← Click here to return to the Volume II Menu

A

Material Inventory

APPENDIX A – MATERIAL INVENTORY

A.1 COLLECTION OF DATA

Data collection consisted of a review of Sandia National Laboratories/New Mexico (SNL/NM) material databases in conjunction with facility projections from selected facilities. The facility projections were aggregated using the SNL/NM Facility Information Manager Database to query each facility by material type. These projections are shown in the tables throughout the appendix. Table A.1–1 contains data sources reviewed in preparation for projections of material inventories under each alternative.

In addition to using the sources listed in the table, the accident analysis team conducted walk-throughs of the selected facilities to review material inventories for potential accident scenarios. Information provided by those data sources was assumed to be correct and complete unless differences in inventories were found during the walk-through. The facility manager resolved any inventory differences between the walk-throughs and databases. If the inventory surveyed during the walk-through was found to be more accurate, it was used for further analysis. For a complete list of chemicals used for accident analysis, see the Accident Analysis, Appendix F.

The data from the Material Inventory appendix were made available for use in the following resource areas:

- Accidents
- Human Health and Worker Safety
- Transportation

A.2 ACTIVITY MULTIPLIERS

The activities proposed under the alternatives would potentially impact the types and quantities of material used at SNL/NM. The activity scenarios from the *SNL/NM Facility Source Documents* (SNL/NM 1998a) are shown in Tables A.2–1, A.2–2, and A.2–3 and were used to project inventories for facilities based on activities at the facilities. The selected existing facilities represent the types of operations that would occur at SNL/NM over the next 10 years. These activities primarily relate to test shots, production levels, and, in some instances, man-hour estimates for these selected facilities. These activities have been converted to unitless numbers that have been normalized so that a site-wide aggregate multiplier for each alternative could be developed. In turn, these multipliers were used to develop projections for the waste management and transportation consequence analysis. Operations at new facilities were not considered for the multiplier because the start-up of these operations reaching their planned production levels would artificially inflate the multiplier and

Table A.1–1. Data Sources Used to Develop SNL/NM Material Inventories

MATERIAL TYPE	DATA SOURCES
Special Nuclear Material	SNL/NM Facility Information Manager Database, April 1998 SNL/NM Preliminary Draft Environmental Information Document, October 1, 1997
Radioactive Material	SNL/NM Facility Information Manager Database, April 1998 SNL/NM Preliminary Draft Environmental Information Document, October 1, 1997
Source Material	SNL/NM Facility Information Manager Database, April 1998 SNL/NM Preliminary Draft Environmental Information Document, October 1, 1997
Spent Fuel	SNL/NM Facility Information Manager Database, April 1998
Chemical	CheMaster Chemical Information System SNL/NM Preliminary Draft Environmental Information Document, October 1, 1997 Hazard Assessments Building Profiles
Explosives	SNL/NM Facility Information Manager Database, April 1998 Explosives Inventory System SNL/NM Preliminary Draft Environmental Information Document, October 1, 1997

Sources: SNL/NM 1997b, 1998a

Table A.2–1. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for Tests and Shots

FACILITY NAME	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
ACTIVITY LEVELS REPORTED IN SNL/NM SOURCE DOCUMENTS							
Aerial Cable Facility	Drop/pull-down	tests	21	32	38	100	2
Aerial Cable Facility	Aerial target	tests	6	6	6	30	0
Centrifuge Complex	Centrifuge	tests	32	46	46	120	2
Centrifuge Complex[b]	Impact	tests	0	10	10	100	0
Containment Technology Test Facility - West	Survivability testing	tests	1	1	0	2	1
Drop/Impact Complex	Drop test	tests	18	20	20	50	0
Drop/Impact Complex	Water impact	tests	1	1	1	20	1
Drop/Impact Complex	Submersion	tests	1	1	1	5	0
Drop/Impact Complex[b]	Underwater blast	tests	0	2	2	10	0
Explosive Components Facility[c]	Neutron generator tests	tests	200	500	500	500	500
Explosive Components Facility	Explosive testing	tests	600	750	850	900	300
Explosive Components Facility	Battery tests	tests	50	60	60	100	10
Explosives Applications Laboratory	Explosive testing	tests	240	240	240	360	50
Lurance Canyon Burn Site	Certification testing	tests	12	12	12	55	1
Lurance Canyon Burn Site	Model validation	tests	56	56	56	100	0
Lurance Canyon Burn Site	User testing	tests	37	37	37	50	0

Table A.2–1. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for Tests and Shots (continued)

FACILITY NAME	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
Repetitive High Energy Pulsed Power Unit I	Accelerator tests	tests	500	5,000	5,000	10,000	100
Repetitive High Energy Pulsed Power Unit II	Radiation production	tests	80	160	160	800	40
Sandia Pulsed Reactor	Irradiation tests	tests	100	100	100	200	30
Sled Track Complex	Rocket sled test	tests	10	10	15	80	2
Sled Track Complex	Explosive testing	tests	12	12	12	239	0
Sled Track Complex	Rocket launcher	tests	3	4	4	24	0
Sled Track Complex	Free-flight launch	tests	40	40	40	150	0
Terminal Ballistics Complex	Projectile impact testing	tests	50	80	100	350	10
Terminal Ballistics Complex	Propellant testing	tests	25	40	50	100	4
Thunder Range	Ground truthing tests	test series	1	5	8	10	1
Advanced Pulsed Power Research Module	Accelerator shots	shots	500	1,000	1,000	2,000	40
High-Energy Radiation Megavolt Electron Source III	Irradiation of components or materials	shots	262	500	500	1,450	40
Sandia Accelerator & Beam Research Experiment	Irradiation of components or materials	shots	187	225	225	400	0
SATURN	Irradiation of components or materials	shots	65	200	200	500	40

