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H

Waste Generation

APPENDIX H – WASTE GENERATION

H.1 INTRODUCTION

This appendix contains information supporting the waste generation impacts analysis. It details Sandia National Laboratories/New Mexico's (SNL/NM's) current and anticipated future waste generation and disposal activities under the three alternatives proposed in this Site-Wide Environmental Impact Statement (SWEIS): No Action, Expanded Operations, and Reduced Operations. The information used in this analysis was taken from available baseline data, projected operational levels, projected material consumption, and actual waste generation quantities given in the following documents:

- SNL/NM facility source documents (SNL/NM 1998a);
- *SNL/NM Environmental Information Document* (SNL/NM 1997a);
- *Facilities and Safety Information Document* (SNL/NM 1997b, SNL/NM 1998ee);
- *Environmental Assessment* of *the Environmental Restoration Project at Sandia National Laboratories/New Mexico,* DOE/EA-1140 (DOE 1996c);
- *Medical Isotopes Production Project: Molybdenum-99 and Related Isotopes Environmental Impact Statement*, DOE/EIS-0249F (DOE 1996b); and
- *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997i).

For detailed discussions of these waste types and waste management impacts, see Sections 4.11, 5.3.10, 5.4.10, and 5.5.10. Additional information on transportation associated with waste activities is presented in Sections 4.10, 5.3.9, 5.4.9, 5.5.9, and Appendix G.

H.2 SCOPE OF THE ANALYSIS

Multipliers were calculated to analyze waste generation impacts and to project the quantities of waste expected to be generated under each alternative in this SWEIS. These multipliers were derived from base year (typically 1996 or 1997) material inventories (see Appendix A, Material Inventory, for details on multiplier calculations) and from projections presented in the SNL/NM facility source documents (SNL/NM 1998a) for the 10-year time frame of this SWEIS (1998 to 2008).

This analysis focuses on waste types, volumes, onsite storage capacities, and offsite disposal. To further refine projections for the three alternatives, waste generation was further identified by the following four sources:

- Selected facilities (10 selected facilities under the SWEIS as having the most potential for impact)—existing operations (see Chapter 3 for a discussion on the selection of facilities). The waste projections for selected facilities are the maximum quantities generated for any 1-year period. Existing operations-derived wastes are considered to be those generated from mission-related work (see Chapter 2 for definitions of mission lines).
- Selected facilities—new operations. New facilities or new operations were addressed separately from existing operations to show the changes from the base year, without large increases from the new programs inflating the results.
- Balance of operations—existing operations. This source includes wastes generated during the base year from the balance of SNL/NM operations not covered under selected facilities or special projects.
- Special Projects. Due to the nature of SNL/NM operations, irregular or one-time waste generation activities from special projects that are not existing operations-related are possible. These projects include the Environmental Restoration (ER) Project, Decontamination and Decommissioning (D&D) Program, and Legacy Waste Work-off Project.

Special wastes were treated as a separate category in this analysis, even though special wastes could include all waste categories identified below, because of the potentially large volumes of these wastes, their special treatment and storage, and the specific time frames of their generation, storage, and disposal (Section H.3.3).

H.3 WASTE CATEGORIES

The various waste categories that would potentially be generated by SNL/NM include

- radioactive, including low-level wastes (LLW), low-level mixed wastes (LLMW), transuranic (TRU) wastes, and mixed transuranic (MTRU) wastes (Section H.3.1);
- hazardous, including chemical wastes (*Resource Conservation and Recovery Act* [RCRA]-listed, *Toxic Substances Control Act* [TSCA]-listed), and biohazardous (medical) wastes (Section H.3.2);

- nonhazardous, including solid wastes deposited in local landfills (trash and debris) and sewage (process wastewater) (Section H.3.3); and
- recyclable material, including such things as lead, ignitable liquids, solvents, oils, scrap metal, paper, and plastics (Section H.3.4).

Each of these waste categories was evaluated for waste generation impacts, including the amount of each waste category generated for the base year and for each of the alternatives. For spent fuel inventory projections, see Appendix A.

H.3.1 Assumptions

Several assumptions were made that had impacts across the various waste streams. The most important assumption was waste density, which was also the basis for other calculations. Waste density was calculated using the following equation:

$$\frac{\text{weight of waste}}{\text{volume of waste}} = \text{density of waste for a specific volume}$$

(Eq. H.3–1)

For water, the density is approximately equal to 1.0 kg/L and 1 L=0.001 m^3. Therefore:

$$\frac{1{,}000\ \text{L}}{1\ \text{m}^3} \times \frac{1.0\ \text{kg}}{1\ \text{L}} = 1{,}000\ \text{kg/m}^3$$

(Eq. H.3–2)

One 55-gal drum of waste has approximately 7.35 ft^3 of volume. For normal operations, the drum is left with some void space at the top, usually 5 percent, leaving a full drum of waste with 7 ft^3 of usable volume. There are 35.3 ft^3 in every cubic meter. Therefore:

$$\frac{7\ \text{ft}^3}{1\ \text{drum}} \times \frac{1\ \text{m}^3}{35.3\ \text{ft}^3} = 0.2\ \text{m}^3/\text{drum}$$

(Eq. H.3–3)

Densities of waste generated from the representative selected facilities are shown in Table H.3–1. Waste projections were based on these numbers when actual densities were unavailable, so that the information could be presented in standard units.

