9 acres under both the Planned Utilization and Operations and the Maximum Operations Alternatives (DOE/NNSA 2003a). Recent estimates indicate that approximately 92 acres of impervious surface are currently present at SNL/CA, including approximately 2.35 acres added since the SWEA was produced. Examination of aerial/satellite photographs, however, reveals that the current areal extent of impervious surfaces is nearly identical to that in existence at the time the SWEA was written (see Figure 3-1). It is estimated that approximately 2.35 acres of impervious surface have been added since that time. It appears, therefore, that the SWEA underestimated the impervious surface. Storm water runoff at the site in the interim has had little or no impact on other resources. Approximately 3 acres of impervious surface would be added as a result of projected construction (including LVOC-related development) through 2015. The overall change in impervious surface from that in existence as of 2010 would be approximately 5.35 acres. This represents a minor increase in impervious surface, and with standard storm water management practices would result in negligible impacts to surface water.

Approximately 93 additional acres were projected to be developed under the Maximum Operations Alternative. Given the fact that only two LVOC buildings and associated infrastructure (3 acres total) are planned for construction at SNL/CA in the next five years, the projected increase in impervious surface area would be only slightly greater than the 92 acres projected in the SWEA. Additional development would be subject to the requirements of Section 438 of the *Energy Independence and Security Act* of 2007 (see Section 3.4.3). Guidance on implementing the storm water runoff requirements under the Act (EPA 2009) would be implemented, where appropriate and feasible, to minimize increases in storm water runoff.

3.4.5 SUMMARY

Because the projected impervious surface would be greater than that projected in the SWEA, this issue has been analyzed in detail in Chapter 4.

3.5 BIOLOGICAL RESOURCES

3.5.1 TERRESTRIAL RESOURCES

The terrestrial communities at the SNL/CA site have changed very little since the issuance of the SWEA. Land disturbance has been limited, and primarily in areas that were previously disturbed. Major projected changes at SNL/CA are described in Chapter 2 of this SA.

Potential impacts to terrestrial resources include the displacement of wildlife and vegetation, an increase in the abundance of weedy vegetation species, and noise-related disturbance of wildlife.

3.5.1.1 Vegetation

There are three major terrestrial habitat areas at the SNL/CA site: grassland, coyote brush scrub, and riparian woodland. Much of the unaltered habitat lies in a wildlife reserve or migration corridors and receive minimal disturbance from site operations. No Federal- or state-listed special-status plant species are known to occur at the site.

As stated in Section 4.6.3.1 of the SWEA, grasslands represent the majority (226 acres) of the undeveloped land at SNL/CA; both native and non-native plant species are present but non-native species are dominant within grasslands at SNL/CA (DOE/NNSA 2003a). Proposed construction of the LVOC would disturb up to 45 acres of grassland; however, only 3 acres of development is projected through 2015. The remaining construction activities would be located in previously developed areas. Coyote brush scrub (1.5 acres) and riparian woodland (2.4 acres) areas are of limited extent and would not be affected by proposed activities at SNL/CA.

3.5.1.2 Wildlife

Amphibians (3 species), reptiles (2 species), birds (58 species), and mammals (14 species) were documented as present at SNL/CA in the SWEA. Facility construction would result in the loss of some vegetation with a commensurate loss of wildlife habitat. The area designated for construction has not changed since the 2003 SWEA was completed.

3.5.2 Aquatic Resources

Within the riparian woodland habitat are 0.44 acre of seasonal wetlands associated with Arroyo Seco. Numerous vegetation species characteristic of wetlands are present. No new facility or infrastructure development would occur within wetlands.

3.5.3 Threatened, Endangered and Sensitive Species

The SWEA identified four Federally listed threatened or endangered species known to occur in the vicinity of SNL/CA. Two of these, the threatened California red-legged frog (*Rana aurora draytonii*) and California tiger salamander (*Ambystoma californiense*), have been observed onsite since completion of the SWEA (SNL 2010a). SNL/CA performs activities in a manner consistent with protective measures specified in the Biological Opinion issued by the U.S. Fish and Wildlife Service.

As of 2009, 60 species protected under the *Migratory Bird Treaty Act* have been observed at SNL/CA. In addition, one special protected mammal, the mountain lion (*Felis concolor californica*), has also been observed onsite.

No new facility or infrastructure development would take place in areas where threatened, endangered, or species of concern are known to occur.