Table A.2–1. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for Tests and Shots (continued)

FACILITY NAME	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
Short-Pulse High Intensity Nanosecond X-Radiator	Irradiation of components or materials	shots	1,185	2,500	2,500	6,000	200
Z-Machine	Accelerator shots	shots	150	300	300	350	84
TOTAL[d]		**Tests and shots**	**4,445**	**11,950**	**12,093**	**25,155**	**1,458**
MULTIPLIER FROM BASE YEAR		**Multiplier**	**1.00**	**2.69**	**2.72**	**5.66**	**0.33**
MULTIPLIERS CONTAINED IN SNL/NM SOURCE DOCUMENTS							
Aerial Cable Facility	Drop/pull-down	multiplier	1.00	1.52	1.81	4.76	0.10
Aerial Cable Facility	Aerial target	multiplier	1.00	1.00	1.00	5.00	0.00
Centrifuge Complex	Centrifuge	multiplier	1.00	1.44	1.44	3.75	0.06
Centrifuge Complex[b]	Impact	multiplier	0.00	1.00	1.00	10.00	0.00
Containment Technology Test Facility - West	Survivability testing	multiplier	1.00	1.00	0.00	2.00	1.00
Drop/Impact Complex	Drop test	multiplier	1.00	1.11	1.11	2.78	0.00
Drop/Impact Complex	Water impact	multiplier	1.00	1.00	1.00	20.00	1.00
Drop/Impact Complex	Submersion	multiplier	1.00	1.00	1.00	5.00	0.00
Drop/Impact Complex[b]	Underwater blast	multiplier	0.00	1.00	1.00	5.00	0.00
Explosive Components Facility[c]	Neutron generator tests	multiplier	1.00	2.50	2.50	2.50	2.50
Explosive Components Facility	Explosive testing	multiplier	1.00	1.25	1.42	1.50	0.50
Explosive Components Facility	Battery tests	multiplier	1.00	1.20	1.20	2.00	0.20

Table A.2–1. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for Tests and Shots (continued)

FACILITY NAME	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
Explosives Application Laboratory	Explosive testing	multiplier	1.00	1.00	1.00	1.50	0.21
Lurance Canyon Burn Site	Certification testing	multiplier	1.00	1.00	1.00	4.58	0.08
Lurance Canyon Burn Site	Model validation	multiplier	1.00	1.00	1.00	1.79	0.00
Lurance Canyon Burn Site	User testing	multiplier	1.00	1.00	1.00	1.35	0.00
Repetitive High Energy Pulsed Power Unit I	Accelerator tests	multiplier	1.00	10.00	10.00	20.00	0.20
Repetitive High Energy Pulsed Power Unit II	Radiation production	multiplier	1.00	2.00	2.00	10.00	0.50
Sandia Pulsed Reactor	Irradiation tests	multiplier	1.00	1.00	1.00	2.00	0.30
Sled Track Complex	Rocket sled test	multiplier	1.00	1.00	1.50	8.00	0.20
Sled Track Complex	Explosive testing	multiplier	1.00	1.00	1.00	19.92	0.00
Sled Track Complex	Rocket launcher	multiplier	1.00	1.33	1.33	8.00	0.00
Sled Track Complex	Free-flight launch	multiplier	1.00	1.00	1.00	3.75	0.00
Terminal Ballistics Complex	Projectile impact testing	multiplier	1.00	1.60	2.00	7.00	0.20
Terminal Ballistics Complex	Propellant testing	multiplier	1.00	1.60	2.00	4.00	0.16
Thunder Range	Ground truthing tests	multiplier	1.00	5.00	8.00	10.00	1.00
Advanced Pulsed Power Research Module	Accelerator shots	multiplier	1.00	2.00	2.00	4.00	0.08
High-Energy Radiation Megavolt Electron Source III	Irradiation of components or materials	multiplier	1.00	1.91	1.91	5.53	0.15

Table A.2–1. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for Tests and Shots (concluded)

FACILITY NAME	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
Sandia Accelerator & Beam Research Experiment	Irradiation of components or materials	multiplier	1.00	1.20	1.20	2.14	0.00
SATURN	Irradiation of components or materials	multiplier	1.00	3.08	3.08	7.69	0.62
Short-Pulse High Intensity Nanosecond X-Radiator	Irradiation of components or materials	multiplier	1.00	2.11	2.11	5.06	0.17
Z-Machine	Accelerator shots	multiplier	1.00	2.00	2.00	2.33	0.56
TOTAL[d]			**30.00**	**56.85**	**60.61**	**192.94**	**9.79**
AVERAGE[d]			**0.94**	**1.78**	**1.89**	**6.03**	**0.31**

Sources: SNL/NM 1997b, 1998a

[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (FSID) (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

[b] Because of the lead time required to set up operations for these facilities, the base year was assumed to be 2003 for calculations, in accordance with information in the FSID.

[c] Indicates a change from the original source documents rollup based on additional information provided by SNL/NM

[d] Numbers are rounded and may differ slightly from calculated values.