Table H.3–1. Densities Used to Calculate Waste Quantities[a]

WASTE	DENSITY[b] (kg/m^3)
Low-Level Waste	500
Low-Level Mixed Waste	550
Transuranic	310
Mixed Transuranic	76
Hazardous	1,000
Solid	310

Sources: SNL/NM 1998a, t
kg/m³: kilograms per cubic meter
[a] Densities are listed; however, actual quantities are used whenever possible.
[b] Rounded to two significant digits

H.3.2 Radioactive Wastes

Table H.3–2 lists radioactive waste volumes, by radioactive waste type, selected facilities (existing operations), new facilities (new operations), and balance of operations (existing operations) for the base year and each of the three alternatives.

H.3.2.1 Low-Level Waste

It is expected that the disposal of LLW will continue at the U.S. Department of Energy (DOE)-approved facilities. Pending the final decision for the *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997i), facilities including, but not limited to, the Nevada Test Site (NTS) or a commercial facility such as the Envirocare facility located outside of Clive, Utah, will be used. Disposal at these facilities is dependent on the waste meeting their waste acceptance criteria. Projected waste volumes are shown in Table H.3–2. Current waste storage levels and waste capacities are shown in Table H.3–3. Table H.3–4 shows medical isotopes production waste volumes.

H.3.2.2 Low-Level Mixed Waste

It is expected that the treatment and/or disposal of LLMW would occur at DOE-approved facilities pending the final decision for the *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Wastes* (DOE 1997i). Examples of these facilities include: the CIF Incinerator at the Savannah River Site, South Carolina; the WERF Incinerator at

Table H.3–2. Radioactive Waste Generation by Alternative

FACILITY	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
LLW, SELECTED FACILITIES, NORMAL OPERATIONS (ft^3)					
Microelectronics Development Laboratory	4	5	7	8[b]	3
Explosive Components Facility	95	190	190	190	190
Neutron Generator Facility	211	282	282	282	282
Radioactive and Mixed Waste Management Facility [b]	119	154	154	196	59
Sandia Accelerator & Beam Research Experiment	4	4.8	4.8	8.4	0
High-Energy Radiation Megavolt Electron Source III	0.25	0.48	0.48	1.38	0.04
Z-Machine	44	20	20	28	12
Gamma Irradiation Facility	56	0	0	126	56
Sandia Pulsed Reactor	31	31	31	63.4	31
Radiographic Integrated Test Stand	2.1	4.2	6.3	8.5	1.1
Subtotal	**566**	**692**	**696**	**911**[b]	**634**
LLW, NEW FACILITIES (OPERATIONS)					
Hot Cell Facility	100	2,200	2,200	5,000	270
Annular Core Research Reactor (medical isotopes production configuration)	56	370	370	1,090	56
Annular Core Research Reactor (DP configuration)	0	0	35	170	0
New Gamma Irradiation Facility	0	92	92	126	56
Subtotal	**156**	**2,662**	**2,697**	**6,386**	**382**
LLW, BALANCE OF OPERATIONS, NORMAL OPERATIONS (ft^3)					
Balance of Operations	2,600	2,600	2,600	2,600	2,600
TOTAL LLW	**3,322**	**5,954**	**5,993**	**9,897**[b]	**3,616**
LLMW, SELECTED FACLITIES, NORMAL OPERATIONS (kg)					
Neutron Generator Facility	150	300	300	300	300
Radioactive and Mixed Waste Management Facility [c]	842	1,095	1,095	1,390	421
Sandia Pulsed Reactor	143	143	143	500	143
Aerial Cable Facility	0	0	0	0	0

Table H.3–2. Radioactive Waste Generation by Alternative (continued)

