The Current and Planned Low-Level Waste Disposal Capacity Report Revision 2

December 2000

U.S. Department of Energy
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List of Acronyms and Abbreviations

AEC	Atomic Energy Commission
am	activated metal
CA	composite analysis
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Ci	curie
cm	centimeter
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
EMWMF	Environmental Management Waste Management Facility
ERDF	Environmental Restoration Disposal Facility (Hanford)
FY	fiscal year
ha	hectare
ICDF	Idaho CERCLA Disposal Facility
ILAW	Immobilized Low Activity Waste (Hanford)
ILNT	Intermediate Level Non-Tritiated (SRS)
ILT	Intermediate Level Tritiated (SRS)
ILW	Intermediate Level Waste (SRS)
INEEL	Idaho National Engineering and Environmental Laboratory
IPABS	Integrated Planning, Accountability, and Budgeting System
IWMF	Interim Waste Management Facility
km	kilometer
LANL	Los Alamos National Laboratory
LAW	Low Activity Waste (SRS)
LFRG	Low-Level Waste Disposal Facility Federal Review Group
LLW	low-level waste
m	metastable
m^3	cubic meters
mi	mile
mR/hr	millirem per hour
MLLW	mixed low-level waste
NTS	Nevada Test Site
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OSDF	On-Site Disposal Facility (Fernald)
PA	performance assessment
PE	Performance Evaluation
RCRA	Resource Conservation and Recovery Act
ROD	record of decision
RWMC	Radioactive Waste Management Complex (INEEL)
RWMS	Radioactive Waste Management Site (NTS)
SDD	Stream Disposition Data (part of IPABS)
SOF	sum-of-fractions
SRS	Savannah River Site
TA-54	Technical Area 54 (LANL)
WAC	waste acceptance criteria

WM PEIS	Waste Management Programmatic Environmental Impact Statement

Executive Summary

The purpose of this Report is to assess whether U.S. Department of Energy (DOE or the Department) disposal facilities have sufficient volumetric and radiological capacity to accommodate the low-level waste (LLW) and mixed low-level waste (MLLW) that the Department expects to dispose at these facilities. This Report is the third capacity assessment prepared by DOE and provides an update of the previous revision, *The Current and Planned Low-Level Waste Disposal Capacity Report, Revision 1*, issued on September 18, 1998.[1] The Department expects information on disposal facility characteristics and projected waste volumes and radiological content will change over time, and DOE plans to prepare future updates of this report as appropriate.

As a result of the analyses performed in this Report, based on an early 2000 snapshot of current Department waste projections and capacity information, the following conclusions can be drawn:

1. *The Department has sufficient complex-wide volumetric capacity for LLW disposal through 2070. The radiological capacity through 2070 for LLW disposal also appears to be sufficient.*

The Department's existing, approved, and planned LLW disposal facilities provide sufficient volumetric and radiological capacity to accommodate all LLW the Department projects will require disposal at DOE facilities. A number of these facilities also appear to have significant volumetric and radiological disposal capacity surpluses. This assessment considered 13 disposal facilities at 7 DOE sites, including 8 waste operations facilities (Hanford 200 Area Burial Grounds, INEEL RWMC, LANL TA-54 Area G, NTS Areas 3 and 5 RWMS, ORR IWMF, SRS LAW Vaults, SRS ILW Vaults, and SRS E-Area Trenches), three existing/approved environmental restoration CERCLA disposal facilities (Fernald OSDF, Hanford ERDF, and Oak Ridge Reservation EMWMF), one planned environmental restoration CERCLA disposal facility (INEEL ICDF), and one planned CERCLA remediation unit (INEEL CERCLA Remediation Unit).[2] DOE's disposal facilities also have sufficient volumetric capacity to accommodate LLW currently destined for disposal in a planned facility (if the planned facility were not constructed) and LLW that does not have an identified disposal option (disposition in a to be determined facility).

[1] The 1998 Revision 1 report is available electronically at http://www.em.doe.gov/lowlevel/llw_toc.html.

[2] Waste operations facilities are not limited by non-DOE regulation as to what DOE LLW and MLLW they may receive with respect to the waste origin. Environmental restoration CERCLA disposal facilities are limited by federal regulation to acceptance of LLW and MLLW generated from designated on-site environmental restoration activities.

2. *The Department has sufficient complex-wide radiological capacity for MLLW disposal through 2070. However, to accommodate the volume of MLLW projected to require disposal at the Department's waste operations facilities, implementation issues regarding use and expansion of the Hanford Mixed Waste Trenches 31 and 34 and the Nevada Test Site Area 5 Mixed Waste Disposal Unit must be resolved.*

The Department has two MLLW disposal facilities: the Hanford Mixed Waste Trenches 31 and 34, and the NTS Area 5 Mixed Waste Disposal Unit. These two facilities provide the Department a total disposal capacity of 62,000 m^3, and both facilities include room for further expansion. The Department has projected that 63,000 m^3 of MLLW will be disposed at these two facilities through 2070. While the combined capacity of these facilities is less than the total projected waste volume, future disposal needs may change as a result of changes in both waste volume and disposal capacity. DOE expects changes to include additional off-site MLLW that may be disposed at Hanford and NTS as a result of implementation of DOE's Waste Management Programmatic Environmental Impact Statement Record of Decision for MLLW disposal, changes in the quantities of on-site MLLW destined for these facilities, and, if necessary, expansion of the MLLW disposal facilities at these sites.

3. *Development of the planned environmental restoration CERCLA disposal facility may affect the available disposal capacity at Waste Operations MLLW disposal facilities.*

DOE plans to develop an environmental restoration CERCLA disposal facility at Idaho National Engineering and Environmental Laboratory, the INEEL ICDF. This facility is projected to receive 37,000 m^3 of MLLW as well as a larger quantity of LLW. The potential effects that not constructing this facility could have on MLLW disposal capacity was assessed in the alternative scenarios presented in this Report. Developing this facility would allow more flexibility in using DOE's currently available remaining MLLW disposal capacity.

