

ated with the No Action Alternative. For a summary of potential environmental justice impacts under the No Action Alternative, see Table 5-15.

5.5 MAXIMUM OPERATIONS ALTERNATIVE

5.5.1 LAND USE AND VISUAL RESOURCES

Implementing the Maximum Operations Alternative would not affect existing land use patterns or visual resources at SNL/CA. Sections 5.5.1.1 and 5.5.1.2 discuss these resource areas in relation to the Maximum Operations Alternative.

5.5.1.1 Land Use

No changes would occur to land use patterns at SNL/CA under this alternative. The extent of DOE land available for use by SNL/CA, 410 acres, would remain the same. SNL/CA operations would remain consistent with industrial research park uses and would not change established land use patterns or requirements.

Under this alternative, Building 916 would be replaced with a new building twice as big, and a new R&D building would be constructed. Both would be constructed within the 93 acres designated for new construction, thus there would be no impact to overall site land use, as explained in Section 5.4.1. Completion of these facilities would be consistent with the existing environment. In addition, the functions of these buildings would be consistent with those surrounding them. Structures no longer determined to be economically useful potentially would be vacated and removed (up to 100,000 sq ft). These existing structures are located throughout the SNL/CA and their removal would not impact land use.

5.5.1.2 Visual Resources

The Maximum Operations Alternative would not adversely change the overall appearance of the existing landscape, obscure views, or otherwise detract from the scenic views of SNL/CA or from areas adjacent to the site. A new Building 916 and a new R&D building would be constructed within the 93-acre construction area, and would be expected to have no impacts to visual resources. All construction would be consistent with campus-style design and the guidelines presented in the *Master Plan* (Royston *et al.* 1993). Although construction in this area increases the size of the main campus, it would have little or no effect on the scenic qualities of the SNL/CA site. Removal of facilities and structures would tend to improve the visual characteristics of the site.

5.5.2 GEOLOGY AND SOILS

As with the No Action Alternative, no impacts to general geology and geologic resources are anticipated. Additionally,

there would be no increase in the likelihood of impacts from seismic activity.

For a discussion regarding the Arroyo Seco Improvement Plan and the placement of the soil on a 25-acre part of the 93-acre future construction areas, see Section 5.4.2.

Construction activities would result in the construction of two new buildings totaling 100,000 sq ft. D&D activities would potentially remove 100,000 sq ft of facilities determined to be no longer economically useful. While these activities would disturb soil, these areas are part of the existing industrial park and the land would be used again for future construction; no impacts would be expected. Additionally, upgrades to storm water runoff areas would be beneficial.

In general, activities at SNL/CA would increase by 53 percent (derived from the increase in workforce) above the No Action Alternative. There would be a proportional increase in the likelihood of a spill or release to the environment; however, industry accepted controls are in place to minimize the potential for soil contamination from any SNL/CA operations.

5.5.3 WATER RESOURCES AND HYDROLOGY

The impacts of this alternative on water resources and hydrology would be essentially the same as those associated with the Planned Utilization and Operations Alternative. Due to the increased staffing levels (53 percent increase in staff site-wide) under this alternative, increases in discharge to the sanitary sewer system would occur. The capacity of the current system is adequate to handle this increase (see Section 5.5.7).

5.5.4 BIOLOGICAL RESOURCES

Under the Maximum Operations Alternative, impacts to biological resources would be substantially the same as those associated with the Planned Utilization and Operations Alternative. The main difference between the alternatives would be the use of two work shifts to increase R&D (versus the one work shift used in the No Action and Planned Utilization and Operations Alternatives). Due to the proposed disturbance of critical habitat for the California red-legged frog on the east side of SNL/CA, DOE would coordinate with the USFWS under the provisions of Section 7 of the *Endangered Species Act*.

Under this alternative, two new structures are proposed, including a new building similar to the CRDL and a replacement for Building 916. These proposed structures would have a negligible effect on biological and ecological resources. They would be constructed on previously disturbed land in either the existing footprint or within 93 acres designated for future development (see Section 5.4.4.2).

5.5.5 CULTURAL RESOURCES

Implementation of the Maximum Operations Alternative would likely have no impacts on cultural resources due to the apparent lack of prehistoric and Native American resources and historic archaeological sites, the nature of the buildings and structures present, and compliance with applicable regulations and established procedures for the protection and conservation of cultural resources located on lands administered by the DOE.

The potential to impact buried archaeological sites would be the same under this alternative as under the Planned Utilization and Operations Alternative. Additional construction projects that would occur under this alternative would take place within the 93-acres set aside for construction projects. Again, some maintenance activities that require ground disturbance could result in the discovery of buried archaeological sites, but compliance with regulations and procedures would ensure that any impacts would be minimal. Approximately 100,000 sq ft of buildings potentially would be removed from the site under this alternative. These existing buildings are recent in origin and not historically significant, thus removing them would not adversely affect cultural resources.