FACILITY	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
Sled Track Facility	0	0	0	0	0
Lurance Canyon Burn Site	0	0	0	0	0
Explosive Components Facility	1,000	1,000	1,000	1,000	1,000
Subtotal	**2,135**	**2,538**	**2,538**	**3,190**	**1,864**
LLMW, NEW FACILITIES (OPERATIONS) (kg)					
Hot Cell Facility	250	607	607	1,429	179
Annular Core Research Reactor (DP configuration)	0	0	0	179	0
Subtotal	**250**	**607**	**607**	**1,607**	**179**
LLMW, BALANCE OF OPERATIONS, NORMAL OPERATIONS (kg)					
Balance of Operations	157	157	157	157	157
TOTAL LLMW	**2,542**	**3,302**	**3,302**	**4,954**	**2,200**
TRU WASTE, SELECTED FACILITIES, NORMAL OPERATIONS (ft^3)					
Z-Machine	0	8	8	16	0
Sandia Pulsed Reactor	0	2	2	5	0
Subtotal	**0**	**10**	**10**	**21**	**0**
TRU WASTE, NEW FACILITIES (OPERATIONS) (ft^3)					
Annular Core Research Reactor (DP configuration)	0	0	0	5	0
Subtotal	0	0	0	**5**	**0**
TRU WASTE, BALANCE OF OPERATIONS, NORMAL OPERATIONS (ft^3)					
Balance of Operations	0	0	0	0	0
TOTAL TRU	**0**	**10**	**10**	**26**	**0**
MTRU WASTE, SELECTED FACILITIES, NORMAL OPERATIONS (ft^3)					
Sandia Pulsed Reactor	0	2	2	5	0
Radioactive and Mixed Waste Management Facility[c]	0	2	2	5	0
Subtotal	**16**	**23**	**23**	**32**	**8**
MTRU WASTE, NEW FACILITIES (OPERATIONS) (ft^3)					
Annular Core Research Reactor (DP configuration)	0	0	0	5	0

Table H.3–2. Radioactive Waste Generation by Alternative (concluded)

FACILITY	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
Subtotal	**0**	**0**	**0**	**5**	**0**
Balance of Operations	0	0	0	0	0
TOTAL MTRU	**1**	**23**	**23**	**37**	**8**

Sources: SNL/NM 1998a, 1997b
DP: Defense Programs
ft^3: cubic feet
kg: kilograms
m^3: cubic meter
LLMW: low-level mixed waste
LLW: low-level waste
MESA: Microsystems and Engineering Sciences Applications
MTRU: mixed transuranic
RMWMF: Radioactive and Mixed Waste Management Facility
TRU: transuranic
[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.
[b] If implemented, the MESA Complex configuration would increase the quantity by 0.1 ft^3 of LLW annually.
[c] RMWMF MTRU waste should be considered to be inventory based on projected facility operations.
Note: 1) Numbers are rounded and may differ from calculated values.
2) LLW and LLMW managed by the RMWMF may require repackaging and generation of a secondary waste. Waste generated for these operations was assumed to be less than 1 percent of the total in storage and was considered the bounding case.

Table H.3–3. Low-Level Waste in Storage and Facility Storage Capacity[a]

FACILITY	LLW IN STORAGE		FACILITY CAPACITY	
	WEIGHT (kg)	VOLUME (m^3)	WEIGHT[b] (M kg)	VOLUME (m^3)
High Bay (6596) in TA-I	0	0	2.268	1,800
ISS in TA-III	0	0	0.643	510
Manzano Bunker 37118[c]	0	0	0.352	279
Manzano Bunker 37045[c]	0	0	0.222	176
Manzano Bunker 37078[c]	0	0	0.352	279
Manzano Bunker 37063[c]	255	0.62	0.296	235
Manzano Bunker 37034[c]	4,450	6.71	0.296	235
Manzano Bunker 37055[c]	1,732	3.48	0.222	176
Manzano Bunker 37057[c]	6.4	0.82	0.222	176
RMWMF in TA-III	69,811	325	10.08	8,000
TOTAL LLW IN STORAGE	**76,255**	**336**		
TOTAL FACILITY CAPACITY			**14.95**	**11,874**

Source: SNL/NM 1998a
ACRR: Annular Core Research Reactor
ISS: Interim Storage Site
kg: kilograms
LLW: low-level waste
m^3: cubic meters
M kg: million kilograms
RMWMF: Radioactive and Mixed Waste Management Facility
TA: technical area
[a] LLW generated from the ACRR, while operating in the medical isotopes production configuration, will be managed at the ACRR facility prior to offsite disposal.
[b] Facility weight capacity is based on a maximum weight of 250 kg per drum (actual), using all available storage.
[c] See Figure 4.4–12 for the approximate locations of these waste storage facilities.
Note: Numbers are rounded and may differ from calculated values.