4. *The Department should make efforts to improve data quality and reduce uncertainties*.

The Department's confidence in the quality of data used in the report has improved considerably since the 1998 Revision 1 report. However, DOE expects that uncertainty in the analysis will continue to be reduced as data quality continues to improve. Uncertainty can be reduced in three distinct areas. First, the uncertainty of many of the waste stream radionuclide profiles used in this Report can be reduced in those cases where the profiles are estimates based on composited, incomplete, and extrapolated radionuclide data. This report used considerably more field-developed site-specific radiological profile data than in the previous report. However, much of the radionuclide inventory used in this report was still based on composited and extrapolated radionuclide data. Second, uncertainty can be reduced in developing improved volumetric projections. As implementation of the Environmental Management Program's site cleanup plans proceed, these projections have improved and are expected to continue to improve. Finally, uncertainty can be reduced by an improved understanding of disposal facility performance assessment attributes. All waste operations disposal facilities performance assessments have been approved and several revisions and addenda have been completed as part of the performance assessment maintenance process.

Current Waste Disposition Strategy

The Department's current plans for disposition of LLW and MLLW are shown in Table ES-1 below. A distinction is made between DOE's waste operations facilities and CERCLA disposal facilities because the CERCLA facilities can only receive waste generated from on-site environmental restoration activities. In contrast, the waste operations facilities can receive waste from both environmental restoration and other activities.

Table ES-1. Estimated Volume and Projected Disposition of DOE's LLW and MLLW (2000-2070)

Projected Disposition	Estimated Volume by Waste Type (cubic meters)		Totals [a]
	LLW	MLLW	
Waste Operations Disposal Facilities	1,200,000	63,000	1,200,000
Existing/Approved Environmental Restoration CERCLA Disposal Facilities	7,500,000	200,000	7,700,000
Planned Environmental Restoration CERCLA Facilities	170,000	37,000	200,000
To Be Determined	280,000	5,100	280,000
Commercial Disposal	1,000,000	150,000	1,200,000
Totals [a]	10,100,000	450,000	10,600,000

[a] Because of rounding, some totals may not equal the sum of their components.
Source: Integrated Planning, Accountability, and Budgeting System Stream Disposition Database, June 26, 2000, data set.

1.0 INTRODUCTION

This report, *The Current and Planned Low-Level Waste Disposal Capacity Report, Revision 2* (abbreviated in this document as "the Report"), uses the most recent complex-wide life-cycle volumetric and radionuclide concentration projections of Department of Energy (DOE or the Department) low-level waste (LLW) and mixed low-level waste (MLLW) disposal and reassesses the ability of Department facilities to dispose of LLW and MLLW without exceeding volumetric and radiological capacity limits.

On July 30, 1996, the Department issued *The Current and Planned Low-Level Waste Disposal Capacity Report, Revision 0* (abbreviated in this document as "Revision 0"), to assess the adequacy of LLW disposal capacity at Department sites. (Revision 0 can be viewed or downloaded at http://www2.em.doe.gov/dnfsbrpt.) On September 18, 1998, the Department issued *The Current and Planned Low-Level Waste Disposal Capacity Report, Revision 1* (abbreviated in this document as "Revision 1"). (Revision 1 can be viewed or downloaded at http://www.em.doe.gov/lowlevel/llw_toc.html.) Revisions 0 and 1 provided life-cycle volumetric projections of DOE LLW and MLLW and compared those projections with estimates of the current and planned volumetric disposal capacity at DOE disposal facilities. The major difference between Revision 0 and Revision 1 was the inclusion of radiological information.

Revision 0 and Revision 1 of this report were prepared as part of the Department's response to Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-2, *Conformance with Safety Standards at DOE Low-Level Nuclear Waste and Disposal Sites*. The DNFSB closed Recommendation 94-2 on December 22, 1999. The Department believes this analysis is a good planning tool and will revise and reissue this report as necessary.

1.1 Summary of Report Sections

Chapter 1.0 discusses the history of the Department's LLW disposal operations, the radiological assessment process, the recently issued *Record of Decision for the Department of Energy's Waste Management Program: Treatment and Disposal of Low-Level Waste and Mixed Low-Level Waste* (issued February 25, 2000), and the data sources and assumptions used for this Report. Chapter 2.0 discusses the projected volumetric content and capacity of DOE LLW and MLLW disposal facilities. Commercial disposal of DOE LLW and MLLW is also discussed. Chapter 2.0 also includes a new section discussing radioactive material with the potential to be declared waste in the future. Chapter 3.0 discusses the projected radiological content and capacity of DOE LLW and MLLW disposal facilities for key radionuclides, and describes the methodology used to assess radiological capacity. In both Chapters 2.0 and 3.0, alternative scenarios for disposal of waste for which a disposal site has not yet been selected are discussed and the resulting projected volumetric and radiological effects on various facilities' capacities are discussed. Chapter 4.0 provides the summary and conclusions.

Appendix A provides a description of the Department's LLW and MLLW disposal facilities considered in this Report and scaling factor determinations for groundwater pathway radionuclide concentration limits. Appendix B provides results from analyses of disposal facility radiological capacity. Appendix C provides a discussion of the key radionuclides and the Department processes that generate them. Appendix D provides summaries of the methods used to determine radioactivity projected to be disposed at various facilities. Appendix E provides definitions and references.