3.5.4 Summary

The SWEA indicated that minimal to no impacts to biological resources would result from implementation of the Maximum Operations Alternative. Development of the LVOC would eliminate approximately 45 acres of grassland, approximately 17 percent of the total grassland at SNL/CA;

however, only 3 acres are projected to be developed through 2015. Other construction would occur within previously developed areas. No areas designated as critical habitat would be developed, and all construction would be located within areas that were designated for future development at the time that the SWEA was prepared. Effects on biological resources resulting from projected operations and construction/development projects would remain within the bounds of the analyses presented in the SWEA.

3.6 CULTURAL RESOURCES

Cultural resources are prehistoric or historic archaeological sites, buildings, structures, districts, or other places or objects considered to be important to a culture or community for scientific, historical, traditional, religious, or other reasons. Cultural resources surveys performed in 1990 and 2001 determined that there were no prehistoric resources, Native American resources, historic archaeological sites, or buildings of historical significance or eligible for the National Register of Historic Places (DOE/NNSA 2003a).

Buried archaeological sites could be impacted during construction or other ground-disturbing activities. These activities would include construction of new facilities, such as those associated with the LVOC, and associated infrastructure. However, compliance with regulations and procedures would address impacts to any cultural resources discovered during the construction of these facilities, either avoiding, reducing, or mitigating the potential impacts. Some maintenance activities that require ground disturbance could also result in the discovery of buried archaeological sites, but again, compliance with regulations and procedures would address any impacts.

No cultural resources have been identified at SNL/CA. While archaeological resources could be encountered during construction activities, operating procedures would be in place to ensure that construction activities would stop and appropriate measures would be taken in the event that such resources are discovered.

3.7 AIR QUALITY

Alameda County has been designated as a non-attainment area under the *Clean Air Act* for $PM_{2.5}$ and is in attainment for other Federally regulated pollutants. Under the *Clean Air Act* General Conformity Rule, Federal agencies must work with state, tribal, and local governments in air quality nonattainment or maintenance areas to ensure that federal actions conform to the state implementation plan. A conformity determination is required for each criteria pollutant or precursor organic compounds where the total of direct and indirect emissions of the criteria pollutant or precursor organic compounds in a nonattainment or maintenance area caused by a Federal action would equal or exceed specified emission rates. The specified emissions rates (conformity threshold limits) range from 10 tons per year to 100 tons per year. Emissions estimates projected for 2015 are well below the applicable conformity thresholds for air quality; therefore, projected air emissions are in conformance with *Clean Air Act* conformity requirements.

The SWEA indicates that, under the Maximum Operations Alternative, 57 nonexempt emissions sources would be in operation at SNL/CA sources. 14 such sources are projected to be in operation by 2015.

Projected criteria pollutant emission rates estimated for 2015 are all less than rates evaluated under the SWEA Maximum Operations Alternative (see Table 2-1).

Construction activities at SNL/CA could have short-term adverse impacts due to emissions of criteria air pollutants from construction worker traffic, construction equipment, and fugitive dust from earth-moving activities. The fugitive dust from construction could exceed $PM_{2.5}$ and particulate matter 10 μm in diameter and smaller (PM_{10}) concentration standards if no dust control measures were implemented. However, engineered controls, such as the application of water or chemical dust suppressants and seeding of soil piles and exposed soils, would minimize fugitive dust. It is expected that particulate matter concentrations would be within all applicable standards.

Under the authority of Assembly Bill 32, signed on September 27, 2006, the State of California has adopted several new regulations regarding emissions of greenhouse gases. For facilities like SNL/CA, the State of California requires mandatory reporting of greenhouse gases from stationary source combustion of natural gas that exceeds 25,000 metric tons per year of carbon dioxide-equivalent emissions. To date, SNL/CA has been below the reporting threshold with a total carbon-dioxide-equivalent of 17,913 metric tons in 2009. For 2015, carbon dioxide equivalent emissions are projected to exceed 25,000 metric tons per year (25,642 metric tons). The EPA also has a mandatory reporting regulation for stationary emission sources, similar to California's regulation (40 CFR 98). SNL/CA personnel continue efforts toward energy conservation and greenhouse gas reduction. These efforts are presented annually in SNL/CA Site Environmental Reports.

The SWEA analyses for the Maximum Operations Alternatives projected emissions of Total Air Toxics at 2,880.16 kg. Emissions in 2010 were reported at 1,075 kg. Projected emissions of Total Air Toxics for 2015 are 1,344 kg.