5.5.6 AIR QUALITY

Under the Maximum Operations Alternative, DOE and interagency programs and activities at SNL/CA would increase. The Maximum Operations Alternative would increase the number of nonexempt emission sources to 57, including:

- 12 boilers
- 14 degreasers and solvent use
- 10 backup generators
- 2 spray booths
- 1 service station

- 1 mixer
- 1 electroplating operation
- 16 miscellaneous sources

Criteria pollutant emissions are estimated to increase 53 percent based on projections of site-wide staff increases of 53 percent (see Section 5.2.6). Table 5-30 presents the criteria pollutant emissions under the Maximum Operations Alternative, reflecting the increase in emissions above the No Action and Planned Utilization and Operations Alternatives. Criteria pollutant emissions from SNL/CA under the Maximum Operations Alternative remain below one percent of the respective pollutant emissions from the Bay Area.

Table 5-31 presents the Maximum Operations Alternative air toxics emissions from SNL/CA, which are estimated to be twice the air toxic emission rates for the Planned Utilization and Operations Alternative, based on the addition of a second shift to the operations at SNL/CA. The Maximum Operations Alternative air toxic emissions are less than one and one-half percent of those for the Bay Area.

Construction activities at SNL/CA could have short-term adverse impacts due to emissions of criteria air pollutants from construction equipment, traffic from construction worker vehicles, and fugitive dust from earth-moving activities. Under the Maximum Operations Alternative, construction activities would include projects under the Planned Utilization and Operations Alternative plus two new projects. The fugitive dust could exceed PM₁₀ 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 be implemented to minimize fugitive dust. It is expected that PM₁₀ concentrations would be within all applicable standards.

Table 5-32 estimates construction-related emissions CO emissions for one typical project. Construction of a

Table 5-30. Criteria Pollutant Emission Rates for the Maximum Operations Alternative (kilograms per year)

Pollutant	Maximum Operations Alternative ^a	Bay Area Emission Year 2000 ^{b,c}	Percent Contribution from SNL/CA
Particulates	NA	57,900,000	NA
Volatile Organic Compounds	2,534	179,000,000	< 1
Sulfur Dioxide	NA	29,100,000	NA
Nitrogen Dioxide	5,066	214,000,000	< 1
Carbon Monoxide	459 to 612	995,000,000	< 1

Sources: SNL/CA 2002b

^aBased on a 53 percent increase in Sandia National Laboratories, California (SNL/CA) staff

^bBay Area Air Quality Management District (BAAQMD) inventory is reported annually for period July to June

^cAll Bay Area-wide emissions except particulates are based on an average summer day multiplied by 365 days. Bay Area particulate emissions are based on an average winter day multiplied by 365 days

<: less than

NA: not available/not applicable

SNL/CA: Sandia National Laboratories, California

Table 5-31. Air Toxic Emission Rates for the Maximum Operations Alternative (kilograms per year)

Pollutant	Maximum Operations Alternative ^a	Bay Area Emission Year 1999 ^b	Percent Contribution from SNL/CA
1,1,1-trichloroethane	470	58,968	< 1
1,4-dioxane	11	771	< 1.5
Ammonia	477	1,406,160	< 1
Benzene	0.64	28,577	< 1
Carbon tetrachloride	0.72	1,406	<1
Formaldehyde	6.8	81,648	< 1
Methyl alcohol	1,364	276,696	< 1
Methylene chloride	151	49,896	< 1
Perchloroethylene	150	371,952	< 1
Toluene	86	335,664	< 1
Trichloroethylene	133	21,773	< 1
Xylene	30	276,696	< 1

Sources: TTNUS, 2002a; SNL/CA 2002b

^aBased on twice the maximum emission rate from the Planned Utilization and Operations Alternative^bBay Area Air Quality Management District (BAAQMD) inventory is reported annually for period July to June

<: less than

NA: not available/not applicable

SNL/CA: Sandia National Laboratories, California

Table 5-32. Estimated Carbon Monoxide Emissions Associated with Representative Project Construction Activities

1-Year Construction Activity (assumes 21-work day months or 252 days)	Total Annual Hours of Operation	Equipment Emission Factors ^a	Estimated Total Annual Carbon Monoxide Emissions (total pounds per year)	Estimated Total Annual Carbon Monoxide Emissions (total tons per year)
Assumptions for Diesel Vehicles Emissions				
7 Diesel Units (trucks for transportation of materials to site throughout life of construction phase)	3,528 (or 2 hours per day each for 252 days)	0.11	388	0.194
8 Diesel Units (dozers, backhoes, graders, dump trucks to grade and lay foundation)	800 (or 5 hours per day each for 20 days)	0.11	88	0.044
6 Diesel Units (forklifts, crane, front end loader, other equipment for construction of buildings)	10,584 (or 7 hours per day each for 252 days)	0.11	1,164	0.582
Total Diesel units (21)	14,912	N/A	1,640	0.82