1.2 History of Past DOE Low-Level Waste Disposal Operations

Initially, the Department's predecessor, the Atomic Energy Commission (AEC), operated the only facilities for disposal of both commercial and defense programs' LLW. When commercial LLW disposal facilities began to operate, the AEC shipped waste to these facilities to encourage and sustain their development. After the closure of several commercial disposal facilities in 1979, the Department issued a policy statement directive requiring all DOE field offices to stop disposing of LLW at commercial facilities ("Redirection of DOE Contractor Waste Formerly Sent to Commercial Burial Sites," November 19, 1979, U.S. Department of Energy) and directed all its sites to dispose of LLW within the DOE complex. DOE sites unable to dispose of their waste in on-site disposal facilities negotiated with other DOE field offices and arranged to ship LLW to other DOE sites. The policy statement also required the Naval Reactors Program to redirect LLW shipments to Savannah River Site (SRS), directed other defense wastes to Los Alamos National Laboratory (LANL) and Nevada Test Site (NTS), and specified that wastes generated at non-defense facilities were to be sent to Hanford Site and Idaho National Engineering and Environmental Laboratory (INEEL).

These initial programmatic and mission considerations, rather than facility-specific performance factors, were the primary influences on the waste management disposal configuration. NTS and LANL were used for disposal of DOE defense-generated waste because of their historical defense program affiliations. Because of its reactor testing and other nuclear research missions, INEEL was used as the disposal site for research-generated LLW. Hanford Site was used as an alternate disposal site to INEEL and a disposal facility for west coast Naval Reactors Program waste. SRS was used to receive Naval Reactors program LLW and non-tritium contaminated LLW generated at Mound Plant. Oak Ridge Reservation (ORR) disposed of some wastes from other Oak Ridge Operations sites (e.g., Paducah and Portsmouth) and a few other sites in the southern region of the country.

Over time, increasingly strict disposal site waste acceptance criteria and state involvement required INEEL, LANL, and ORR to stop accepting off-site LLW for disposal. Prior to issuance of the *Department of Energy Final Waste Management Programmatic Environmental Impact Statement* (WM PEIS) Record of Decision (ROD), five Naval Reactors Program facilities were approved generators at SRS, 15 DOE and Department of Defense generators were approved for disposal at NTS, and Hanford Site had approved 26 generators for disposal.

1.3 Current Status of the Low-Level and Mixed Low-Level Waste Disposal Configuration

The Department analyzed options regarding LLW and MLLW treatment and disposal and issued the WM PEIS on May 30, 1997 according to the National Environmental Policy Act. The WM PEIS preferred alternatives for both LLW and MLLW disposal were the same: to select two or three regional disposal sites from six candidate DOE sites -- Hanford, INEEL, LANL, NTS, ORR, and SRS.

The Department notified the public of its preferred sites for disposal of LLW and MLLW in a *Federal Register* Notice (64 FR 69241) on December 10, 1999. The Department issued the ROD for LLW and MLLW disposal on February 18, 2000 (65 FR 10061, February 25, 2000). The Department decisions for disposal of LLW and MLLW were the preferred alternatives announced in the December 1999 *Federal Register* Notice. For LLW disposal, the Department specified regional disposal at the Hanford Site and NTS, with continued on-site disposal, to the extent practicable, at INEEL, LANL, ORR, and SRS. INEEL and SRS also will continue to dispose of LLW generated by the Naval Reactors Program. For MLLW disposal, the Department specified regional disposal at the Hanford Site and NTS. The Department may also continue to use commercial disposal facilities, consistent with Radioactive Waste Management Order 435.1 and current DOE policy.

Since the WM PEIS ROD was issued after DOE initiated the FY 2000 update of its Integrated Planning, Accountability, and Budgeting System (IPABS) Stream Disposition Data (SDD), the site projections recorded in the June 26, 2000 SDD and this version of the Capacity Report do not reflect the WM PEIS ROD. All generator sites now have access to LLW and MLLW disposal facilities at both Hanford and NTS, but the data still largely reflect the pre-ROD disposal configuration (the one exception being the designation of NTS as the LLW disposal location for ORR waste). For example, no generator site has designated Hanford or NTS as a disposal site for MLLW. Future updates of IPABS and the SDD are expected to result in a different disposal configuration as wastes without an identified disposal destination are assigned to disposal facilities and as some generator sites elect to begin sending their wastes to another disposal facility.

Currently, the Department disposes of operations-generated LLW at six sites: Hanford, INEEL, LANL, NTS, ORR, and SRS. The Department also continues to ship LLW to commercial disposal facilities.

Information contained in the June 26, 2000, version of IPABS reports the Department plans to close the LLW disposal facilities at INEEL and at ORR (located at the Oak Ridge National Laboratory) by 2009 and 2005, respectively. Recent changes in planning assumptions indicate the closure dates for the INEEL and ORNL disposal facilities may be revised to 2020 and 2009, respectively. These changes are expected to be reported in future updates of IPABS. Figure 1-1 illustrates the Department's current LLW and MLLW disposal configuration.

Figure 1-1. Current Configuration for Department Low-Level and Mixed Low-Level Waste Disposal

Notes: 1. Three licensed commercial disposal facilities currently exist; Barnwell in South Carolina, Envirocare in Utah, and U.S. Ecology in Washington state. Historically, the Department has primarily disposed of waste at the Envirocare facility in Utah. Other commercial facilities will be considered as they become available.

While both NTS and Hanford have existing MLLW disposal facilities operating under interim status with Resource Conservation and Recovery Act (RCRA) Part A permits, neither can currently dispose of off-site generated MLLW. NTS has a restriction in its existing Part A permit that restricts the site from disposing of off-site MLLW until it receives its Part B permit. NTS is expected to begin disposing of off-site MLLW once the site completes modifications to its facility, develops new processes and procedures, and receives a final RCRA Part B permit from the State of Nevada. Hanford is expected to begin disposing of off-site MLLW, pending the outcome of the ROD from its ongoing *Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement*. The Hanford facility does not require any upgrades, and Hanford does not need to modify its processes or procedures to begin disposing of off-site MLLW.