Table A.2–2. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for Other Operations

FACILITY NAME	ACTIVITY CATEGORIES	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
					5-YEAR	10-YEAR		
ACTIVITY LEVELS REPORTED IN SNL/NM SOURCE DOCUMENTS								
Microelectronics Development Laboratory	Development or production of devices, processes, and systems	Microelectronic devices and systems	wafers	4,000	5,000	7,000	7,500[b]	2,666
Aerial Cable Facility[c]	Test activities	Scoring system tests	series	0	1	1	2	0
Advanced Manufacturing Processes Laboratory	Development or production of devices, processes, and systems	Materials, ceramics/glass, electronics, processes, and systems	operational hours	248,000	310,000	310,000	347,000	248,000
Neutron Generator Facility	Development or production of devices, processes, and systems	Neutron generators	neutron generators	600	2,000	2,000	2,000	2,000
Gamma Irradiation Facility[d]	Test activities	Tests	hours	1,000	0	0	8,000	0
New Gamma Irradiation Facility[d]	Test activities	Tests	hours	0	13,000	13,000	24,000	0

Table A.2–2. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for Other Operations (continued)

FACILITY NAME	ACTIVITY CATEGORIES	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
					5-YEAR	10-YEAR		
Thunder Range	Other	Equipment disassembly and evaluation	days/year	60	82	82	144	42
Explosive Components Facility	Test activities	Chemical analysis	analyses	900	950	1,000	1,250	500
Integrated Materials Research Laboratory	Other	Research and development of materials	operational hours	395,454	395,454	395,454	395,454	363,817
MULTIPLIERS CONTAINED IN SNL/NM SOURCE DOCUMENTS								
Microelectronics Development Laboratory	Development or production of devices, processes, and systems	Microelectronic devices and systems	multiplier	1.00	1.25	1.75	1.88[b]	0.67
Aerial Cable Facility[c]	Test activities	Scoring system tests	multiplier	0.00	1.00	1.00	2.00	0.00
Advanced Manufacturing Processes Laboratory	Development or production of devices, processes, and systems	Materials, ceramics/glass, electronics, processes, and systems	multiplier	1.00	1.25	1.25	1.40	1.00

Table A.2–2. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for Other Operations (concluded)

FACILITY NAME	ACTIVITY CATEGORIES	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
					5-YEAR	10-YEAR		
Neutron Generator Facility	Development or production of devices, processes, and systems	Neutron generators	multiplier	1.00	3.33	3.33	3.33	3.33
Gamma Irradiation Facility[c]	Test activities	Tests	multiplier	1.00	0.00	0.00	8.00	0.00
New Gamma Irradiation Facility[d]	Test activities	Tests	multiplier	0.00	1.00	1.00	1.85	0.00
Thunder Range	Other	Equipment disassembly and evaluation	multiplier	1.00	1.37	1.37	2.40	0.70
Explosive Components Facility	Test activities	Chemical analysis	multiplier	1.00	1.06	1.11	1.39	0.56
Integrated Materials Research Laboratory	Other	Research and development of materials	multiplier	1.00	1.00	1.00	1.00	0.92
TOTAL[e]			**multiplier**	**7.00**	**11.26**	**11.81**	**23.24**	**7.18**
AVERAGE[e]			**multiplier**	**0.78**	**1.25**	**1.31**	**2.58**	**0.80**

Sources: SNL/NM 1997b, 1998a

[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (FSID) (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

[b] If implemented, the Microsystems and Engineering Sciences Applications (MESA) Complex configuration under the Expanded Operations Alternative would not change the number of wafers produced. Whether MESA is implemented or not, SNL/NM's maximum production capacity is 7,500 wafers per year with three shifts. Therefore, no changes in activity multipliers would occur.

[c] The operation at this facility is considered to be a constant operation that has a low activity level; however, for calculations, the base year is 2003.

[d] The operations at this facility are considered to be a continuation of the current Gamma Irradiation Facility operations; however, for calculations, the base year is 2003.

[e] Numbers are rounded and may differ slightly from calculated values.

Table A.2–3. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for New Operations

FACILITY NAME	ACTIVITY CATEGORIES	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
					5-YEAR	10-YEAR		
ACTIVITY LEVELS REPORTED IN SNL/NM SOURCE DOCUMENTS								
Annular Core Research Reactor (medical isotopes production configuration)	Test activities	Irradiation of production targets	targets	8	375	375	1,300	40
Annular Core Research Reactor (DP configuration)[b]	Test activities	Irradiation tests	tests	0	0	1	3	0
Hot Cell Facility	Development or production of devices, processes, and systems	Processing of production targets	targets	8	375	375	1,300	40
TESLA[c]	Test activities	Accelerator shots	shots	40	1,000	1,000	1,300	40
Radiographic Integrated Test Stand[c]	Test activities	Accelerator shots	shots per year	0	400	600	800	100
TOTAL[d]			**activities**	**56**	**2,150**	**2,351**	**4,703**	**220**
NORMALIZED TO THE BASE YEAR								
Annular Core Research Reactor (medical isotopes production configuration)	Test activities	Irradiation of production targets	multiplier	1.00	46.88	46.88	162.50	5.00
Annular Core Research Reactor (DP configuration)[c]	Test activities	Irradiation tests	multiplier	0.00	0.00	1.00	3.00	0.00
Hot Cell Facility	Development or production of devices, processes, and systems	Processing of production targets	multiplier	1.00	46.88	46.88	162.50	5.00

Table A.2–3. Activity Multipliers by SNL/NM Facility, Activity, and Alternative for New Operations (concluded)