Comparison of anticipated emissions through 2015 with those analyzed in the SWEA indicates that projected air emissions would not exceed those evaluated in the SWEA. The number of nonexempt sources would remain within the bounds assessed for the Maximum Operations Alternative. Similarly, criteria pollutant emissions would not exceed those analyzed in the SWEA. Emissions of greenhouse gases were not evaluated in the SWEA, so the quantities of greenhouse gases emitted in 2003 are not available. However, comparison of other operational parameters (air emissions of other constituents, other environmental outputs, and projected changes/increases in operational activities, etc.) suggests that greenhouse gas-generating activities would not likely increase substantially above those assumed in the Maximum Operations Alternative. Further, while an increase in greenhouse gas emissions is anticipated, the projected emissions for 2015 would not be substantially above the reporting threshold. Therefore, projected air emissions through 2015 remain within the bounds of the SWEA analysis.

3.8 INFRASTRUCTURE

The SWEA evaluated important aspects of the SNL/CA site infrastructure, including buildings, services, maintenance, utilities, and transportation systems that support site operations. Since completion of the SWEA, infrastructure maintenance and minor upgrades have been performed. System capacities listed in the SWEA remain valid.

3.8.1 WATER

SNL/CA purchases potable water from the adjacent LLNL. LLNL is supplied primarily by the San Francisco Water District. The secondary or emergency water source is the Alameda County Flood and Water Conservation District, Zone 7. The SWEA calculated annual water use under the Maximum Operations Alternative at 91.8 M gal/yr. Water use in 2010 was substantially below this value at 60.04 M gal. Projected water use in 2015 is estimated at 58.7 M gal, substantially less than that assessed for the Maximum Operations Alternative in the SWEA. System capacity was estimated in the SWEA at 922 M gal.

DOE/NNSA has not identified any constraints on the water supply system at LLNL; estimated usages at LLNL through 2015 are consistent with recent water consumption (DOE/NNSA 2011).

3.8.2 WATER DISCHARGE

Wastewater discharge in 2010 was 25.4 M gal, less than the 29.1 M gal projected in the SWEA under the Maximum Operations Alternative (2010 was used as the baseline year because of recent increases in wastewater discharge). Projected wastewater discharge in 2015 is 12 M gal, 17.1 M gal less than the Maximum Operations Alternative projection in the SWEA. System capacity was estimated in the SWEA at 81 M gal.

3.8.3 ELECTRICITY

Electricity use in 2010 was 37,054 megawatt-hour (MWh), less than the 48,800 MWh projected for the Maximum Operations Alternative. Projected electricity use in 2015 is 46,690 MWh, approximately 4 percent less than the SWEA projection for the Maximum Operations Alternative. System capacity was estimated in the SWEA at 239,000 MWh.

3.8.4 NATURAL GAS

Natural gas use in 2010 was 81.6 MMCF, less than the 94 MMCF projected in the SWEA under both the Planned Utilization and Operations and Maximum Operations Alternatives. Projected natural gas use in 2015 is 73.86 MMCF, substantially less than the SWEA projections. System capacity was estimated in the SWEA at 430 MMCF.

3.8.5 SUMMARY

Current and projected use of water, electricity, and natural gas, as well as discharge of wastewater, are projected to remain below those evaluated in the SWEA and therefore within the bounds of the SWEA analysis.

3.9 TRANSPORTATION

The SWEA addressed transportation impacts by examining projected onsite and offsite transportation activities involving hazardous materials and wastes (includes radioactive materials and wastes). Regional traffic impacts related to the alternatives also were addressed.

The number of commuter vehicles is projected to increase from 1,133 per day in 2010 to 1,416 per day by 2015. This is less than the 1,530 vehicles per day evaluated under the SWEA Maximum Operations Alternative.

A total of 55 waste and hazardous materials shipments were made to and from SNL/CA in 2010, much below the 396 shipments projected under the SWEA Maximum Operations Alternative. For 2015, shipments are projected at 428. The SWEA analysis concluded that no significant transportation impacts would exist for 396 shipments. The increase in the number of vehicles on the road (32 shipments per year, or less than one per week) is not a substantial increase over that analyzed in the SWEA.

The increase in the number of total waste and hazardous materials shipments above that analyzed in the SWEA includes construction waste associated with the development of the LVOC. All other waste generation is projected to be less than that considered in the SWEA analysis (see Section 3.10). Further, projected commuter vehicle traffic is 114 vehicles per day less than that estimated in the SWEA; therefore, the SWEA analysis remains valid for projected impacts associated with transportation.

3.10 WASTE GENERATION

The SWEA analysis of waste generation focused on whether activities under the Maximum Operations Alternative would generate new types of waste streams, and whether increased quantities would exceed existing waste management capacities.