The Environmental Restoration Disposal Facility (ERDF) at Hanford and the On-Site Disposal Facility (OSDF) at Fernald are currently operational and have disposed of waste for nearly three years. The Department has also approved the construction and operation of the Environmental Management Waste Management Facility (EMWMF), a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) disposal cell, at ORR. These three facilities are designed and authorized to accept LLW and MLLW generated from certain on-site remediation and decommissioning activities (within facility waste acceptance criteria).

The Department has proposed to build a LLW and MLLW CERCLA disposal facility and a CERCLA remediation unit at INEEL. The decisions to begin construction of the INEEL CERCLA Disposal Facility (ICDF) and INEEL Remediation Unit are still pending.

Table 1-1 is a tabulation of the disposal facilities evaluated in this Report. The facility acronyms or short names listed will be used throughout the rest of this Report.

1.4 Methodology for Base Case and Alternative Scenarios Analyses

This Report presents two types of capacity comparisons, a Base Case and a series of Alternative Scenarios. For purposes of this analysis, LLW and MLLW projected to be disposed in existing or approved DOE disposal facilities is included in the Base Case. The Base Case analyses compare the volumetric and radiological capacity of each disposal facility with the volumes and radionuclide inventories projected for disposal at those facilities.

The Alternative Scenarios include all LLW and MLLW included in the Base Case as well as additional waste identified as alternative-scenario waste. Alternative-scenario waste includes two types of waste: waste from environmental restoration activities projected to be disposed in planned facilities (in particular, this includes waste destined for the planned CERCLA disposal facility and remediation unit at INEEL) and waste for which the disposal facility is identified as *to be determined*. Chapter 2 presents a more detailed discussion of which wastes are defined as alternative-scenario waste.

Table 1-1. Disposal Facility Names and Acronyms/Short Names

Site	Facility Name	Facility Acronym or Short Name
Fernald	On-Site Disposal Facility	OSDF
Hanford	200 Area Burial Grounds	(Same as facility name)
	Mixed Waste Trenches 31 and 34	(Same as facility name)
	Environmental Restoration Disposal Facility	ERDF
INEEL	Radioactive Waste Management Complex	RWMC
	INEEL CERCLA Disposal Facility	ICDF
	INEEL CERCLA Remediation Unit	CERCLA Remediation Unit
LANL	TA-54 Area G	(Same as facility name)
NTS	Areas 3 and 5 Radioactive Waste Management Site	Areas 3 and 5 RWMS
	Area 5 Mixed Waste Disposal Unit	(Same as facility name)
ORR	Solid Waste Storage Area 6 Interim Waste Management Facility	IWMF
	Environmental Management Waste Management Facility	EMWMF
SRS	E-Area Low Activity Waste Vaults	LAW Vaults
	E-Area Intermediate Level Waste Vaults	ILW Vaults
	E-Area Trenches	(Same as facility name)
	E-Area Pad	(Same as facility name)

In order to assess the potential impact of disposal of the alternative-scenario waste on the existing DOE LLW and MLLW disposal configuration, a series of alternative scenarios was developed. In the alternative scenarios, the alternative-scenario waste is added to the waste projected to be disposed at selected facilities. For the purposes of this analysis, the alternative-scenario LLW and MLLW were assumed to be disposed at Hanford and NTS, as a form of sensitivity analysis and for information in future decision making. The other waste operations disposal facilities were not considered in the alternative scenarios because these facilities were not specified as regional disposal facilities in the WM PEIS ROD. The alternative-scenario waste will ultimately be disposed of in one of the two regional LLW facilities, one of the two regional MLLW facilities, the planned CERCLA disposal cell or remediation unit, or a commercial facility. The process for deciding where to dispose of the alternative-scenario LLW and MLLW is not within the scope of this Report.

For the purposes of this Report, analyses of radiological capacity required the assessment of the actual dimensions, or footprint, of the disposal facilities (see Appendix A). A considerable portion of the current and planned disposal capacity was known to be available, but was not sufficiently designed to identify the footprint. In these cases, conservative assumptions were made to identify the probable footprint, which may result in lower projected capacities than may actually be available in the future when detailed design of the facilities is completed. Some differences in the volumetric capacity numbers between Report revisions have also resulted due to evolution of planning and design activities at the sites.

1.5 Radiological Assessments

Each DOE LLW and MLLW disposal facility has its own infrastructure, management structure, and waste acceptance criteria to meet site-specific disposal requirements. DOE Order 435.1, *Radioactive Waste Management*, requires rigorous characterization of LLW and the development of radiological performance assessments for each LLW disposal facility. The performance assessment process analyzes facility characteristics to demonstrate that disposal operations will not exceed radiological performance objectives for protection of the public and the environment. These performance objectives are delineated in terms of potential dose, and consider potential disposal facility releases and the doses that could result from inadvertent intrusion into the facility after institutional controls have ended. The scope of performance assessments includes any LLW disposed after 1988, although some DOE disposal facilities have included some wastes disposed of before 1988 . Similarly, the radiological analyses in this Report do not include pre-1988 disposed LLW unless the wastes were included in the facility performance assessment (although some pre-1988 disposed LLW is included in the Report's *volumetric* analyses). Furthermore, this Report does not analyze LLW disposal facilities no longer in operation (i.e., have no current or planned capacity).

Performance assessments are a systematic analysis of the potential radiological doses posed by waste management systems to the public and the environment, and a comparison of those radiological doses with established performance objectives and dose limits. Information from performance assessments is important to establishing the disposal facility operating parameters (e.g., waste acceptance criteria) which ensure operation within established performance objectives. However, many of the DOE sites that have disposal facilities also have additional radiological sources that may potentially impact the public. In Recommendation 94-2, the DNFSB noted that "low-level waste radiological performance assessments do not account for other source terms that potentially add to the dose projected for the low-level waste disposal facilities." In response, DOE committed to perform site-specific composite analyses at these disposal facility sites to assess the potential public dose due to on-site radiological sources that interact with the LLW disposal facility. Composite analyses consider all significant radiological sources in the assessment of potential doses to the public, including LLW disposed of before and after 1988, and other sources of radiological contamination at a site. The composite analysis preparation and review process was standardized through the development of format and content guidance, and development and use of approval criteria.