Table H.3–4. Medical Isotopes Production Project, Low-Level Waste Projections (kg)

FACILITY	BASE YEAR [a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
Hot Cell Facility	1,686	37,086	37,086	84,286	4,551
ACRR (medical isotopes production configuration)	944	6,237	6,237	18,374	944
TOTAL	**2,630**	**43,323**	**43,323**	**102,660**	**5,495**

Sources: SNL/NM 1998a, SNL/NM 1997b
ACRR: Annular Core Research Reactor
kg: kilograms
LLW: low-level waste

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

Note: Waste generated by the Medical Isotopes Production Project represents approximately 32 to 84 percent of the selected facility total LLW at SNL/NM projected under the three alternatives.

INEEL, Idaho; the TSCA Incinerator at Oak Ridge, Tennessee; Environcare facilities in Clive, Utah; Waste Control Specialist in Texas; DSSI, Oak Ridge, Tennessee, for treatment; Hanford, Washington, for disposal; and the NTS, Nevada, for disposal. Disposal at these facilities is dependent on meeting waste acceptance criteria. Projected waste volumes are shown in Table H.3–2. Current stored quantities of these wastes and capacities of storage facilities are shown in Table H.3–5. Table H.3–6 lists medical isotopes production waste volumes.

H.3.2.3 Transuranic and Mixed Transuranic Waste

The existing TRU and MTRU wastes stored onsite, as well as all future TRU and MTRU wastes, are to be transferred to Los Alamos National Laboratory (LANL) for certification, as indicated in the January 20, 1998, Record of Decision (ROD) for DOE's *Waste Management Program: Treatment and Storage of Transuranic Waste* (DOE 1998n). Projected waste volumes are shown in Table H.3–2. Current stored quantities of these wastes and facility storage capacities are shown in Table H.3–7. Neither TRU nor MTRU wastes would be generated at the ACRR during medical isotopes production.

H.3.3 Hazardous Waste

Table H.3–8 lists hazardous waste volumes by selected facilities (existing operations), new facilities (new operations), and balance of operations (existing operations) for the base year and each of the three alternatives.

SNL/NM uses multiple hazardous waste disposal facilities located throughout the U.S. Table H.3–9 shows these facilities. Wastes shipped in 1997 are shown in Table H.3–10. Hazardous waste storage facility capacities are shown in Table H.3–11. The August 5, 1998, *Record of Decision for the Department of Energy's Waste Management Program: Treatment of Non-Wastewater Hazardous Waste* discusses the decision to continue to use commercially available facilities for hazardous waste disposal (DOE 1998m).

H.3.3.1 Biohazardous (Medical) Waste

The total volume of medical waste would remain generally a function of the total number of full-time employees and subcontractors located at SNL/NM. A total of 2,463 kg of biohazardous waste was disposed of in 1997. No large increase is anticipated based on the information provided.

Table H.3–5. Low-Level Mixed Waste Currently in Storage and Facility Storage Capacity[a]

FACILITY	LLMW IN STORAGE		FACILITY CAPACITY	
	WEIGHT (kg)	VOLUME (m^3)	WEIGHT [b] (M kg)	VOLUME (m^3)
High Bay (6596) in TA-I	60,261	101	2.269	1,800
ISS in TA-III	0	0	0.643	510
Manzano Bunker 37118 [c]	0	0	0.352	279
Manzano Bunker 37045 [c]	0	0	0.222	176
Manzano Bunker 37078 [c]	0	0	0.352	279
Manzano Bunker 37063 [c]	0	0	0.296	235
Manzano Bunker 37034 [c]	6,568	9.8	0.296	235
Manzano Bunker 37055 [c]	163.3	1.7	0.222	176
Manzano Bunker 37057 [c]	0	0	0.222	176
RMWMF in TA-III	17,065	39	10.08	8,000
TOTAL LLMW IN STORAGE	**84,057**	**152**		
TOTAL FACILITY CAPACITY			**14.95**	**11,874**

Source: SNL/NM 1998a
ACRR: Annular Core Research Reactor
ISS: Interim Storage Site
kg: kilograms
LLMW: low-level mixed waste
m^3: cubic meters
M kg: million kilograms
RMWMF: Radioactive and Mixed Waste Management Facility
TA: technical area
[a] LLMW generated from the ACRR, while operating in the medical isotopes production configuration, will be managed at the ACRR facility prior to offsite disposal.
[b] Faclity weight capacity is based on a maximum weight of 250 kg per drum (actual), using all available storage.
[c] See Figure 4.4–12 for the approximate locations of these waste storage facilities.
Note: Numbers are rounded and may differ from calculated values.

Table H.3–6. Medical Isotopes Production Project, Low-Level Mixed Waste Projections (kg)

FACILITY	BASE YEAR [a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
Hot Cell Facility	250	607	607	1,429	179
ACRR (medical isotopes production configuration)	0	0	0	179	0
TOTAL	**250**	**607**	**607**	**1,607**	**179**

Sources: SNL/NM 1998a, SNL/NM 1997b
ACRR: Annular Core Research Reactor
kg: kilograms
[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.
Notes: 1) Waste generated by the Medical Isotopes Production Project represents approximately 32 to 84 percent of the selected facility total LLMW at SNL/NM projected under the three alternatives
2) Numbers are rounded and may differ from calculated values.