FACILITY NAME	ACTIVITY CATEGORIES	ACTIVITY TYPES	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
					5-YEAR	10-YEAR		
TESLA	Test activities	Accelerator shots	multiplier	1.00	25.00	25.00	32.50	1.00
Radiographic Integrated Test Stand	Test activities	Accelerator shots	multiplier	0.00	1.00	1.50	2.00	0.25
TOTAL[d]			**multiplier**	**3.00**	**119.75**	**121.25**	**362.50**	**11.25**
AVERAGE[d]			**multiplier**	**0.60**	**23.95**	**24.25**	**72.50**	**2.25**
NORMALIZED TO THE 5- OR 10-YEAR, NO ACTION ALTERNATIVE								
Annular Core Research Reactor (medical isotopes production configuration)	Test activities	Irradiation of production targets	multiplier	0.02	1.00	1.00	3.47	0.11
Annular Core Research Reactor (DP configuration)	Test activities	Irradiation tests	multiplier	0.00	0.00	1.00	3.00	0.00
Hot Cell Facility	Development or production of devices, processes, and systems	Processing of production targets	multiplier	0.02	1.00	1.00	3.47	0.11
TESLA[c]	Test activities	Accelerator shots	multiplier	0.04	1.00	1.00	1.30	0.04
Radiographic Integrated Test Stand[c]	Test activities	Accelerator shots	multiplier	0.00	1.00	1.50	2.00	0.25
TOTAL[d]			**multiplier**	**0.08**	**4.00**	**5.50**	**13.23**	**0.50**
AVERAGE[d]			**multiplier**	**0.02**	**0.80**	**1.10**	**2.65**	**0.10**

Sources: SNL/NM 1997b, 1998a

TESLA: Tera-Electron Volt Semiconducting Linear Accelerator

[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (FSID) (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

[b] Because of the lead time required to set up operations for these facilities, the base year was assumed to be 2003 for calculations, in accordance with information in the FSID.

[c] Indicates a change from the original source documents rollup based on additional provided information from SNL/NM

[d] Numbers are rounded and may differ slightly from calculated values.

Table A.2–4. Summary of Activity Multipliers

ACTIVITY		BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
			5-YEAR	10-YEAR		
Tests & Shots	Unit Total	30	56.85	60.61	192.94	9.79
	Average	0.94	1.78	1.89	6.03	0.31
Nontest or Shot Activities	Unit Total	7.00	11.26	11.81	23.24	7.18
	Average	0.78	1.25	1.31	2.58	0.80
Multiplier to Use (No New Operations)		0.902	1.661	1.766	5.273	0.414
Normalized to Base Year for Multiplication		1.00	1.841	1.957	5.843	0.458
New Operations (Using 1998 as a Base year)	TOTAL (Unitless)	3.00	119.75	121.25	362.50	11.25
	Average	0.60	23.95	24.25	72.50	2.25
	Count	5	5	5	5	5

Sources: SNL/NM 1997b, 1998a

[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (FSID) (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

not truly reflect the anticipated activity levels. Table A.2–4 summarizes the multipliers used to reflect activity levels.

If implemented, the Microsystems and Engineering Sciences Applications (MESA) Complex configuration under the Expanded Operations Alternative would not change the activity projections. Whether MESA Complex configuration is implemented or not, SNL/NM's maximum production capacity is 7,500 wafers per year with three shifts. Therefore, no changes in activity multipliers would occur.

A.3 MATERIAL INVENTORY PROJECTIONS

The following material inventory projections are divided into two sections for each type of material at SNL/NM. These sections, existing operations and new operations, comprise all of the selected representative facilities at SNL/NM. There is also the potential for special programs that could arise in the future and that would be categorized separately from new and existing operations.

The material inventory projections for existing operations are limited to those facilities that maintain material under existing operations and are required to maintain current production at SNL/NM.

New operations are defined as programmatically planned projects with defined implementation schedules that will take place beyond the base year. These projects are currently under development, but will reach their intended operational capacity within the next 10 years under each alternative. Material levels projected for these facilities were omitted from the existing operations assessments and are outlined separately. The following existing facilities are included in the new operations section for each material category: Tera-Electron Volt Energy Superconducting Linear Accelerator (TESLA), Radiographic Integrated Test Stand (RITS), Hot Cell Facility (HCF), and Annular Core Research Reactor (ACRR) (medical isotope production configuration).

A.3.1 Nuclear Material

A.3.1.1 Existing Operations

Nuclear material inventories at SNL/NM are presented in Table A.3–1. The table shows inventories for existing operations under each alternative.

No Action Alternative

An increase at the Integrated Materials Research Laboratory (IMRL) would be due to the addition of a

Table A.3–1. Nuclear Materials Inventories Under Each Alternative

FACILITY NAMES	MATERIALS	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
EXISTING OPERATIONS							
Annular Core Research Reactor (DP configuration)	Enriched Uranium	kg	12	37	37	85	12
Annular Core Research Reactor (DP configuration)	Plutonium-239	g	148	148	148	8,800	148
Hot Cell Facility	Enriched Uranium	g	25	25	25	125	25
NEW OPERATIONS							
Annular Core Research Reactor (medical isotopes production mode)	Enriched Uranium	kg	25.8	56.7	56.7	56.7	18.3
Explosive Components Facility	Tritium	Ci	49	49	49	49	49
Gamma Irradiation Facility	Depleted Uranium	kg	13,600	13,600	13,600	13,600	13,600
Integrated Materials Research Laboratory	Depleted Uranium	mCi	0.93	1	1	1	0
Neutron Generator Facility	Tritium	Ci	682	682	682	836	511
Repetitive High Energy Pulsed Power Unit I	Depleted Uranium	µg	0	10	10	100	0
Sandia Pulsed Reactor	Enriched Uranium	kg	550	900	550	1,000	550
Sandia Pulsed Reactor	Plutonium-239	g	53	10,000	10,000	10,000	53
Thunder Range	Americium-241	Ci	≤0.52	≤0.52	≤0.52	0.52	0