Performance assessments and composite analyses are reviewed by the Low-Level Waste Disposal Facility Federal Review Group (LFRG). The LFRG prepares a compliance evaluation and forwards a recommendation to the Deputy Assistant Secretaries for Environmental Management. Upon approval of a facility's performance assessment and composite analysis, the LFRG prepares a compliance evaluation. The cognizant Deputy Assistant Secretary issues the facility a Disposal Authorization Statement. Disposal Authorization Statements usually have conditions of acceptance the disposal facilities must meet in order to maintain their disposal authorization. Disposal authorization statements have now been issued to all disposal facilities.

On-site disposal cells are constructed for disposal of wastes from site clean-up activities under CERCLA authority. Under Departmental policy and under the Department's clean-up authorities, these on-site disposal cells demonstrate protection of workers, the public, and the environment through analyses and risk assessments required under CERCLA that are equivalent to preparing a radiological performance assessment.

1.6 Data Sources for Waste Disposal Volumes, Waste Radiological Profiles, and Disposal Facility Capacities

Information developed for Revision 1 was used for historical (1988-1997) disposal volumes and radiological profiles. Disposal volumes for recent disposal operations (1998-1999) and projected disposal (2000-2070) were obtained from the June 26, 2000, IPABS SDD database. Radionuclide data were obtained preferentially from SDD when provided by the sites. When radionuclide concentration data were not available from SDD, waste stream radionuclide data were developed from discussions and correspondence with subject matter experts at LLW and MLLW disposal facilities and stream profiles previously developed for the 1998 Revision 1 Capacity Report.

Disposal facility volumetric and radiological capacity information was developed from performance assessments, RCRA documentation, CERCLA records of decision, performance evaluations, and waste acceptance criteria. These sources were supplemented with information provided by subject matter experts at the disposal facilities. Table 1-2 summarizes the data sources for the Report. Appendix D provides a summary of how radioactivity profiles were determined from the available data. Also, resultant data were reviewed for consistency against the body of Department LLW-related reports, including the Integrated Data Base Report and the WM PEIS.

Table 1-2. Data Sources

Data Types	Data Sources [a]
Disposal Volumes	- *1988-1997 Disposed Volumes* - 1998 Revision 1 Capacity Report, Performance Assessments, Integrated Data Base Report - *1998-1999 Disposed Volumes* - June 26, 2000, version of Stream Disposition Data - *2000+ Projected Volumes* - June 26, 2000, version of Stream Disposition Data
Radiological Profile	- *1988-1997 Disposed Volumes* - 1998 Revision 1 Capacity Report, Performance Assessments - *1998-1999 Disposed Volumes* - June 26, 2000, version of Stream Disposition Data, Performance Assessments, 1998 Revision 1 Capacity Report - *2000+ Projected Volumes* - June 26, 2000, version of Stream Disposition Data, Performance Assessments, 1998 Revision 1 Capacity Report
Disposal Capacity	- *Radiological* - Performance Evaluations, Performance Assessments, Waste Acceptance Criteria - *Volumetric* - Performance Assessments, RCRA permits, CERCLA Records of Decision

[a] Data from these sources was supplemented by information provided by disposal facility subject matter experts.

1.7 Assumptions

The assumptions for the projected volumes and radiological profiles used in these analyses are a function of the various databases used for this Report and bound the scope of the analyses. These assumptions are discussed below:

- The base case analysis is developed from the current disposal configuration described in Section 1.3. However, the disposition of a number of existing and anticipated waste streams is not finalized and in some cases may have changed since the data for this Report was compiled. In order to assess the potential impact of these unassigned waste streams, alternative scenarios were developed. A radiological source term was developed for the alternative scenarios by compiling the volumetric and radiological profile information associated with DOE LLW and MLLW streams currently not assigned to an existing or approved disposal facility. The potential impact of this waste on various disposal sites is then analyzed. This process is detailed in Chapters 2.0 and 3.0, and the results are summarized in Chapter 4.0.

- The current scope (as defined by IPABS SDD) of the Department's cleanup program will not change significantly. Other nuclear materials with the potential to be declared waste in the future are discussed qualitatively in Section 2.8.

- Federal environmental regulations (e.g., CERCLA) will not change in a manner that significantly increases or decreases cleanup volumes (e.g., a de minimis standard will not be established that would significantly affect waste generation projections).

- Land use designations assumed by site personnel projecting LLW and MLLW volumes and schedules will not change significantly.

- Current technologies are employed in cleanup activities.

- The current configuration of LLW and MLLW management for the *base case* - treatment, storage, and disposal - will continue until program completion.

- This report reflects site assumptions, as defined in IPABS, about waste generation volumes and future missions.

- No pre-1988 CERCLA buried LLW will be retrieved; nor will LLW and MLLW in closed disposal facilities be retrieved.

- LLW and MLLW volumes generated in the deactivation of surplus contaminated facilities will be transferred to the Environmental Management program for eventual disposal.

- The radionuclides identified in Appendix C are sufficient to evaluate the potential radiological impact to the public. Other radionuclides present in DOE LLW and MLLW (e.g., short-lived radionuclides) will not contribute significantly to potential long-term radiological impact.

- The current and planned Department LLW and MLLW disposal facilities are those listed in Appendix A. The Report only considers those disposal facilities currently accepting LLW or MLLW or currently expected to accept LLW or MLLW before 2070. The radiological capacity used by pre-1988 disposed LLW, or by closed disposal facilities, is not included in the assessment of available radiological capacity. The impact on capacity from such LLW, as well as other sources of radiological impacts, has been assessed through the Composite Analysis process.