Table 5-32. Estimated Carbon Monoxide Emissions Associated with Representative Project Construction Activities

1-Year Construction Activity (assumes 21-work day months or 252 days)	Total Annual Hours of Operation	Equipment Emission Factors ^a	Estimated Total Annual Carbon Monoxide Emissions (total pounds per year)	Estimated Total Annual Carbon Monoxide Emissions (total tons per year)
Assumptions for Gasoline Vehicles Emissions				
24 Light Gasoline units (worker personal vehicles, snack wagons, light commercial vans)	6,048 (or 1 hour per day each for 252 days)	0.48	2,903	1.451
2 Hand tampers	160 (or 4 hours per day each for 20 days)	0.48	77	0.38
Total Gas units	6,208	N/A	2,980	1.49
Total Estimated Carbon Monoxide Emissions during Typical Construction Phase			4,620 pounds	2.31 tons

Source: SNL/CA 2001i

^aCarbon Monoxide (CO) emission factors are based on the Environmental Protection Agency (EPA) National Vehicle and Fuel Emission Laboratory (Ann Arbor, Michigan) average emission rates for idling vehicles. CO emissions for light-duty trucks are estimated at 219 grams per hour, for heavy-duty gas vehicles at 245 grams per hour, and for heavy-duty diesel vehicles at 50 grams per hour. Calculations are based on a conversion factor of 0.035 ounce per gram (grams x 0.035) divided by 16 (ounces per pounds) times hour's operation divided by 2,000 (pounds per ton) to obtain tons per yr.

replacement building for Building 916 and a new building similar to the CRDL would produce similar levels of CO emissions shown in Table 5-32. It is expected that CO emissions will be within all applicable standards. The Arroyo Seco improvement activities are covered in Table 5-19.

The estimated number of daily commuters to SNL/CA during FY 2001 is 700 to 1,000 vehicles. Under the Maximum Operations Alternative, it is estimated that a 53 percent increase in daily commuter traffic will occur resulting in 1,071 to 1,530 vehicles. Increases of carbon monoxide and nitrogen oxides, an ozone precursor, will occur with the increase in commuter traffic. Actual future emissions are not expected to be equivalent to the increase in commuter vehicles because future vehicles will have lower emission rates and more stringent inspection

and maintenance programs. In addition, the BAAQMD vehicle buy back program designed to remove 1981 and earlier model vehicles from the road will contribute to the reduction in commuter vehicle emissions.

Total carbon monoxide emissions estimates are shown in Table 5-33. Total carbon monoxide emissions for the Maximum Operations Alternative are 70 tons per year above the 2000 baseline and below the 100 tons per year incremental increase above baseline that would require a conformity determination. In addition, the total carbon monoxide emissions for the Maximum Operations Alternative were found to be less than 1 percent of the maintenance area's emissions of carbon monoxide. As a result, the NNSA has concluded that no conformity determination is required for the Maximum Operations Alternative.

Table 5-33. Carbon Monoxide Emissions from Sandia National Laboratories, California under the Maximum Operations Alternative (tons per year) and Calendar Year 2000 (baseline)

Stationary Sources	Mobile Sources	Construction Activities	Total
Maximum Operations Alternative			
0.61	282	9.2	291.8
Baseline			
0.4	214	6.9	221.3

Source: EPA 1995

Notes: Mobile Source Emission Factors assumptions Baseline (2000) 24.77 grams per mile, the No Action Alternative (2005) 21.29 grams per mile, 1,000 to 1,530 vehicles, 30-mile trip, average speed 35 miles per hour. Assumed three typical construction projects each year (2.31 tons per project) plus the Arroyo Seco project (2.25 tons per year).

5.5.7 INFRASTRUCTURE

As discussed in Section 5.3.7, the infrastructure analysis evaluated potential incremental changes to SNL/CA services, utilities, and facilities by alternative.

The Maximum Operations Alternative would increase demands on infrastructure over the next 10 years (Table 5-34). Annual consumption of water, electricity, and natural gas would exceed recent historic levels (DOE 1992a; TtNUS 2002a). Under the Maximum Operations Alternative, the current infrastructure would be capable of accommodating SNL/CA facility requirements and no major additional infrastructure facilities are proposed.