3.10.1 RADIOACTIVE WASTE

SNL/CA generates small quantities of radioactive waste: only 98 kg in 2010 compared with an estimate under the SWEA Maximum Operations Alternative of 8,811 kg. Radioactive waste generation is anticipated to increase to 100 kg by 2015. This quantity is substantially below the level analyzed in the SWEA.

3.10.2 HAZARDOUS WASTE

The SWEA analysis projected the annual maximum quantity of hazardous waste generated at SNL/CA operating facilities to be 133,820 kg/yr under the Maximum Operations Alternative. Hazardous waste generation in 2010 was 59,741 kg. By 2015, the quantity is estimated to increase to 60,000 kg. This quantity is substantially below the level projected for both alternatives assessed in the SWEA.

3.10.3 BIOHAZARDOUS WASTE

Biohazardous waste generated at SNL/CA is autoclaved and does not contribute to the transported waste stream. Medical waste is generated in small quantities: 39 kg in 2009, projected to increase to 49 kg in 2015. In the SWEA, generation of 843 kg/year for the Maximum Operations Alternative was projected. By 2015, the quantity is estimated at 136 kg. This quantity is substantially below the level projected for both alternatives assessed in the SWEA.

3.10.4 MUNICIPAL SOLID WASTE

The SWEA analysis projected generation of 378.7 metric tons/year of municipal solid waste under the Maximum Operations Alternative. The actual quantity generated in 2010 was 92 metric tons, with 134 metric tons projected for 2015. Both of these quantities are substantially below the SWEA projection.

3.10.5 SUMMARY

Annual generation of all waste types projected through 2015 is below the quantities assessed for both the Planned Utilization and Operations Alternative and the Maximum Operations Alternative, and therefore remains within the bounds of the SWEA analysis.

3.11 NOISE

The SWEA noise analysis focused on whether SNL/CA activities would potentially increase ambient background noise in the surrounding community. Projected construction activities would generate noise produced by heavy construction equipment, trucks, and power tools. In addition, traffic and construction noise is expected to increase during construction onsite and along offsite local and regional transportation routes used to bring construction material and workers to the site. These construction noise levels would contribute to the ambient background noise levels for the duration of construction, after which ambient background noise levels would return to pre-construction levels. Table 3-1 presents peak attenuated noise levels expected from operation of construction equipment including peak noise levels at the source and at distances of 50, 100, 200, and 400 ft.

The onsite and offsite acoustical environments may be impacted during construction of the LVOC because of its close proximity to the site boundary. Construction activities would generate noise produced by heavy construction equipment, trucks, and power tools, and percussion from pile drivers, hammers, and dropped objects. The levels of noise would be representative of levels at large-scale building sites. Relatively high and continuous levels of noise would be produced by heavy equipment operations during the site preparation phase of construction. However, after this time, heavy equipment noise would become more sporadic and brief in duration. The noise from trucks, power tools, and percussion would be sustained through most of the building erection and equipment installation activities on the proposed facility site. As construction activities reach their conclusion, sound levels on the proposed facility site would decrease to levels typical of daily facility operations. Traffic noise is expected to increase during construction onsite and along offsite local and regional transportation routes used to bring construction material and workers to the site.

Table 3-1. Peak Attenuated Noise Levels (in A-weighted decibels [dBA]) Expected from Operation of Construction Equipment

SOURCE	PEAK NOISE LEVEL	DISTANCE FROM SOURCE			
		50 FT	100 FT	200 FT	400 FT
Heavy trucks	95	84-89	78-83	72-77	66-71
Dump trucks	108	88	82	76	70
Concrete mixer	108	85	79	73	67
Jackhammer	108	88	82	76	70
Scraper	93	80-89	74-82	68-77	60-71

Bulldozer	107	87-102	81-96	75-90	69-84
Generator	96	76	70	64	58
Crane	104	75-88	69-82	63-76	55-70
Loader	104	73-86	67-80	61-74	55-68
Grader	108	88-91	82-85	76-79	70-73
Dragline	105	85	79	73	67
Pile driver	105	95	89	83	77
Forklift	100	95	89	83	77

Source: Golden et al. 1980

Operations at the LVOC would have a negligible effect on background noise levels and would not increase the number of impulse noise events. Operation of the facility would generate some noise, caused particularly by site traffic and mechanical systems associated with operation of the facility (e.g., cooling systems). In general, sound levels are characterized as typical of a light industrial setting, within the range of 50 to 70 A-weighted decibels (dBA).