Table H.3–7. Transuranic and Mixed Transuranic Waste in Storage and Facility Storage Capacity[a]

FACILITY	TRU WASTE		MTRU WASTE		CAPACITY	
	WEIGHT (kg)	VOLUME (m^3)	WEIGHT (kg)	VOLUME (m^3)	WEIGHT [b] (M kg)	VOLUME (m^3)
High Bay (6596)	0	0	0.5	0.03	2.268	1,800
ISS	0	0	0	0	0.643	510
Manzano Bunker 37118 [c]	0	0	0	0	0.352	279
Manzano Bunker 37045 [c]	0	0	0	0	0.222	176
Manzano Bunker 37078 [c]	0	0	0	0	0.352	279
Manzano Bunker 37063 [c]	1,719	4.84	0	0	0.296	235
Manzano Bunker 37034 [c]	0	0	0	0	0.296	235
Manzano Bunker 37055 [c]	0	0	0	0	0.222	176
Manzano Bunker 37057 [c]	0	0	0	0	0.222	176
RMWMF	134	1.22	34	0.42	10.08	8,000
TOTAL TRU and MTRU IN STORAGE	**1,853**	**6.1**	**34.5**	**0.45**		
TOTAL FACILITY CAPACITY					**14.95**	**11,874**

Source: SNL/NM 1998a
ACRR: Annular Core Research Reactor
ISS: Interim Storage Site
kg: kilograms
m^3: cubic meters
MTRU: mixed transuranic
RMWMF: Radioactive and Mixed Waste Management Facility
TA: technical area
TRU: transuranic

[a] TRU and MTRU waste generated from the ACRR, while operating in the medical isotopes production configuration, will be managed at the ACRR facility prior to offsite disposal.
[b] Facility weight capacity is based on a maximum weight of 250 kg per drum (actual), using all available storage.
[c] See Figure 4.4–12 for the approximate locations of these waste storage facilities.
Note: Numbers are rounded and may differ from calculated values.

Table H.3–8. Hazardous Waste Generation by Alternative

FACILITY NAME	BASE YEAR [a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
HAZARDOUS WASTE, NORMAL OPERATIONS (kg)					
Microelectronics Development Laboratory	2,520	3,150	4,410	4,738	1,688
MESA Complex configuration [b]				(5,938)	
Advanced Manufacturing Processes Laboratory	4,732	5,915	5,915	6,625	4,732
Explosive Components Facility	360	500	500	500	500
Integrated Materials Research Laboratory	2,400	2,100	1,850	2,000	2,000
Neutron Generator Facility	2,760	3,680	3,680	3,680	3,680
Hazardous Waste Management Facility	800	750	770	860	690
Thermal Treatment Facility	0	76	76	272	0
High-Energy Radiation Megavolt Electron Source	167	316	316	915	25
SATURN	167	501	501	1,286	100
Short-Pulse High Intensity Nanosecond X-Radiator	21	45	45	107	3.6
Sandia Accelerator and Beam Research Experiment	63	76	76	132	0
Z-Machine	750	1,000	1,000	1,250	400
Advanced Pulsed Power Research Module	50	100	100	200	5
Gamma Irradiation Facility	199	0	0	398	199
Repetitive High Energy Pulsed Power Unit I	0	1	1	1	0
Repetitive High Energy Pulsed Power Unit I	0	5	5	10	0
Sandia Pulsed Reactor	199	398	398	852	199
Radiographic Integrated Test Stand	68	136	204	272	34
Containment Technology Test Facility-West	0.1	0.1	0	0.1	0.1
Sled Track Complex	15	15	15	50	3
Centrifuge Complex	10	12	12	15	12

Table H.3–8. Hazardous Waste Generation by Alternative (concluded)