5.5.8 TRANSPORTATION

Based on current transportation operation data, the Maximum Operations Alternative would increase the amount of highway and pedestrian infrastructure within SNL/CA by approximately 53 percent (Table 5-35). The number of truck shipments from SNL/CA would increase by approximately 600 vehicles per year from the current/No Action numbers. Of these, 57 would be hazardous shipments. The number of commuter vehicles would increase by approximately 371 to 530. The increased number of shipments and the increase in employee vehicles would not represent substantial increase in the number of vehicles on the road by virtue of the area's

**Table 5-34. Annual Sandia National Laboratories, California
Utility Usage and Capacities under the Maximum Operations Alternative**

Utility	Maximum Operations Alternative	System Capacity	Usage as Percent of Capacity
Water Use	76.5 to 91.8 M gal	922 M gal	8 to 10
Wastewater Discharge	18.4 to 29.1 M gal	81 M gal	23 to 36
Electrical Use	48,800 MWh	239,000 MWh	20
Natural Gas Use	94 M ft ³	430 M ft ³	22

Source: TtNUS 2002a; Royer 2002a

ft³: cubic feet

M gal: millions of gallons

MWh: megawatt hours

Table 5-35. Transportation Activities under the Maximum Operations Alternative

Activity	No Action Alternative	Maximum Operations Alternative	Change from No Action
Paved and unpaved road	6.2 miles	9.7 miles	+3.5 miles
Pedestrian mall	4 acres	6.24 acres	+2.24 acres
Paved service areas	5.5 acres	8.6 acres	+3.1 acres
Paved service parking	12.7 acres	19.8 acres	+7.1 acres
Waste (includes hazardous & radioactive)	76 shipments	116 shipments	+40 shipments
Sanitary Waste	52 shipments	80 shipments	+28 shipments
SNL/CA Weekly Hazardous Materials Transports (excluding waste)	1 to 3 outbound shipments per week (Total of 33)	1 to 3 shipments (Total of 50)	+17 shipments
Supplier Weekly Hazardous Material Transports	1 to 3 inbound shipments per week (Total of 100)	1 to 3 shipments (Total of 150)	+50 shipments
Soil Transports	NR	1,600 to 2,000 shipments over 10 Years	+200 shipments
Incoming Material (Rock, Soil, Concrete)	NR	1,500 to 3,000 shipments over 10 Years	+300 shipments
Commuter traffic	700 to 1,000 vehicles	1,071 to 1,530 vehicles	+371 to 530 vehicles

Source: TtNUS 2002a

NR: not reported

SNL/CA: Sandia National Laboratories, California

projected population growth and would have no significant impact on the region. Based on the number of additional vehicles, impacts from accidents should be the same as under current conditions.

5.5.9 WASTE GENERATION

The Maximum Operations Alternative would not cause any major changes in the types of waste streams generated onsite. Waste generation at SNL/CA would increase, consistent with a 53 percent increase in laboratory operations. However, existing waste minimization and pollution prevention programs would control the extent of the waste generation increase. Under the Maximum Operations Alternative, waste projections used for analysis would not exceed existing waste management capacities.

Site-wide waste generation would increase by 53 percent above the 5-year average under the Maximum Operations Alternative. For specific facilities, the CY 2000 waste generation data were doubled to correspond with two shifts. Existing operations wastes are considered to be derived from mission-related work. New operations are

discussed separately in order to show the maximum likely operational increases. The projected totals would be below recent highs experienced within the last five years (See Tables 4-10 and 4-11).

5.5.9.1 Radioactive Wastes

Existing Operations

Under the Maximum Operations Alternative, SNL/CA would generate LLW and LLMW (Table 5-36). However, SNL/CA would not generate any TRU waste or high-level waste. Projections for radioactive waste generation at specific facilities from new and existing operations are shown in Table 5-37.

Under the Maximum Operations Alternative, SNL/CA anticipates a 53 percent increase in the generation of LLW and LLMW from all operations over the next 10 years. There would be sufficient management capacity to accommodate anticipated radioactive wastes. LLW and LLMW are shipped offsite for final disposal.