Noise from both construction and operational activities would remain essentially the same as that evaluated in the SWEA. Therefore, it appears that noise effects resulting from activities at SNL/CA would remain within the bounds of the analyses contained within the SWEA.

3.12 HUMAN HEALTH AND WORKER SAFETY

The SWEA analysis examined radiological health effects and occupational health and safety of workers. Key indicators for worker safety (worker doses, and injury/illness rates) were evaluated. Because there are no SNL/CA sources of radioactive air emissions, and thus no radiation exposure to the offsite population from SNL/CA operations, health effects to the public were not directly evaluated.

3.12.1 RADIOLOGICAL HEALTH EFFECTS

The SWEA analysis estimated the collective involved worker dose at SNL/CA through apportionment of lab-wide totals (New Mexico, California, Tonopah, and Kauai) based on the number of monitored workers. This method was used because monitoring data was not previously broken down by site. The projected dose under the Maximum Operations Alternative was 1.35 person-rem.

For this screening review, data was obtained specifically for SNL/CA. The collective involved worker dose for 2010 was 0.20 person-rem, substantially below the SWEA projection (Goke 2010). Though dose can vary by year, no new activities are anticipated that would increase this dose above the SWEA projection.

3.12.2 WORKER SAFETY

SNL/CA workers had 14 total recordable cases of accident or injury in 2010; eight of these cases resulted in lost workdays. Both of these values were substantially below the SWEA Planned Utilization and Operations Alternative projection of 61 recordable cases and 15 lost workday cases and the Maximum Operations Alternative projection of 79 recordable cases per year, with 19 cases resulting in lost workdays. It is anticipated that the yearly average of recordable cases and lost workdays would remain below the SWEA Maximum Operations Alternative projections through 2015.

Use of biological agents at SNL/CA remains within the Biosafety Levels (BSL) 1 and 2 categories that were in place at the time the SWEA was prepared. BSL 1 and 2 operations do not typically represent a serious risk to employees or the public. No BSL-3 or higher operations are conducted at SNL/CA, and none are projected through 2015; therefore, current and projected operations remain within the bounds of the SWEA analysis.

3.12.3 SUMMARY

Doses that could contribute to radiological health effects resulting from projected activities at SNL/CA would not likely increase substantially above current levels, and would therefore remain well below those assessed in the SWEA for both the Planned Utilization and Operations and Maximum Operations Alternatives. Similarly, current recordable cases and lost workdays are substantially lower than those analyzed in the SWEA; therefore, impacts resulting from radiation exposure and worker safety issues would remain within the bounds of the SWEA analysis.

3.13 SOCIOECONOMICS

The SWEA socioeconomics analysis determined whether implementation of the Maximum Operations Alternative would result in impacts to demographic characteristics, the economy, or community services in the region. The SWEA projected an SNL/CA workforce of 1,931 under the Maximum Operations Alternative. The 2010 workforce was 1,076, with a projected 2015 workforce of 1,345. Both of these numbers are substantially below the SWEA projections.

The SWEA projected expenditures associated with SNL/CA at $262 M under the Maximum Operations Alternative. Expenditures in 2010 were $252.6 M and are projected to increase to $316 M by 2015. While this is above the SWEA estimates in terms of absolute dollars, the $54 M difference between the projected expenditures for the Maximum Operations Alternative and those projected for 2015 represents a compound annual growth rate (CAGR) of 3.17 percent, which would likely be well within the rate of inflation during that period using the Maximum Operations Alternative as a starting figure. Using actual figures from 2010, the 2015 figure would represent a 3.8 percent CAGR. Therefore, the 2015 projection is consistent with the expenditures projected in the SWEA and would not represent substantial growth over the current budget.

Because the increased projected expenditures would result in a CAGR that would likely be within the rate of inflation when compared to expenditures evaluated in the SWEA, and the projected workforce would be less than that analyzed in the SWEA, impacts to socioeconomics would remain within the bounds of the SWEA analysis.

3.14 ENVIRONMENTAL JUSTICE

Pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, environmental justice analyses identify and address any disproportionately high and adverse human health or environmental effects on minority or low-income populations. The SWEA concluded that implementation of either the Planned Utilization and Operations Alternative or the Maximum Operations Alternative would have no discernable adverse impacts for any resource area evaluated, thus, no disproportionately high and adverse impacts to minority or low-income communities would be anticipated.

No changes in operations are planned that would result in noticeable increases in adverse impacts. Therefore, environmental justice analyses contained within the SWEA remain valid for projected operations.

3.15 ACCIDENTS

The SWEA considered three general areas of accident analysis: natural phenomena, material accidents, and operational accidents. No radiological scenarios were postulated because no sources of potential airborne hazards were identified.