FACILITY NAME	BASE YEAR [a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
Aerial Cable Facility	5	5	5	9	5
Lurance Canyon Burn Site	900	900	900	900	900
Drop/Impact Complex	0	0	0	0	0
Explosives Application Laboratory	1.0	1	1	2	0.5
Terminal Ballistics Complex	0.3	0.5	0.5	0.8	0
Subtotal ***MESA Complex configuration[b]***	**16,187**	**19,682**	**20,780**	**25,074** **(26,274)**	**15,176**
HAZARDOUS WASTE, NEW FACILITIES (OPERATIONS) (kg)					
Hot Cell Facility	199	398	398	625	199
Annular Core Research Reactor (Medical Isotopes Production Configuration)	199	398	398	852	199
Annular Core Research Reactor (DP Configuration)	0	0	57	398	0
Tera-Electron Volt Energy Superconducting Linear Accelerator	0	50	50	65	2
New Gamma Irradiation Facility	0	398	398	398	199
Subtotal	**398**	**1,243**	**1,300**	**2,337**	**598**
Selected Facilities Total ***MESA Complex configuration[b]***	**16,585**	**20,925**	**22,080**	**27,411** **(28,611)**	**15,774**
Hazardous Waste Derived Multiplier ***MESA Complex configuration[b]***	**1.00**	**1.26**	**1.33**	**1.65** **(1.73)**	**0.95**
HAZARDOUS WASTE, BALANCE OF OPERATIONS, EXISTING OPERATIONS (kg)					
Balance of Operations	39,267	49,544	52,278	64,902	37,349
TOTAL HAZARDOUS WASTE ***MESA Complex configuration[b]***	**55,852**	**70,469**	**74,358**	**92,314** **(93,514)**	**53,132**

Sources: SNL/NM 1998a, SNL/NM 1997b
DP: Defense Programs
kg: kilograms
MESA: Microsystems and Engineering Sciences Applications
MDL: Microelectronics Development Laboratory

[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.
[b] If implemented, the MESA Complex configuration under the Expanded Operations Alternative would increase hazardous waste generation by 1,200 kg per year.
Note: Numbers are rounded and may differ from calculated values.

Table H.3–9. 1997 Waste Disposal and Recyclable Quantities and Sites Used[a]

FACILITY NAME	WASTE/MATERIAL TYPE [b]	RCRA WASTE (kg)	NON-RCRA WASTE (kg)
Ensco Environmental Services	Hazardous	34,709	22,907
Keers Environmental	Asbestos	0	148,793
Kinsbursky Bros.	Batteries (recycle)	0	7,715
Kirtland Air Force Base	Explosives	125	0
Laidlaw, NY	Pyrophoric materials, nonflammable gas	218	99
Laidlaw - APTUS, UT	Hazardous, biohazardous (medical), PCBs	10,791	10,455
Laidlaw, UT	PCBs	0	198
Laidlaw, UT	Chromium-contaminated water, contaminated soil, PCBs, asbestos	346,393	32,445
Laidlaw, OK	Hazardous	1,167	0
NSSI	Cylinder	500	0
Safety-Kleen	Used oil (recycle)	0	36,243
Salesco Systems	PCBs, fluorescent lights, nonregulated	419	18,871
SNL/NM	Explosives, hazardous	1,330	490
Tab Manufacturing	Lead (recycle)	0	16,647
Transformer Disposal Specialists, Inc.	PCBs	0	23,459

Source: Rinchem 1998a
HWMF: Hazardous Waste Management Facility
kg: kilogram
NSSI: National Sources & Services, Inc.
PCB: polychlorinated biphenyl
RCRA: *Resource Conservation and Recovery Act*
SNL/NM: Sandia National Laboratories/New Mexico
[a] Represents only material handled through the HWMF
[b] Includes recyclable waste

Table H.3–10. Hazardous Waste Management Facility (HWMF) 1997 Waste and Recycle Quantities Shipped

WASTE/MATERIAL TYPE	TOTAL SHIPPED (kg)
Asbestos	155,951
ER Project	338,635
Explosives	130
Lead (Recyclable)	16,647
Non-RCRA	69,321
PCBs	28,591
RCRA	55,852
Recyclable (Other)	7,879
Subtitle D [a]	4,728
Used Oil (Recyclable)	36,242
TOTAL	**713,976**

Source: Rinchem 1998a
ER: Environmental Restoration
kg: kilogram
PCB: polychlorinated biphenyl
RCRA: *Resource Conservation and Recovery Act*
[a] Subtitle D refers to RCRA Subtitle D as defined in 40 CFR Parts 257 and 258.
Note: Recyclable materials are considered to have economic value and are not included as waste for calculations.

Table H.3–11. Hazardous Waste Management Facility Operations Storage Capacities

FACILITY	CAPACITY	
	(m^3)	(kg)
Waste Packaging Building 959	21.65	21,715
Waste Storage Building 958	226.95	227,587
Modular Storage Buildings	37.89	38,001
TOTAL	**286.50**	**287,303**

Source: SNL/NM 1998a
kg: kilograms
m^3: cubic meters

H.3.4 Special Projects Wastes

H.3.4.1 Environmental Restoration Project

Overall projections indicate the ER Project, a special project beyond the scope of normal operations, will be the single largest waste generator at SNL/NM in 1998. In 1997, SNL/NM shipped approximately 0.58 M kg of hazardous (RCRA and TSCA) waste for offsite disposal. The ER Project was responsible for 338,635 kg of that total. The ER Project will produce and dispose of various waste types, primarily contaminated soil and debris, by the conclusion of the project in 2004. The environmental consequences associated with the project are discussed separately in the ER Project Environmental Assessment (DOE 1996c). However, the ER Project waste volumes are included in this analysis and are listed in Table H.3–12.