Table A.3–1. Nuclear Materials Inventories Under Each Alternative (concluded)

FACILITY NAMES	MATERIALS	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
Thunder Range	Americium-243	Ci	≤0.52	≤0.52	≤0.52	0.52	0
Thunder Range	Normal Uranium	Ci	≤4.2	≤4.2	≤4.2	4.2	0
Thunder Range	Plutonium-238	Ci	≤0.62	≤0.62	≤0.62	0.62	0
Thunder Range	Plutonium-239	Ci	≤0.52	≤0.52	≤0.52	0.52	0
Z-Machine	Depleted Uranium	mg	0	200	200	200	0
Z-Machine	Deuterium[b]	L	0	1,000	1,000	5,000	0
Z-Machine	Plutonium-239	mg	0	200	200	200	0
Z-Machine	Tritium	Ci	0	1,000	1,000	50,000	0

Sources: SNL/NM 1997b, 1998m
µg: microgram
Ci: curies
DP: Defense Programs
g: gram
kg: kilogram
L: liter
mCi: millicurie
mg: milligram
[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (FSID) (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.
[b] Deuterium is not radioactive; however, it is considered an accountable nuclear material.

small calibration source that would not require any additional storage capacity. Increases at the Sandia Pulsed Reactor (SPR) facility would be due to increased test activities, but the inventory levels would continue to be within the facility storage capacity. Furthermore, due to recent major reductions in overall nuclear material stored onsite, excess storage capacity currently exists to accommodate any increases under this alternative. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed. The Z-Machine and Repetitive High Energy Pulsed Power Unit (RHEPP) I show increases from the base year to year 5 under the No Action Alternative. However, these facilities would increase to normal production capacity by 2003, which would then become the base year and, therefore, not a reflected increase.

Expanded Operations Alternative

Under the Expanded Operations Alternative, the nuclear material inventory would generally remain consistent with current facility levels, with the exception of four facilities: SPR, Neutron Generator Facility (NGF), RHEPP I, and the Z-Machine (formerly the Particle Beam Fusion Accelerator [PBFA] II). The increases at the SPR facility would be due to increased test activities, but the inventory levels would continue to be within the facility storage capacity. Furthermore, due to recent major reductions in overall nuclear material stored onsite, excess storage capacity currently exists to accommodate any increases under this alternative. Therefore, no additional storage and handling capacity or regulatory requirements would be needed. However, the Z-Machine would have to be upgraded to Hazard Classification 3, which would require additional safety documentation.

Reduced Operations Alternative

Under the Reduced Operations Alternative, the nuclear material inventory at existing facilities would decrease or remain consistent with current facility levels. Furthermore, due to recent major reductions in overall nuclear material stored onsite, excess storage capacity currently exists to accommodate any material needs under this alternative. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

A.3.1.2 New Operations

No Action Alternative

Operating levels at the ACRR would increase to full production capacity. These increases were anticipated during the facility design and would, therefore, not be considered to be increases over the normal design inventory. Furthermore, the U. S. Department of Energy (DOE) issued a record of decision (ROD) for the *Medical Isotopes Production Project* (MIPP) (DOE 1996b), published in the September 17, 1996, *Federal Register* (61 FR 48921-48929), in which material inventories associated with this program were reviewed. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

Expanded Operations Alternative

Under the Expanded Operations Alternative, the nuclear material inventory at two new facilities, the ACRR and the HCF, would increase as the facilities become operational. The projected inventory increases are identified in Table A.3–1. Currently, operating levels at the ACRR are increasing to full production capacity. These increases were anticipated during the facility design and would, therefore, not be considered to be increases under this alternative. Furthermore, the DOE issued a ROD for the MIPP, published in the September 17, 1996, *Federal Register* (61 FR 48921-48929), in which material inventories associated with this program were reviewed. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

Reduced Operations Alternative

Operating levels at new facilities would increase to minimum production capacity. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

A.3.2 Radioactive Material

A.3.2.1 Existing Operations

Radioactive material inventories at SNL/NM are presented in Table A.3–2. The table shows inventories by existing operations for each alternative.