- The groundwater pathway, atmospheric pathway, and intruder scenarios as described in the *Performance Evaluation of the Technical Capabilities of DOE Sites for Disposal of Mixed Low-Level Waste* (published in March 1996, and referred to as the "Performance Evaluation" in this Report), are the potential pathways through which radionuclides from LLW and MLLW disposal facilities could impact the public.

- Radionuclide transport mechanisms, intake fractions, and dose conversion factors assumed in the Performance Evaluation conservatively estimate the potential radiological impact.

- Radiological performance analyses were calculated for a minimum 1,000-year period, consistent with DOE guidance for time of compliance in DOE LLW disposal facility radiological performance assessments.

2.0 VOLUMETRIC PROJECTIONS AND CAPACITY

This chapter presents a volumetric analysis of Department of Energy (DOE or the Department) low-level waste (LLW) and mixed low-level waste (MLLW) disposal capacity. The analysis compares the volumetric capacity of DOE disposal facilities with the quantities of waste previously and projected to be disposed.

The Department estimates that approximately 10.1 million m^3 of LLW will require disposal by DOE from 2000 through 2070. This includes approximately 8.8 million m^3 of LLW to be disposed in DOE facilities, 1.0 million m^3 to be disposed in commercial facilities, and 280,000 m^3 for which the disposal destination has not yet been determined (this waste is referred to as *"to be determined"* or "TBD" LLW in this analysis). The 8.8 million m^3 destined for DOE facilities is composed of 1.2 million m^3 of LLW destined for eight existing/approved waste operations facilities, 7.5 million m^3 destined for three existing/approved environmental restoration CERCLA cells, and 170,000 m^3 destined for one planned environmental restoration CERCLA cell and one planned environmental restoration CERCLA remediation unit.[1] Table 2-1 summarizes the categories of facilities and the quantities of LLW destined for each. Information on these waste volumes and their corresponding projected dispositions is presented in the following subsections.

Table 2-1. Projected LLW and MLLW Disposal by Destination

Facility Type	Projected Disposal (2000-2070, cubic meters) [a]		
	LLW	MLLW	Totals [b]
DOE Waste Operations	1,200,000	63,000	1,200,000
DOE Existing/Approved Environmental Restoration CERCLA	7,500,000	200,000	7,700,000
DOE Planned Environmental Restoration CERCLA	170,000	37,000	200,000
To Be Determined	280,000	5,100	280,000
Commercial	1,000,000	150,000	1,200,000
Totals [b]	**10,100,000**	**450,000**	**10,600,000**

[a] LLW and MLLW volumes destined for other specialized disposal facilities are not included in these figures.
[b] Because of rounding, some totals may not equal the sum of their components.

[1] Waste operations facilities are not limited by non-DOE regulation as to what DOE LLW and MLLW they may receive with respect to the waste origin. Environmental restoration CERCLA disposal facilities are limited by federal regulation to acceptance of LLW and MLLW generated from designated on-site environmental restoration activities.

In addition, DOE projects that an additional 5,100 m^3 of LLW and 610,000 m^3 of low activity waste resulting from high-level waste processing will be disposed of in facilities designed specifically for these wastes. Because these additional wastes are projected to be disposed of in specialized facilities, they are not included in the capacity analysis.

In addition to the LLW discussed above, DOE estimates that a total of 450,000 m^3 of MLLW volume will require disposal by DOE between 2000 and 2070. This includes 300,000 m^3 to be disposed at DOE facilities; 150,000 m^3 to be disposed in commercial facilities, and 5,100 m^3 of *to be determined* MLLW waste. The 300,000 m^3 destined for six DOE disposal facilities and includes 63,000 m^3 of MLLW destined for two existing/approved waste operations facilities, 200,000 m^3 destined for two existing/approved environmental restoration CERCLA facilities, and 37,000 m^3 destined for one planned environmental restoration CERCLA facility. Table 2-1 summarizes the categories of facilities and the quantities of MLLW destined for each.

This chapter compares the Department's currently available and projected LLW and MLLW volumetric disposal capacity with the volume of waste projected to require disposal. Section 2.1 identifies the sources of the data and methodology used in the comparison. Section 2.2 presents a brief overview of the generator waste volume projections. Sections 2.3 and 2.4 present, respectively, the LLW and MLLW volumes projected to be disposed at each DOE facility and at commercial facilities. Section 2.5 presents the Department's Base Case comparison of the volume of LLW and MLLW projected to be disposed at each facility with the available volumetric capacity of the facility. Sections 2.6 and 2.7 present alternative scenarios for disposing of waste categorized as *to be determined* or destined for some of the Department's planned facilities. Section 2.8 describes some additional materials that have been associated with LLW but have not been included in this analysis.

This is the second revision of this analysis. DOE issued Revision 0 on July 30, 1996, and Revision 1 on September 18, 1998. The Department's LLW and MLLW disposal projections and facility capacities are generally consistent with the previous revisions of the report. However, the following four changes are the most significant differences between the volumetric capacity analyses in this revision and Revision 1:

- One CERCLA environmental restoration facility previously identified as a planned facility in the Revision 1 report is now identified as an existing/approved facility. The Department issued the Decision for this facility, the Environmental Management Waste Management Facility (EMWMF) at Oak Ridge Reservation, on November 1, 1999 (see *Record of Decision for the Disposal of Oak Ridge Reservation CERCLA Waste* (DOE/OR/01-1791&D3)).

- The projected quantities of LLW specified in this report differ from previous reports. In comparison to the Revision 1 report, the overall projected quantity of LLW disposed between 2000 and 2070 has increased from 8.1 to 10.1 million m^3. The major changes in LLW disposal are increases in the volumes destined for environmental restoration CERCLA facilities (1.9 million m^3 increase) and commercial facilities (500,000 m^3 increase), and a 380,000 m^3 decrease in the volume destined for waste operations facilities.