H.3.4.2 SNL/NM Facility

A second special project beyond the scope of normal operations, to renovate and refurbish outdated metal, temporary office, and trailer structures, is currently planned for the next 10 years. The projections directly affect the quantity of TSCA hazardous waste requiring disposal. Under these projections, SNL/NM would continue to generate TSCA hazardous waste, primarily asbestos removed from older buildings and PCBs from old transformers, at the rate of approximately 122,000 kg per year. A total of 184,542 kg of TSCA waste, generated through special projects, was shipped offsite for disposal in 1997.

No projections are made for this program beyond the year 2007. The wastes generated under this special project are related indirectly to the decrease in gross square feet of facilities presented in Table H.3–13.

H.3.4.3 Legacy Waste Work-Off Project

Legacy waste is considered to be waste material currently in storage pending disposal. For the most part, legacy waste is either radioactive or classified. SNL/NM is in the process of disposing of this waste as treatment and disposal capacity becomes available. The projected time frame for removal of this waste is discussed in Appendix G.

Table H.3–12. Analysis of Environmental Restoration Project-Generated Waste Volumes[a]

YEAR	WASTE TYPE	VOLUME (m^3)	WEIGHT[ab] (kg)
1996[bc]	RCRA Hazardous	274.7	314,981
	LLW	374.2	429,046
	LLMW	66.5	76,232
	TSCA Hazardous	3.8	4,384
	Nonhazardous	43.6	49,975
	Subtotal	**762.8**	**874,626**
1997[bc]	RCRA Hazardous	34.8	39,957
	LLW	255.3	292,727
	LLMW	99.6	114,240
	TSCA Hazardous	5.4	6,137
	Nonhazardous	74.9	85,921
	Subtotal	**470**	**538,883**
1998	RCRA Hazardous	20,066.1	23,007,630
	LLW	2,216.8	2,541,780
	LLMW	53.2	61,022
	TSCA Hazardous	901.5	1,033,686
	Nonhazardous	109.1	125,112
	Subtotal	**23,346.8**	**26,769,230**
1999	RCRA Hazardous	694.6	796,402
	LLW	15.5	17,762
	LLMW	1.8	2,017
	TSCA Hazardous	878.6	1,007,384
	Nonhazardous	38.2	43,837
	Subtotal	**1,628.7**	**1,867,403**
2000	RCRA Hazardous	1,529.3	1,753,497
	LLW	-	-
	LLMW	-	-
	TSCA Hazardous	-	-
	Nonhazardous	-	-
	Subtotal	**1,529.3**	**1,753,497**
TOTAL		**27,737.5**	**31,803,638**

Source: SNL/NM 1998m
LLMW: low-level mixed waste
LLW: low-level waste
RCRA: *Resource Conservation and Recovery Act*
TSCA: *Toxic Substances Control Act*
[a] Actual cleanup is expected to be completed between fiscal year (FY) 2003 and FY2005, with environmental restoration waste disposed of prior to the end of the project.
[b] Conversion based on 1997 average waste density of 1,146.6 kg/m^3
[c] Actual quantities

Table H.3–13. SNL/NM Facility Square Footage Changes

YEAR	NUMBER OF BUILDINGS	GROSS SQUARE FEET
Current Levels	674	5,020,014
FY 1998 through 1999 Decreases	-138	-179,204
FY 2000 through 2002 Decreases	-49	-108,937
FY 2003 through 2007 Decreases	-29	-84,132
FY 1998 through 2007 Increases	+7	+240,000
TOTALS THROUGH 2007	465	4,887,741

Source: SNL 1997a
CSRL: Compound Semiconductor Research Laboratories
FY: fiscal year
MESA: Microsystems and Engineering Sciences Applications
Note: Table does not include leased space, MESA Complex, and CSRL.

H.3.5 Nonhazardous Waste

H.3.5.1 Solid Waste

Municipal solid waste is usually transported once a week from SNL/NM. In 1997, 51 shipments were made from SNL/NM Solid Waste Transfer Facility to the Rio Rancho Sanitary Landfill. For the SWEIS analysis, the bounding calculation assumed the disposal of solid waste would be located within 50 km. These volumes are not expected to vary significantly over the time frame of the SWEIS. Solid waste projections are shown in Table H.3–14. Quantities of building debris generated from construction and demolition (C&D) activities are currently disposed of onsite at the KAFB Landfill and are shown in Table 5.3.10–3.