The SWEA selected two accident scenarios for detailed analysis: 1) a major earthquake, and 2) an unspecified accident resulting in the explosion of a refueling tanker truck. The analysis of the earthquake scenario concluded that the most likely result would be damage to unsecured equipment that might impact hazardous chemical containers or a fire resulting from damage to electrical equipment or the rupture of onsite gas lines. Typical emergency response actions would be taken, including inspection and damage assessment of facilities, gas lines, water lines, fire alarms, and building areas. Explosion of a refueling tanker truck carrying 40,000 ft^3 of hydrogen would result in potential physical harm to individuals, including injury from flying debris, eardrum rupture, or death, at distances up to 500 ft from the site of the explosion.

Bounding accidents for projected operations would remain essentially the same as those utilized in the SWEA analysis. Therefore, the SWEA accident analyses remain valid for projected operations.

3.16 INTENTIONAL DESTRUCTIVE ACTS

The SWEA did not discuss the potential environmental impacts of intentionally destructive acts such as might be committed by a terrorist attack on facilities at SNL/CA. This approach was consistent with the DOE policy and requirements in effect at the time the SWEA was issued. The DOE has since released a December 1, 2006 memorandum requiring consideration of intentional destructive acts (i.e., acts of sabotage or terrorism) in NEPA documents.

The SNL/CA site offers certain inherent safeguards: restricted access, security barriers, and access to a highly-effective, rapid-response security force. As part of DOE/NNSA's detailed design and planning processes, DOE/NNSA would continue to identify safeguards, security measures, and design features that would further protect facilities from terrorist attack and other forms of sabotage. DOE believes that the safeguards should involve a dynamic process of enhancement to meet threats, which could change over time. Potential additional measures that DOE/NNSA could adopt include:

- Reinforcement of buildings to secure against theft of energetic materials;
- Additional doors, airlocks, and other features to delay unauthorized intrusion;
- Additional site perimeter barriers;
- Active denial systems to disable any adversaries and prevent access to the facility; and
- Increased area coverage, monitoring, and/or capabilities of surveillance systems to detect potential intruders.

Although it is not possible to predict if or how malevolent acts would occur, DOE/NNSA examined several intentional destructive act scenarios, consequences of those actions, and general mitigations.

Detonation or intentional release of materials. Toxic and/or flammable materials could be detonated or released, causing injury or death. Likewise, biological agents could be released causing illness. Large or highly toxic quantities of these materials would be secured, with access allowed only to individuals with a need to use them.

Theft of energetic materials. The theft of energetic materials could result in transport to another location within or outside of SNL/CA, and detonation with the intent of harming individuals or infrastructure. Potential targets within the boundaries of SNL/CA could include SNL/CA facilities; consequences of various types of accidents at these facilities have been analyzed in the SWEA. The consequences of detonations at potential targets outside of SNL/CA are highly variable, but could result in loss of life. Because activities of the type described in this SA already take place at SNL/CA, and have been ongoing for decades, there are already extensive safeguards in place to minimize the potential of theft of energetic materials. Multiple layers of protection exist to keep materials inside SNL/CA boundaries.

In-situ detonation of energetic materials. Energetic materials could be detonated at the Explosive Storage Area. The consequences of such a detonation could include loss of life. Because this storage location is in an area of an access-controlled facility with relatively few personnel, the number of lives lost from a malevolent act would be limited to a relatively small number of nearby workers. Storage locations have barriers against intrusion and are reinforced to reduce the consequences of a potential accident or deliberate act.

Theft of sealed radiation sources. Sealed sources, used in many operations within SNL/CA, contain small amounts of radioactive material that could pose a contamination hazard if the source material were deliberately dispersed. The consequences of exposure to this radioactive material would vary with the amount of source radioactivity, but could result in a dose to one or more individuals that could raise the risk of cancer. Sealed sources are accountable items that would continue to be secured according to SNL and DOE/NNSA guidelines. Access to sealed sources would continue to be strictly controlled.

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4.0 DETAILED CONSEQUENCE ANALYSIS

This chapter presents more detailed analyses for technical disciplines that did not pass the screening review criteria described in Section 3.1, as Step 1, thus requiring further analysis. The only resource area requiring investigation beyond Step 1 is surface water quantity.