SNL/NM has significantly reduced radioactive and chemical inventories. Since 1995, SNL/NM has reduced source nuclear material holdings by 22.4 metric tons,

Table A.3–2. Radioactive Material Inventories Under Each Alternative

FACILITY NAMES	MATERIAL	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
EXISTING OPERATIONS							
Integrated Materials Research Laboratory	Carbon-14	µCi	220	220	220	220	220
Z-Machine	Activated hardware	kg	50,000	10,000	10,000	10,000	2,000
NEW OPERATIONS							
Annular Core Research Reactor (DP configuration)	Cobalt-60	Ci	33.6	19	10	33.6	33.6
Hot Cell Facility	Mixed fission products	Ci	3,000	10,800	10,800	54,100	10,800
Radiographic Integrated Test Stand	Activated hardware	kg	500	500	500	500	500

Sources: SNL/NM 1997b, 1998m
µCi: microcuries
Ci: Curies
DP: Defense Program
kg: kilograms
[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (FSID) (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

nearly 39 percent of the former inventory. Surplus source nuclear material holdings were reduced by 79 percent. Further, SNL/NM has reduced its inventory of surplus other nuclear material by 40 percent. Planning for these reductions began in 1993 with an extensive inventory assessment. Disposition options were identified, including returning materials to vendors, better inventory and purchasing controls, and disposal of unneeded materials at the Nevada Test Site. SNL/NM has plans for additional inventory reduction activities through 2002. A detailed discussion is provided in Chapter 11 of Volume II of the Environmental Information Document (SNL/NM 1998f). That chapter also includes material storage facility information.

No Action Alternative

Under the No Action Alternative, the overall radioactive material inventory at all existing and new facilities would remain consistent with current levels or decrease, except for the new operation at the HCF, which would increase to full operational capacity. Furthermore, due to recent major reductions in the total quantities of radioactive material stored onsite, excess storage capacity currently exists to accommodate any increases. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

Expanded Operations Alternative

Under the Expanded Operations Alternative, the overall radioactive material inventory at all existing and new facilities would remain consistent with current levels, except for the new operation at the HCF, which would increase to full operational capacity. Furthermore, due to recent major reductions in the total quantities of radioactive material stored onsite, excess storage capacity currently exists to accommodate any increases. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

Reduced Operations Alternative

Under the Reduced Operations Alternative, the site-wide radioactive material inventory would decrease or remain

at current levels except for the new operation at the HCF, which would increase to full operational capacity. Furthermore, due to recent major reductions in overall radioactive material stored onsite, excess storage capacity currently exists to accommodate any increases under this alternative. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

A.3.2.2 New Operations

No Action Alternative

As the new facilities increase operations to full production capacity, the radioactive material inventory levels would increase. However, these increases were anticipated during the design phase of the facilities, and there will be sufficient capacity to accommodate them. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

Expanded Operations Alternative

As the new facilities increase operations to full production capacity, the radioactive material inventory levels would increase. However, these increases were anticipated during the design phase of the facilities, and there will be sufficient capacity to accommodate them. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

Reduced Operations Alternative

Operating levels at new facilities would decrease to minimum production capacity. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

A.3.3 Source Material

Radioactive sealed source material inventories are presented in Table A.3–3. The table shows inventories by existing and new operations for each alternative.

A.3.3.1 Existing Operations

No Action Alternative

Under the No Action Alternative, the source material inventory would generally remain consistent with current levels, with the exception of the SPR. The source material inventory at this facility would potentially increase, as indicated in Table A.3–3. The increases at the SPR facility would be due to increased test activities, but these levels would continue to fall within the facility storage capacity. Furthermore, due to recent major reductions in overall source material stored onsite, excess storage capacity currently exists to accommodate increases under this alternative. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

Expanded Operations Alternative

Under the Expanded Operations Alternative, the source material inventory at existing facilities would generally remain consistent with current levels, with the exception of two facilities, the SPR and Gamma Irradiation Facility (GIF). The source material inventory at these facilities would potentially increase as indicated in Table A.3–3. These increases would be due to increased test activities, but these levels would not exceed the facility storage capacity. Furthermore, due to recent major reductions in overall source material stored onsite, excess storage capacity currently exists to accommodate any increases under this alternative. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

Reduced Operations Alternative

Under the Reduced Operations Alternative, the source material inventory at existing facilities would decrease or remain consistent with current levels. Furthermore, due to recent major reductions in overall nuclear material stored onsite, excess storage capacity currently exists to accommodate any increases under this alternative. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

A.3.3.2 New Operations

No Action Alternative

As the new facilities increase operations to full production capacity, the source material inventory levels would increase. However, these increases were anticipated during the design phase of the facilities, and there will be sufficient capacity to accommodate them. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

Table A.3–3. Source Material Inventory Under Each Alternative

FACILITY NAMES	MATERIALS	UNITS	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
Annular Core Research Reactor (DP configuration)	Enriched Uranium	kg	12	37	37	85	12
Annular Core Research Reactor (DP configuration)	Plutonium-239	g	148	148	148	8,800	148
Annular Core Research Reactor (medical isotopes production configuration)	Enriched Uranium	kg	25.8	56.7	56.7	56.7	18.3
Explosive Components Facility	Tritium	Ci	49	49	49	49	49
Gamma Irradiation Facility	Depleted Uranium	kg	13,600	13,600	13,600	13,600	13,600
Hot Cell Facility	Enriched Uranium	g	25	25	25	125	25
Integrated Materials Research Laboratory	Depleted Uranium	mCi	0.93	1	1	1	0
Neutron Generator Facility	Tritium	Ci	682	682	682	836	511
Repetitive High Energy Pulsed Power Unit I	Depleted Uranium	µg	0	10	10	100	0
Sandia Pulsed Reactor	Enriched Uranium	kg	550	900	550	1,000	550
Sandia Pulsed Reactor	Plutonium-239	g	53	10,000	10,000	10,000	53
Z-Machine	Depleted Uranium	mg	0	200	200	200	0
Z-Machine	Deuterium	L	0	1,000	1,000	5,000	0
Z-Machine	Plutonium-239	mg	0	200	200	200	0
Z-Machine	Tritium	Ci	0	1,000	1,000	50,000	0

Sources: SNL/NM 1997b, 1998a
µg: micrograms
Ci: Curies
DP: Defense Program
g: grams
kg: kilograms
L: liters
mCi: millicuries
mg: milligrams
[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (FSID) (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

Expanded Operations Alternative

As the new facilities increase operations to full production capacity, the source material inventory levels would increase. However, these increases were anticipated during the design phase of the facilities, and there will be sufficient capacity to accommodate them. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be needed.