If implemented, the Microsystems and Engineering Sciences Applications (MESA) Complex configuration under the Expanded Operations Alternative would result in the following estimated quantities of decontamination, decommissioning, and demolition wastes: 1 ton of asbestos–TSCA, 0.5 ton of PCB–TSCA ballasts, 0.5 ton of hazardous waste, 0.1 ton of nonhazardous waste, and 2,000 tons of demolition debris. The analysis assumed that 1 ton is equal to approximately 2.5 yd^3 and that demolition wastes would occur after the MESA Complex becomes operational in fiscal year (FY) 2003.

H.3.5.2 Wastewater

Wastewater is discussed in detail in Sections 4.4, 5.3.2, 5.4.2, and 5.5.2 of the SWEIS. Projections of wastewater volumes are shown in Table H.3–15.

H.3.6 Recyclable Materials

SNL/NM routinely recycles solid waste materials such as scrap metal, paper, cardboard, and plastics. SNL/NM also recycles hazardous materials such as lead, waste oil, solvents, and other chemicals whenever possible. Recyclable materials are considered to have economic value and are, therefore, not included as waste for calculations. See Section 4.12 for a detailed discussion.

Table H.3–14. Solid Waste Quantities from Existing Facilities and New Facilities (Operations)

SOLID WASTE	BASE YEAR[a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
Site-Wide Municipal Solid Waste (m^3)	2,022	2,006	1,955	2,022[b]	1,955
Change From Base Year (%)	0	-0.8	-3.3	0	-3.3

Sources: SNL/NM 1998a, c, y
CSRL: Compound Semiconductor Research Laboratories
FY: fiscal year
m^3: cubic meters
[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.
[b] Not expected to change in the MESA Complex configuration under the Expanded Operations Alternative.
Note: See Table 5.3.10–3 for construction and demolition wastes, including 2,000 tons for demolition of CSRL after FY 2003.

Table H.3–15. Analysis of Process Wastewater Generation from All Existing Facilities and New Facilities (Operations)

WASTEWATER	BASE YEAR [a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
Existing Operations Wastewater (M gal)	49	62	84	86[b]	51
New Operations Wastewater (M gal)	0	4	4	5	3
TOTAL OPERATIONS WASTEWATER (M gal)	49	66	88	91[b]	54
Site-Wide Water Use (M gal)	440	454	463	495[b]	416
Site-Wide Wastewater[c] (M gal)	280	290	304	322[b]	268

Sources: SNL/NM 1997b, 1998a, c
M gal: million gallons
MESA: Microsystems and Engineering Sciences Applications
[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.
[b] If implemented, the MESA Complex configuration under the Expanded Operations Alternative would increase the quantity by 3.8 M gal per year.
[c] Wastewater includes process water and sanitary water

H.4 SUMMARY

Table H.4–1 is a summary of total waste volumes for the waste categories addressed above, by base year, under each of the three alternatives. Percentage increases or decreases from base year are also shown.

Table H.4–1. Summary of Waste Volumes and Percent Increases/Decreases by Alternative for All Operations

SUMMARY OF ALL WASTES	UNITS	BASE YEAR [a]	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
			5-YEAR	10-YEAR		
Radioactive Waste	m^3	98.9	174.9	176	289.4[b]	106.4
RCRA Hazardous Waste[c]	kg	55,852	70,469	74,358	92,314[b]	53,123
Solid Waste	m^3	2,022	2,006	1,955	2,022	1,955
Process Wastewater	M gallons	280	273	265	322[b]	270
Radioactive Waste	% Change	0	76.9	78	192.7	7.6
RCRA Hazardous Waste	% Change	0	24.4	31.3	74.3	-8.8
Solid Waste	% Change	0	-0.8	-3.3	0	-3.3
Process Wastewater	% Change	0	2.2	-5.4	15.0	-3.6

Sources: SNL/NM 1997b, 1998a, c, m, y;
D&D: decontamination and decommissioning
DOE: U.S. Department of Energy
ft^3: cubic feet
gal: gallons
kg: kilograms
M: million
m^3: cubic meters
MESA: Microsystems and Engineering Sciences Applications
RCRA: *Resource Conservation and Recovery Act*
SNL/NM: Sandia National Laboratories/New Mexico
TSCA: *Toxic Substances Control Act*
[a] The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.
[b] If implemented, the MESA Complex configuration under the Expanded Operations Alternative would contribute an additional 1,200 kg of hazardous waste, 0.1 ft^3 of low-level waste, and 3.8 M gal of wastewater annually. The MESA Complex configuration is not expected to increase the overall quantities of solid waste because the DOE would not increase the workforce, a key parameter in solid waste generation.
[c] SNL/NM operations are projected to generate approximately 122,000 kg of TSCA hazardous waste annually, primarily from D&D operations.

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