4.1 SURFACE WATER QUANTITY

As discussed in Section 3.4.4, the SWEA estimated existing and projected storm water runoff based on the anticipated increase in impervious surface area at SNL/CA. The SWEA estimated an additional 27.7 acres of impervious surface (over the 49.2 acres estimated at SNL/CA in the year 2000) (DOE/NNSA 2003a). Recent estimates indicate that approximately 92 acres of impervious surface are currently present at SNL/CA, including approximately 2.35 acres added since the SWEA was produced. Examination of aerial/satellite photographs, however, reveals that the current areal extent of impervious surfaces is nearly identical to that in existence at the time the SWEA was written (see Figure 3-1).

It appears, therefore, that the SWEA underestimated the impervious surface. Storm water runoff at the site in the interim has had little or no impact on other resources. Approximately 3 acres of impervious surface would be added as a result of projected construction (including LVOC-related development) through 2015, bringing the total to 95 acres. The overall change in impervious surface from that in existence at the time the SWEA was produced would be approximately 5.35 acres. This represents a minor increase in impervious surface, and with standard storm water management practices would result in negligible impacts to surface water.

Further, 93 additional acres were projected to be developed under the Maximum Operations Alternative. Combined with the 49.2 acres of impervious surface estimated as already present, this could have resulted in up to 142.2 acres of impervious surface depending on the configuration of the additional development. The projected increase in impervious surface area through 2015 would be substantially less than this figure. Finally, it should be noted that no adverse effects have resulted from overall storm water quantity since the SWEA was prepared. Therefore, while impervious surface, and therefore runoff quantity, is greater than that estimated within the SWEA, actual conditions and the associated impacts have not changed substantially, and the amount of impervious surface and surface water runoff are not greater than would have been expected given projected increases in developed area noted elsewhere in the SWEA. Therefore, impacts associated with surface water quantity would appear to remain within the bounds established by the SWEA analysis.

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5.0 CUMULATIVE EFFECTS

The Council on Environmental Quality regulations implementing NEPA define cumulative effects as "the impact on the environment which results from the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7).

The cumulative effects analysis for this SA includes: 1) a review of past, present, and reasonably foreseeable actions for other Federal and non-Federal agencies; 2) a summary of environmental effects identified in this SA; and 3) a summary of the cumulative effects and changes since the SWEA was issued.

Reasonably foreseeable future actions of SNL/CA are described in Chapter 2 of this SA. Reasonably foreseeable future actions for the region impacted by SNL/CA were also reviewed and included in the analysis.

5.1 OTHER ACTIONS

5.1.1 LAWRENCE LIVERMORE NATIONAL LABORATORY

DOE/NNSA has identified 21 projects planned through 2015 at LLNL (DOE/NNSA 2011). However, the workforce at LLNL has decreased from 9,411 workers in 2005 to 6,916 in 2009. This has led to reductions in offsite effects, such as traffic and non-radioactive air emissions. Overall, operations through 2015 are projected to have environmental effects similar to those that currently exist.

5.1.2 LIVERMORE SCIENCE AND TECHNOLOGY CENTER

The City of Livermore is proposing a "Livermore Science & Technology Center" to the northwest of LLNL. This proposal is predicated on the projection of a regional demand for research space in the Tri-Valley area (Flad Architects 2010).

5.2 LAND USE AND VISUAL RESOURCES

Land use and visual resources changes in the area include development of the LVOC at LLNL, and potential development of the Livermore Science and Technology Center. Declining home prices have temporarily slowed new housing construction in the area. Cumulative land use and visual resources effects take into consideration the use of open land, adequacy of buffer zones surrounding site activities, and any potential conflicts between existing or projected onsite and offsite programs and operations. Small incremental effects to land use and visual resources would result from SNL/CA and LLNL operations; however, projected new construction through 2015 remains within the bounds of the SWEA analysis. Projects planned through 2015 are in close proximity to existing facilities and would not combine with off-site construction to result in a substantial change in the visual character of the area. Similarly, construction since the SWEA was released and construction planned through 2015 would be located onsite and would not affect off-site land use. Cumulative impacts to land use and visual resources remain bounded by the SWEA analysis.

5.3 GEOLOGY AND SOILS

Soil would be disturbed during construction activities. New construction has disturbed approximately 2.35 acres since the SWEA and is projected to require another 3 acres through 2015. Associated impacts would be entirely contained onsite and would not combine with other construction activities off-site; therefore, cumulative impacts to soils and geology remain within the bounds of the SWEA analysis.

5.4 WATER RESOURCES AND HYDROLOGY

SNL/CA personnel have implemented monitoring programs to evaluate groundwater resources for contamination. No additional areas of contamination have been identified since the SWEA. All known groundwater contamination is the result of past activities. Contaminant levels observed indicate a decrease in contaminant concentrations.