Table 5-36. Average Annual Radioactive Waste Generation under the Maximum Operations Alternative (in kilograms)

All Waste	Unit	5-Year Average (1996 through 2000) ^a	Maximum Operations Alternative
LLW			
Existing Operations	Kg	198	444
New Operations	Kg	0	0
Balance of Operations	Kg	5,110	7,677
SNL/CA Total LLW	Kg	5,308	8,121
Percent Change		0%	+53%
LLMW			
Existing Operations	Kg	0	0
New Operations	Kg	0	0
Balance of Operations	Kg	451	690
SNL/CA Total LLMW	Kg	451	690
Percent Change		0%	+53%
Total Radioactive Waste			
Existing Operations	Kg	198	444
New Operations	Kg	0	0
Balance of Operations	Kg	5,561	8,367
SNL/CA Total Radioactive Waste	Kg	5,759	8,811
Percent Change		0%	+53%

Sources: SNL/CA 2002b; TtNUS 2002a

^a5-year average represents the No Action Alternative excluding new facilities

%; percent

LLW: low-level waste

LLMW: low-level mixed waste

SNL/CA: Sandia National Laboratories, California

Table 5-37. Average Annual Waste Generation by Specific Sandia National Laboratories, California Facilities under the Maximum Operations Alternative (in kilograms)

Facility	Calendar Year 2000			Maximum Operations Alternative		
	LLW	LLMW	Hazardous ^a	LLW	LLMW	Hazardous ^a
Existing Facilities						
Combustion Research Facility (CRF)	0	0	2,444	0	0	4,888
Building 910	15	0	15,432	30	0	30,864
Building 914	0	0	1,741	0	0	3,482
Building 916	1.5	0	596	3	0	1,192
Building 927	0	0	4,182	0	0	8,364
Micro and Nano Technologies Laboratory (MANTL)	0	0	7,109	0	0	14,218
Chemical and Radioactive Detection Laboratory (CRDL)	13	0	1,169	75	0	6,719
Area 8 Facilities	168	0	814	336	0	1,628
Explosives Storage Area (ESA)	0	0	0	0	0	0
Hazardous and Radioactive Waste Storage Facilities	0	0	0	0	0	0
Subtotals Existing Facilities	198	0	33,487	444	0	71,355
New Facilities						
LIGA Technologies Facility (LTF)	0	0	0	0	0	5,928
Distributed Information Systems Laboratory (DISL)	0	0	0	0	0	0
Glass Furnace and Melting Laboratory (part of the CRF)	0	0	0	0	0	50
Subtotals New Facilities	0	0	0	0	0	5,978
Totals All Facilities	198	0	33,487	444	0	77,333

Sources: SNL/CA 2002b; TtNUS 2002a

^aIncludes RCRA Hazardous, California Toxic, TSCA, and biohazardous (MWMA)

LLW: low-level waste

LLMW: low-level mixed waste

RCRA: *Resource Conservation and Recovery Act*TSCA: *Toxic Substances Control Act*MWMA: *Medical Waste Management Control Act***New Operations**

SNL/CA anticipates 444 kg per year of LLW would be generated from new operations annually over the next 10 years. There would be sufficient capacity to accommodate anticipated new operations radioactive wastes.

Balance of Operations (Includes Maintenance and Decontamination and Decommissioning)

SNL/CA anticipates 7,677 kg per year of LLW and 690 kg per year of LLMW would be generated from balance of operations over the next 10 years. There would be sufficient capacity to accommodate projected radioactive

wastes. Maintenance and D&D wastes are not expected to impact overall SNL/CA waste management operations.

Current Capacity

The total radioactive waste generated per year requiring offsite disposal at licensed/approved facilities would not exceed the existing storage and handling capacities at the Radioactive Waste Storage Facility. Projections indicate that radioactive waste throughput would increase by 53 percent. SNL/CA routinely ships radioactive waste to various offsite governmental and commercial treatment and disposal facilities. All waste is shipped to meet regulatory requirements. Based on these projections and continued operations at specific facilities under this alternative, the radioactive waste generation impacts would continue to be minimal.

5.5.9.2 Hazardous Waste

Existing Operations

The Maximum Operations Alternative total hazardous waste generation would increase for existing facilities. Under the Maximum Operations Alternative, SNL/CA anticipates 133,820 kg per year of hazardous waste through 2012 (Table 5-38). There would be sufficient capacity to accommodate anticipated operations total hazardous wastes. Projections for specific facilities for existing and new operations are presented in Table 5-37.

New Operations

SNL/CA anticipates generation of 5,978 kg per year of hazardous waste by new operations over the next 10 years. The majority of the increase would primarily be due to the full implementation of LIGA wafer production operations (Table 5-37, 5,928 kg/yr). New SNL/CA operations would account for less than five percent of the total hazardous waste at the site (Table 5-38).

Balance of Operations (Includes Maintenance and Decontamination and Decommissioning)

Maintenance and D&D, SNL/CA would produce hazardous waste (includes construction debris) each year. Projected hazardous waste quantities for these activities are included in Table 5-38 as balance of operations. This work would directly impact the quantity of TSCA hazardous waste requiring disposal. SNL/CA would continue to generate TSCA hazardous waste, primarily PCBs and asbestos that are removed from transformers and buildings. Under the Maximum Operations Alternative, 100,000 gsf (an estimated 600 tons or 600,000 kg of construction debris) would be removed.