Reduced Operations Alternative

Operating levels at new facilities would decrease to minimum production capacity. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

A.3.4 Spent Fuel

A.3.4.1 New Operations

The only projected source of spent fuel identified by SNL/NM under the each alternative is the ACRR, a new operation associated with the MIPP. The MIPP operations were analyzed in detail in the MIPP Environmental Impact Statement (DOE 1996b). Furthermore, the DOE issued a ROD for the MIPP published in the September 17, 1996, *Federal Register* (61 FR 48921–48929), in which spent fuel associated with this program was reviewed. Therefore, no additional MIPP consequence analysis has been conducted in this Site-Wide Environmental Impact Statement. Table A.3–4 presents the spent fuel inventory for each alternative.

A.3.5 Chemicals

In 1997, SNL/NM received more than 25,000 chemical containers in approximately 2,750 shipments. The majority of these receipts were small quantity purchases made through the just-in-time (JIT) vendors. The remainder of the receipts were large quantity purchases received as bulk loads, including compressed hydrogen tube trailers and acids received from tanker trucks. The top 20 Chemical Information System vendors who provided chemicals to SNL/NM in 1997 accounted for 67 percent of the JIT shipments and 86 percent of the number of containers shipped (Table A.3–5).

For a representative inventory of chemicals used at SNL/NM, see the Accident Analysis, Appendix F.

A.3.5.1 No Action Alternative

The baseline site-wide chemical inventory contains 1,725 different chemical products for a total of 25,000 individual units. Applying the chemical multiplier derived under the No Action Alternative, approximately 2.0 (1.84 in 2003 and 1.96 in 2008), the site-wide chemical inventory would increase to 50,000 units. Thus, the 2008 site-wide chemical inventory would equal 200 percent of the current inventory level, for a site-wide increase of 100 percent overall. This assumes the maximum anticipated operable level for each selected facility. However, the SNL/NM JIT chemical procurement procedures could accommodate the increased demand by increasing the volume of material shipped on the JIT shipments without increasing the number of JIT shipments or the amount of the material present onsite at any one time. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

A.3.5.2 Expanded Operations Alternative

The baseline site-wide chemical inventory contains 1,725 different chemical products for a total of 25,000 individual units. Applying the chemical multiplier derived under the Expanded Operations Alternative, approximately 6.0, the site-wide chemical inventory would increase to 150,000 units. Thus, the site-wide chemical

Table A.3–4. Spent Fuel Inventory Under Each Alternative

FACILITY NAME	MATERIAL	UNIT	BASE YEAR (1996)	NO-ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
				5-YEAR	10-YEAR		
Annular Core Research Reactor (medical isotopes production configuration)	Spent fuel from fuel elements	kg	0	0	189	399	42

Source: SNL/NM 1998a
kg: kilograms

Table A.3–5. Top 20 Chemical Inventory System Chemical Vendors by Annual Shipments in 1997

VENDOR	ANNUAL SHIPMENTS	VENDOR	ANNUAL SHIPMENTS
1. Fisher Scientific	226	*11. J T Baker Chemical Co.*	32
2. Tri-Gas, Inc.	222	*12. Johnson Matthey Aesar*	31
3. Aldrich Chemical Co.	176	*13. W A Hammond Drierite*	25
4. Matheson Gas Products	118	*14. Dow-Corning Corp.*	24
5. Arcos Organics/Janssen	89	*15. Hoecsht Celanese Corp.*	24
6. Chemtronics, Inc.	81	*16. 3M Co.*	23
7. Ashland Chemical Co.	80	*17. SPEX Industries, Inc.*	23
8. Sigma Chemical Co.	51	*18. Air Products & Chemicals, Inc.*	20
9. Nalco Chemical Co.	39	*19. Gelest, Inc.*	19
10. Shipley Co, Inc.	39	*20. Transene Co, Inc.*	18

Source: FWENC 1998a

inventory would equal 500 percent of the current inventory level, for a site-wide increase of 400 percent overall. This assumes the maximum anticipated operable level for each selected facility. However, the SNL/NM JIT chemical procurement procedures could accommodate the increased demand by increasing the volume of material shipped on the JIT shipments without increasing the number of JIT shipments or the amount of the material present onsite at any one time. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

A.3.5.3 Reduced Operations Alternative

The baseline site-wide chemical inventory contains 1,725 different chemical products for a total of 25,000 individual units. Applying the chemical multiplier derived under the Reduced Operations Alternative, approximately 0.5, the site-wide chemical inventory would decrease to 12,500 units. Thus, the 2008 site-wide chemical inventory would only equal 50 percent of the current inventory level, for a site-wide decrease of 50 percent overall. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

A.3.6 Explosives

Table A.3–6 shows explosive material inventories at SNL/NM by alternative.