Based on a water demand evaluation by the Bay Area Water Supply and Conservation Agency (BAWSCA 2010), the Hetch-Hetchy and Zone 7 system water demands are projected to exceed available supplies after 2018 if strategies to implement water conservation programs are not successful.

Storm water runoff from SNL/CA facilities could potentially combine with other local runoff contributors during storm events. The presence of contamination on paved surfaces, or from any discharges, could result in cumulative impacts to the surface water resource. Analysis of surface water samples has not identified elevated levels of contaminants. No activities analyzed in this SA are projected to increase the quantity of contaminants available for transport by surface water.

The total area of impervious surface was underestimated in the SWEA. No substantial impacts associated with storm water generation have been observed since the SWEA was issued. New construction has added only 2.35 acres of impervious surface since the SWEA was completed and is projected to add 3 acres through 2015.

5.5 BIOLOGICAL RESOURCES

Restricted access, limited planned development, and environmental compliance at SNL/CA has allowed maintenance of biological resources.

5.6 CULTURAL RESOURCES

No known cultural resources exist at SNL/CA. Currently proposed construction projects would not affect historically significant properties or properties outside the bounds of SNL/CA; therefore, no cumulative impacts to cultural resources are anticipated.

5.7 AIR QUALITY

Cumulative impacts to air quality incorporating projected emissions from additional sources and planned construction, may increase particulate matter concentrations during demolition and construction projects, adding to $PM_{2.5}$ concentrations in a non-attainment area. These effects would be temporary. Emissions from operations remain at or below levels described in the SWEA; therefore, cumulative impacts to air quality remain within the bounds of the SWEA analysis.

5.8 INFRASTRUCTURE

An increase in employee population and the addition of new facilities may result in a minor increase in water and energy use; however, these are projected to remain within the bounds of the SWEA analysis.

5.9 TRANSPORTATION

The projected increase in SNL/CA's workforce would increase the number of daily commuters by 250. The number of shipments of materials and waste is not projected to increase above quantities projected in the SWEA; therefore, transportation effects are projected to remain within the bounds of the SWEA analysis.

5.10 WASTE GENERATION

There is offsite disposal of all SNL/CA waste streams, so the area potentially affected extends beyond the immediate vicinity. The generation rate for all waste streams, except construction waste, is within the Maximum Operations Alternative limits presented in the SWEA. Adequate capacity for solid waste disposal exists in the area (DOE/NNSA 2005). Waste generation effects are projected to remain within the bounds of the SWEA analysis.

5.11 NOISE

Cumulative impacts from noise generated from demolition, construction, and operation of new and planned facilities would contribute to the ambient background noise levels. In general, sound levels would increase during demolition and construction of a facility and, upon completion, return to noise levels characteristic of a light industrial setting within the range of 50 to 70 dBA. Minimal noise-related cumulative impacts are anticipated. Noise effects are projected to remain within the bounds of the SWEA analysis.

5.12 HUMAN HEALTH AND WORKER SAFETY

The occupational health and safety of workers at SNL/CA is site-specific and would not be affected by other activities occurring within the area. Cumulative impacts would be negligible and would not exceed those in existence at the time of the SWEA analysis. Impacts to worker safety and health are projected to remain within the bounds of the SWEA analysis.

5.13 SOCIOECONOMICS

Changes in the population and employment in the area from future potential activities at SNL/CA, LLNL, and proposed Livermore Science & Technology Center would have a small impact on total employment. Increases in operating expenditures would be minor. Socioeconomic effects are projected to remain within the bounds of the SWEA analysis.

5.14 ENVIRONMENTAL JUSTICE

Off-site impacts are anticipated to remain negligible; therefore, no change in impacts to populations including minority and low-income populations or children would result.

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6.0 CONCLUSIONS

This SA evaluates whether changes from actions foreseen in 2003, plus new and modified proposals and projects, present a significantly different picture of the likely consequences of continued operation of SNL/CA than was presented in the SWEA and FONSI. This evaluation focused on determining whether the impacts of SNL/CA operations, as identified today, would be within the limits of impacts identified in the SWEA.

Chapters 3 and 4 of this SA evaluated a set of new and modified operations and facilities and other changes and concluded that there has been little change in impacts to the human environment since the SWEA was completed in 2003. Current site operations and those projected through 2015 remain within the bounds of the SWEA analyses.

Cumulative effects, described in Chapter 5 of this SA, would similarly remain virtually unchanged from those evaluated in the SWEA.

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