Current Capacity

The total hazardous waste generated per year requiring offsite disposal at licensed/approved facilities would not exceed the existing storage and handling capacities at the Hazardous Waste Storage Facility. Projections indicate that an increase of 53 percent of hazardous waste generation would occur. SNL/CA routinely ships hazardous waste to various offsite commercial disposal facilities. All waste is shipped in less than one year to meet regulatory requirements. Based on these projections and continued operations at specific facilities under the Maximum Operations Alternative, the hazardous waste generation impacts would be minimal.

5.5.9.3 All Other Wastes

SNL/CA operations also involve the four additional waste management activities discussed below.

Biohazardous (includes Medical Waste Management Act) Waste

Under the Maximum Operations Alternative, biohazardous waste generation would increase from 551 kg/yr to 843 kg/yr (see Table 5-37). The existing waste handling capabilities would be adequate to accommodate this waste. No additional offsite impacts would occur, because offsite disposal capacity would continue to be sufficient.

Construction Waste

Under the Maximum and Operations Alternative, construction debris would include the construction of facilities identified in the No Action Alternative (a total of 208 tons), Planned Utilization Operations Alternative (an additional 10 tons), plus construction of a new 84,000 sq ft building and a new 16,000 sq ft building would generate 168 tons and 32 tons of construction debris, respectively. Since a typical roll off container handles 20 tons of debris, the expected construction waste would be minimal. No additional offsite impacts would occur, because offsite disposal capacity would be sufficient.

Municipal Solid Waste

Under the Maximum Operations Alternative, an estimated 378.7 metric tons per year would be generated annually. No appreciable impacts to disposal facilities would occur because existing waste handling capabilities are already in place.

Wastewater

SNL/CA would generate approximately 18.4-29.1 M gallons annually compared to 15 million gallons in CY 2000. Sufficient disposal capacity would be available (see Table 5-34).

Table 5-38. Average Annual Hazardous Waste Generation under the Maximum Operations Alternative (in kilograms)

All Waste	Unit	5-Year Average (1996 through 2000) ^a	Maximum Operations Alternative
RCRA Hazardous Waste			
Existing Operations	kg	8,659	18,451
New Operations	kg	779	1,546
Balance of Operations	kg	13,178	14,606
SNL/CA Total RCRA Hazardous	kg	22,616	34,603
Percent Change		0%	53.0%
California Toxic Waste			
Existing Operations	kg	9,922	21,141
New Operations	kg	893	1,771
Balance of Operations	kg	15,099	16,736
SNL/CA Total California Toxic	kg	25,914	39,648
Percent Change		0%	53.0%
TSCA			
Existing Operations	kg	14,695	31,313
New Operations	kg	1,323	2,633
Balance of Operations	kg	22,365	24,789
SNL/CA Total TSCA	kg	38,383	58,725
Percent Change		0%	+53.0%
Biohazardous (includes MWMA waste)			
Existing Operations	kg	211	450
New Operations	kg	19	38
Balance of Operations	kg	321	356
SNL/CA Total Biohazardous waste	kg	551	843
Percent Change		0%	+53.0%
Total Hazardous Waste			
Existing Operations	kg	33,487	71,355
New Operations	kg	3,014	5,978
Balance of Operations	kg	50,963	56,487
SNL/CA Total Hazardous waste	kg	87,464	133,820
Percent Change		0%	+53.0%

Sources: SNL/CA 2002b; TtNUS 2002a

^a5-year average represents the No Action Alternative excluding new facilities

%: percent

RCRA: *Resource Conservation and Recovery Act*

SNL/CA: Sandia National Laboratories, California

TSCA: *Toxic Substances Control Act*MWMA: *Medical Waste Management Control Act*

5.5.10 NOISE

Under the Maximum Operations Alternative, activities at SNL/CA would increase to two-shifts.

The Maximum Operations Alternative consists of the background noise levels presented for the affected environment in Section 4.12, Table 4-14, with the following changes:

- Community Noise Equivalent Level (day) (CNEL L_d) changes from 7 am-7 pm to 7 am-10 pm
- L_{dn} (day/night) is deleted
- L_n (night) remains the same

A two-shift operation at SNL/CA would increase onsite noise levels during the evening hours. Little or no increase in ambient background noise levels is expected in the adjacent community.

5.5.11 HUMAN HEALTH AND WORKER SAFETY

Implementation of the Maximum Operations Alternative would result in the human health and worker safety impacts described in the following sections for radiological health and occupational health and safety.