A.3.6.1 Existing Operations

No Action Alternative

Under the No Action Alternative, the explosives inventory levels maintained at existing facilities would potentially increase at the Explosive Components Facility (ECF), Terminal Ballistics Complex, Thermal Treatment Facility (TTF), Z-Machine (formerly known as the PBFA II), and the GIF, as indicated in the Table A.3–6. These small increases would generally be accommodated by the existing storage capacities at the affected facilities. In the event the increases exceed existing storage capacity for a particular facility, the excess material would be relocated through the explosives inventory system to another facility. Furthermore, during SNL/NM's Propellant, Explosive, and Pyrotechnics Reapplication Project, completed in fiscal year (FY) 1995, SNL/NM substantially reduced its current overall explosives inventory. Therefore, the current site-wide explosives storage and handling capacities would be considered adequate to accommodate any increases under this alternative, and no additional regulatory requirements or security requirements would be necessary.

Expanded Operations Alternative

Under the Expanded Operations Alternative, the explosives inventory levels maintained at existing facilities would potentially increase at the ECF, Explosives Application Laboratory (EAL), and Terminal

Table A.3–6. Projected Changes in Existing Facility Explosives Inventories (kg)

FACILITY NAME	MATERIAL BARE UNO[a]	BASE YEAR[b]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
			5-YEAR	10-YEAR		
Annular Core Research Reactor (DP configuration)	1.2	0	0.5	0.5	0.5	0
Annular Core Research Reactor (medical isotopes production configuration)	1.2	0	0.5	0.5	0.5	0
Explosive Components Facility	1.1	130	150	150	150	100
Explosive Components Facility	1.2	20	30	30	30	15
Explosive Components Facility	1.3	23	30	30	30	20
Explosive Components Facility	1.4	2	3	3	3	1
Explosives Application Laboratory	1.1	327	327	327	490	219
Explosives Application Laboratory	1.2	65.5	65.5	65.5	98.25	44
Explosives Application Laboratory	1.3	2,140	2,140	2,140	3,210	1,430
Explosives Application Laboratory	1.4	2,700	2,700	2,700	4,500	1,800
Gamma Irradiation Facility	1.1	0	0	0	0.5	0
New Gamma Irradiation Facility	1.1	0	0.5	0.5	0.5	0
Radioactive and Mixed Waste Management Facility	1.2	1.57	0	0	0	1.57
Radiographic Integrated Test Stand	1.1	0	150	225	300	45
Sandia Pulsed Reactor	1.1	1	1	1	1	0
Terminal Ballistics Complex	1.1	19	20	20	25	19
Terminal Ballistics Complex	1.2	8	8	8	10	5
Terminal Ballistics Complex	1.3	20	20	20	25	15

Table A.3–6. Projected Changes in Existing Facility Explosives Inventories (kg) (concluded)

FACILITY NAME	MATERIAL BARE UNO[a]	BASE YEAR[b]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
			5-YEAR	10-YEAR		
Terminal Ballistics Complex	1.4	20	20	20	24	15
Terminal Ballistics Complex	1.1	0.01	1.44	1.44	10.37	0
Thermal Treatment Facility	1.3	0	0.1	0.1	165.7	0
Thunder Range	1.1	436	436	436	436	0
Z-Machine	1.1	0	1	1	1.5	0

Source: SNL/NM 1998a

kg: kilogram

[a] United Nations Organization (UNO) classification system used to identify hazard class for explosives

[b] The base year varies depending on information provided in the *Facilities and Safety Information Document* (FSID) (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

Ballistics Complex, as indicated in Table A.3–6. These increases would generally be accommodated by the existing storage capacities at the affected facilities. In the event the increases exceed existing storage capacity for a particular facility, the excess material would be relocated through the explosives inventory system to another facility. Furthermore, during SNL/NM's Propellant, Explosive, and Pyrotechnics Reapplication Project, completed in FY 1995, SNL/NM substantially reduced its current overall explosives inventory. Therefore, the current site-wide explosives storage and handling capacities would be considered adequate to accommodate any increases under this alternative, and no additional regulatory requirements or security requirements would be necessary.

Reduced Operations Alternative

Under the Reduced Operations Alternative, the explosives inventory levels maintained at existing facilities would generally decrease or remain consistent with current levels. Furthermore, during SNL/NM's Propellant, Explosive, and Pyrotechnics Reapplication Project, completed in FY 1995, SNL/NM substantially reduced its current overall explosives inventory. Therefore, the current site-wide explosives storage and handling capacities would be considered adequate to accommodate any excess explosives under this alternative, and no additional regulatory requirements or security requirements would be necessary.

A.3.6.2 New Operations

No Action Alternative

Under the No Action Alternative, the explosives inventories at two new facilities, ACRR and RITS, would potentially increase as indicated in Table A.3–6. Currently, operation levels at the ACRR and RITS are increasing to normal production capacity. These increases were anticipated during the facility design and would, therefore, not be considered actual increases over normal inventory. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

Expanded Operations Alternative

Under the Expanded Operations Alternative, the explosives inventories at two new facilities, ACRR and RITS, would potentially increase as indicated in Table A.3–6. Operation levels at these facilities are increasing to full production capacity. These increases were anticipated during the facility design and would, therefore, not be considered actual increases under this alternative. Therefore, the current site-wide storage and handling capacities would be adequate, and no further regulatory requirements or security requirements would be necessary.

Reduced Operations Alternative

Under the Reduced Operations Alternative, operation levels at new facilities would decrease to minimum production capacity. Therefore, no additional storage and handling capacity, regulatory requirements, or security requirements would be necessary.

This page was intentionally left blank