- The projected quantities of MLLW specified in this report differ from previous reports. In comparison to the Revision 1 report, the overall projected quantity of MLLW disposed between 2000 and 2070 has decreased from 710,000 to 450,000 m^3. The major changes in MLLW disposal are a 130,000 m^3 decrease in the volume destined for planned environmental restoration CERCLA facilities, a 160,000 m^3 decrease in the volume categorized as *to be determined*, and a 71,000 m^3 increase in the volume destined for commercial facilities.

- The volumetric capacities of two disposal facilities have been significantly revised in comparison to the Revision 1 report. The capacity of the LANL TA-54 Area G waste operations disposal facility increased in capacity from 225,000 to 1.6 million m^3 due to a planned expansion of that facility, and the capacity of the Hanford Environmental Restoration Disposal Facility was revised from 3.9 to 21.4 million m^3, which is the maximum theoretical capacity of that facility.

2.1 Volumetric Capacity Analysis Methodology

To assess the adequacy of the Department's LLW and MLLW volumetric disposal capacity, the volume of waste disposed to date and projected for disposal at each facility was compared to the facility's total volumetric capacity. The overall methodology used in this report is the same as that used in the Revision 1 report, but updated to the year 2000. The comparison involved the three general categories of data: past waste disposal volumes, projected future waste disposal volumes, and facility disposal capacity.

2.1.1 Past Waste Disposal Volume Data

This data includes waste volumes disposed in currently operating facilities prior to 2000. For volumes disposed prior to 1998, data were compiled from facility radiological performance assessments and historical revisions of the DOE Integrated Database Report. Data for the 1998-1999 period were compiled from the Department's Stream Disposition Database (SDD, version date June 26, 2000), discussed below, which is part of the Department's publicly accessible Central Internet Database (CID, http://cid.em.doe.gov/).[2]

2.1.2 Projected Future Waste Disposal Volume Data

Waste volume projections are based on data DOE compiled in the first half of 2000 in support of the Department's annual strategic planning and budgeting efforts using the SDD. These data identify each LLW and MLLW stream projected to be generated or currently in inventory, the inventory volume, the projected generation and disposal volumes between 2000 and 2070, the

[2] DOE has also released 1998-1999 disposal volume performance metrics in its quarterly management reports. Some of the volumes cited in the SDD differ from those in the management reports. Data from the SDD was used because it is more detailed and was collected specifically to support this analysis.

waste type (either LLW or MLLW), and the disposal facility that the generator expects will be used. For the purpose of this analysis, the Office of Environmental Management uses 2070 as the life-cycle end date of the program. In cases where the generator site has not identified a final disposition or disposal facility, the disposition or destination facility of the waste is identified in the database as *to be determined*.

The waste streams included in this analysis are those meeting the following three criteria in the database. The first criterion is that the LLW or MLLW stream is destined for land disposal or does not have an identified disposition (*to be determined*). This criterion excludes waste that will be treated and subsequently result in a secondary waste stream, although the disposal-bound secondary stream will be included. The second criterion is that either the waste stream is reported by a DOE disposal site (this ensures that the projected disposal volume has been identified by the generator to the disposal site) or that the stream is identified by generators as destined for an unspecified site or unidentified DOE site (this excludes waste destined for commercial disposal sites). As part of the analysis, waste streams reported by generators were compared with those reported by disposal sites. This comparison verified that the generator and disposer waste volume data were reasonably consistent. The third criterion was to eliminate waste streams that fell into special categories (discussed in Section 2.8) or were mis-reported.[3]

The information on projected waste volumes presented in this analysis reflect the program planning, data collection, and analysis efforts that were already ongoing when the Department issued the Waste Management Programmatic Environmental Impact Statement (WM PEIS) Record of Decision (ROD) for treatment and disposal of LLW and MLLW on February 25, 2000 (see Federal Register, Volume 65, page 10061). The information reflects pre-ROD planning, data, and analysis. As DOE continues to implement the ROD and DOE proceeds with other waste management planning decisions, site planning baselines are expected to change. Future analyses are expected to reflect these changes.

2.1.3 Facility Disposal Capacity Data

The volumetric disposal capacity of each facility was based on data from several sources, including facility radiological performance assessments, environmental impact statements, and other planning and analysis documents. The analysis included only currently operating and planned facilities (i.e., closed facilities were excluded from the analysis). Within each facility, each of which may include numerous individual disposal units (e.g., pits and trenches), only the units in operation on or after September 1988 were included in the analysis. DOE is using September 1988 as a cutoff point for this analysis because that is the date when the Department instituted its existing program for development of radiological performance assessments for radioactive waste disposal facilities. This program is set forth in DOE Order 435.1 Radioactive Waste Management (issued July 9, 1999; previously numbered as Order 5820.2a). The volume of past disposed waste, discussed above, was calculated to include only the post-September 1988

[3] Mis-reported streams include wastes that should not be categorized as LLW. Mis-reported streams in the SDD include, for example, non-radioactive solid waste disposed at the Paducah Gaseous Diffusion Plant and 11e(2) material disposed at the Grand Junction Cheney disposal facility.

units because they are the ones included in each facility's radiological performance assessment. More detailed information on how the volumetric disposal capacity of each facility was determined is presented in Section 2.5 and Appendix A.

2.2 Projected Volumetric Disposal Needs

This section summarizes the total volumes of the Department's LLW and MLLW projected to require disposal from 2000 through 2070. LLW and MLLW requiring disposal is generated by a number of Department programs. For the purpose of this Report, DOE has distinguished between waste generated by environmental restoration activities and all other activities. The primary reason for this distinction is that environmental restoration activities generate the largest volume of LLW and MLLW in comparison to other activities and environmental restoration wastes generally contain lower levels of radiological contamination in comparison to wastes from other sources. Additionally, the majority of the Department's environmental restoration LLW and MLLW are managed on-site in facilities developed exclusively for environmental restoration wastes.