5.5.11.1 Radiological Health Effects

Under the Maximum Operations Alternative, NNSA expects minimal worker radiological health impacts from the SNL/CA activities. The values for the alternative were calculated assuming the number of radiation workers and their average annual radiation dose would be the same as the average values for the past 3 years. In addition, NNSA assumed that the ratio of radiation work-

ers to total employees would remain constant and that the average radiation dose to these workers would be the same as under the No Action Alternative (also the baseline). Table 5-39 presents estimated radiation doses for the collective population of workers who would be directly involved in implementing the alternatives as well as LCFs likely attributable to these doses.

The estimated number of LCFs listed in Table 5-39 for the Maximum Operations Alternative can be compared to the projected number of fatal cancers from all causes. Population statistics indicate that cancer caused 23 percent of the deaths in the U.S. in 1997 (CDC 1998). If this percentage of deaths from cancer continues, 23 percent of the U.S. population would contract a fatal cancer from all causes. Thus, in the population of 1,657 – 1,931 workers, 381 – 444 persons would be likely to contract fatal cancers from all causes. Under this alternative, the incremental impacts from SNL/CA operations would be small.

5.5.11.2 Occupational Health and Safety

Table 5-40 provides estimates of the number of TRCs and LWCs that could occur under this alternative. The projected injury rates are based on an average historic SNL/CA injury rates over a 3-year period from 1999 through 2001 (SNL 2001i, 2002a). These rates were then multiplied by the employment levels for this alternative to calculate the number of TRCs and LWCs.

The TRC value includes work-related death, illness, or injury that resulted in loss of consciousness, restriction from work or motion, transfer to another job, or required medical treatment beyond first aid. The data for LWCs represent the number of workdays beyond the day of injury or onset of illness that the employee was away

Table 5-39. Estimated Radiological Dose and Health Impacts to Sandia National Laboratories, California Workers by Alternative

Health Impact	No Action Alternative (baseline)	Maximum Operations Alternative
Collective involved worker dose (person-rem)	0.85 ^a	1.35
Estimated increase in number of latent cancer fatalities	3.4×10^{-4}	5.4×10^{-4}

Sources: DOE 1999d, 2000d, 2001g

^aSNL/CA involved worker dose estimated at 11 percent SNL lab-wide totals in Table 4-15. Any increase in estimated radiation doses would be a result of the increase in the number of radiation workers and not the result of different exposure mechanisms or levels.
rem: Roentgen equivalent, man

Table 5-40. Estimated Occupational Safety Impacts to Sandia National Laboratories, California Workers by Alternative

Worker Safety Parameters	No Action Alternative	Maximum Operations Alternative
Workforce	1,043 – 1,317	1,657 – 1,931
Total recordable cases of accident or injury	43 – 54	68 – 79
Lost workday cases	10 – 13	17 – 19

Source: SNL 2001i, 2002a

from work or limited to restricted work activity because of an occupational injury or illness.

5.5.12 SOCIOECONOMICS

Implementation of the Maximum Operations Alternative would result in no appreciable impacts to demographic characteristics, economy, or community services in the ROI, as discussed below.

5.5.12.1 Demographic Characteristics

The Maximum Operations Alternative would not exert any noticeable change in existing demographic characteristics within the socioeconomic ROI (Section 4.14.3). Under this Alternative, employment is expected to increase by 614 employees to 1,931 workers. Assuming, for a conservative analysis, that all employees would migrate in from areas outside of the ROI, the population increase would represent an extremely small percentage (far less than one percent) of the 2000 ROI population, as a whole.

5.5.12.2 Economic Base

The Maximum Operations Alternative would not have a noticeable change in the existing economic base in the ROI (Section 4.14.3). Table 5-41 presents the direct and indirect impacts SNL/CA operations currently (2000) have on the economy of the ROI. Table 5-42 presents the direct and indirect impacts SNL/CA's Maximum Operations Alternative operations would have on the 2000 economy. (In order to provide a more conservative estimate of the impact of this alternative, a comparison is being made between Maximum Operations Alternative expenditures and year 2000 economic indicators.) As the data indicate, SNL/CA's 2000 payroll expenditures

represent only 0.1 percent of total personal income for the ROI. Additionally, SNL/CA's 2000 employment represents only 0.2 percent of the 1,455,700 individuals currently employed in the ROI.

SNL/CA estimates that the Maximum Operations Alternative will require 1,931 personnel and \$262 million in total operating expenditures. From 1998-2000, SNL/CA payroll expenditures have represented an average of 51 percent of the total operating budgets. Therefore, SNL/CA estimates that payroll expenditures under the Maximum Operations Alternative would be approximately \$133.6 million. This represents a \$59.3 million increase in payroll expenditures (over the No Action alternative). The Maximum Operations Alternative payroll expenditures combined with indirect and induced expenditures would total \$219.1 million and would represent 0.2 percent of the personal income levels found in the ROI for the year 2000. Additionally, a total of 3,784 workers (direct, indirect, and induced) would represent only 0.3 percent of the 2000 employment level in the ROI.

5.5.12.3 Housing and Community Services

The Maximum Operations Alternative would not create a noticeable change in existing housing and community services within the ROI (Section 4.14.3). Assuming one housing unit per additional worker, 614 housing units would be required. This number represents 1.8 percent of the housing stock available in the ROI. Therefore, ROI capacity would far exceed demand. Additionally, contributory effects from other industrial and economic sectors within the ROI would greatly reduce or mask the SNL/CA proportional impact.

Table 5-41. Sandia National Laboratories, California's Current Impact on the Regional Economy

Economic Measure	FY 2000		
	SNL/CA	Total ROI	Percent of ROI
Earnings (Income) (\$Millions)			
Wages and Salaries	74.3		
Indirect and Induced	47.6		
TOTAL EARNINGS	121.9	\$108,376.8	0.1
Earnings Multiplier: 1.64 (2002)			
Employment (Number of Workers)			
SNL/CA Workforce	1,317		
Indirect and Induced	1,264		
TOTAL EMPLOYMENT	2,581	1,455,700	0.2
Employment Multiplier: 1.96 (2002)			

Sources: BEA 2000b, BEA 2002a

FY: fiscal year

ROI: region of influence

SNL/CA: Sandia National Laboratories, California

Table 5-42. Sandia National Laboratories, California's Estimate of Maximum Operations Alternative Impacts on the Regional Economy

Economic Measure	Maximum Operations Alternative		
	SNL/CA	Total ROI	Percent of ROI
Estimated Earnings (Income) (\$Millions)			
Wages and Salaries	133.6		
Indirect and Induced	85.5		
TOTAL EARNINGS	219.1	\$108,376.8	0.2
Earnings Multiplier: 1.64 (2002)			
Employment (Number of Workers)			
SNL/CA Workforce ^a	1,931		
Indirect and Induced	1,853		
TOTAL WORKFORCE	3,784	1,455,700	0.3
Employment Multiplier: 1.96 (2002)			

Sources: BEA 2000b, BEA 2002a

^aEmployment would range from 1,657 to 1,931 workers

ROI: region of influence

SNL/CA: Sandia National Laboratories, California

5.5.13 ENVIRONMENTAL JUSTICE

The impacts of this alternative on environmental justice resources would be the same as those associated with the No Action Alternative. No disproportionately high and adverse impacts to minority or low-income communities are anticipated for these resource areas. For summary of potential environmental justice impacts under the No Action Alternative see Table 5-15.

5.6 ACCIDENTS

This section describes the potential impacts to workers and the public of potential accidents involving SNL/CA facilities and the release of radioactive and/or chemical materials, explosions, and other hazards for all alternatives. As discussed in Section 5.2.12, two accident scenarios were considered for additional analysis: a postulated event initiated by natural phenomena and a postulated material event initiated by unspecified accident.

5.6.1 POSTULATED EVENT INITIATED BY NATURAL PHENOMENA

An earthquake is the most likely natural phenomena to initiate an emergency situation onsite. Two possible faults could affect SNL/CA: Greenville and Las Positas. The Tesla and Greenville faults trend northwest-southeast and are the most strongly documented faults near SNL/CA. The location of a possible earthquake on the Greenville fault is based primarily on geologic evidence.

The Greenville fault is the largest fault with the nearest location to SNL/CA, and evidence of its recent activity is more conclusive than in the case of the other faults. The Las Positas fault branches (see Figure 4-4) through the SNL/CA site and pass very close to SNL/CA facilities, and has a total length of about 10 mi. If the Las Positas fault were to be substantiated by future studies as a structure capable of generating moderate earthquakes, the maximum credible earthquake based on this length and the resulting ground motion at the site would be less than is estimated for the Greenville fault. Section 4.4.3.1 provides further details on the seismic characteristics of the area around SNL/CA. Section 5.3.2 discusses impacts associated with geology and soils.

In January 1980, the Livermore Valley experienced two moderate sized earthquakes estimated to be 5.8 and 5.6 on the Richter scale. Over 100 aftershocks followed, with magnitudes up to 4.6. The epicenters were located on the Greenville fault within 11.2 mi of the SNL/CA site.

Substantial earthquake-resistant structural modifications have been made to onsite facilities where hazardous materials are handled and future construction will meet future standards. Therefore, the more likely result of an earthquake 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.

Following a major earthquake, typical emergency response actions would be taken, including inspection and damage assessment of facilities, gas lines, water lines, fire alarms, and building areas. Impacts would be the same for all three alternatives.