2.2.1 Projections from Activities Other Than Environmental Restoration

Thirty-two DOE sites have been identified as generators of LLW and MLLW. These wastes are generated by several DOE programs, including the Environmental Management; Defense; Science; and Nuclear Energy, Science and Technology. In addition, the Department is responsible for LLW and MLLW generated by the Office of Naval Reactors, a joint DOE-U.S. Navy program. DOE generator sites are shown in Figure 1-1.

For generators of LLW, Table 2-2 presents the LLW volume projections by generator site for wastes produced by non-environmental restoration activities and identifies the projected disposal option. These options include disposal at DOE or commercial disposal sites. In cases where DOE has not projected a disposal option, the waste volumes have been categorized as "to be determined." These waste volumes represent the projected LLW disposal needs from 2000 through 2070. For MLLW, Table 2-3 presents similar data for waste generators and disposal options.

Table 2-2. Projected LLW Disposal Volumes by Generator Site (2000-2070, cubic meters) [a]

Generator Site	Envir. Restoration [b]	Other Activities [b]	Total [c]	Projected Disposal: Disposal Facility [c,d]	Projected Disposal: Facility Type [c]
Ames Laboratory		120	120	Hanford 200 Area Burial Grounds (130,000 m^3)	Waste Operations Disposal Facilities (1,200,000 m^3)
Argonne National Laboratory - East	1,600	11,000	13,000		
Bettis Atomic Power Lab		1,500	1,500		
Brookhaven National Laboratory	2,200	6,800	9,000		
Columbus Environmental Management Project - West Jefferson	2,800		2,800		
Energy Technology Engineering Center	1,500		1,500		
Fermi National Accelerator Laboratory		1,800	1,800		
Hanford Site	340	91,000	92,000		
Knolls Atomic Power Lab-Schenectady		690	690		
Laboratory for Energy-Related Health Research		11	11		
Lawrence Berkeley National Laboratory		270	270		
Massachusetts Institute of Technology [e]		11	11		
Paducah Gaseous Diffusion Plant		320	320		
Parks Township [e]		2,800	2,800		
Portsmouth Gaseous Diffusion Plant		290	290		
Princeton Plasma Physics Laboratory		2,300	2,300		
Stanford Linear Accelerator Center		790	790		
Idaho National Engineering and Environmental Laboratory [f]	10,000	9,800	20,000	INEEL RWMC (20,000 m^3)	
Los Alamos National Laboratory	34,000	88,000	120,000	LANL TA-54 Area G (120,000 m^3)	
Ashtabula Environmental Management Project	40	380	420	NTS Areas 3 & 5 RWMS (780,000 m^3)	
Energy Technology Engineering Center	270		270		
Fernald Environmental Management Project	64,000		64,000		
Inhalation Toxicology Research Institute		2,200	2,200		
Kansas City Plant		24	24		
Lawrence Livermore National Laboratory - Main Site		14,000	14,000		
Miamisburg Environmental Management Project	18,000		18,000		
Nevada Test Site	120,000	560	120,000		
Oak Ridge Reservation	360	400,000	400,000		
Pantex Plant	190	54	250		
Rocky Flats Environmental Technology Site	150,000	11,000	160,000		
Sandia National Laboratory - New Mexico	600	2,700	3,300		
Oak Ridge Reservation		1,800	1,800	ORR IWMF (1,800 m^3)	
Savannah River Site		38,000	38,000	SRS LAW Vaults (38,000 m^3)	
Savannah River Site		5,100	5,100	SRS ILW Vaults (5,100 m^3)	
Savannah River Site		63,000	63,000	SRS E-Area Trenches (63,000 m^3)	
Fernald Environmental Management Project [g]	1,600,000		1,600,000	Fernald OSDF (1,600,000 m^3)	Existing/Approved Environmental Restoration CERCLA Facilities (7,500,000 m^3)
Hanford Site	5,000,000		5,000,000	Hanford ERDF (5,000,000 m^3)	
Oak Ridge Reservation	890,000		890,000	ORR EMWMF (890,000 m^3)	
Idaho National Engineering and Environmental Laboratory	76,000		76,000	INEEL ICDF (76,000 m^3)	Planned Environmental Restoration CERCLA Facilities (170,000 m^3)
Idaho National Engineering and Environmental Laboratory	90,000		90,000	INEEL Remediation Unit (90,000 m^3)	

Table 2-2. Projected LLW Disposal Volumes by Generator Site (2000-2070, cubic meters) [a] (Continued)

Generator Site	Envir. Restoration [b]	Other Activities [b]	Total [c]	Projected Disposal: Disposal Facility [c,d]	Projected Disposal: Facility Type [c]
Brookhaven National Laboratory	8,000		8,000	To Be Determined (280,000 m^3)	
General Electric Vallecitos Nuclear Center	20		20		
Idaho National Engineering and Environmental Laboratory	760	69,000	70,000		
Laboratory for Energy-Related Health Research	5		5		
Los Alamos National Laboratory		27	27		
Oak Ridge Reservation	26,000	20	26,000		
Portsmouth Gaseous Diffusion Plant		6,900	6,900		
Princeton Plasma Physics Laboratory		700	700		
Savannah River Site	6,100		6,100		
Separations Process Research Unit	8,200		8,200		
West Valley Demonstration Project		150,000	150,000		
Ames Laboratory		100	100	Commercial Disposal (1,000,000 m^3)	
Argonne National Laboratory - East		5,000	5,000		
Ashtabula Environmental Management Project	5,500		5,500		
Brookhaven National Laboratory	39,000	4,500	43,000		
Columbus Environmental Management Project - West Jefferson	9,500		9,500		
Energy Technology Engineering Center	15,000		15,000		
Fernald Environmental Management Project	500,000		500,000		
Grand Junction Office	70		70		
Laboratory for Energy-Related Health Research	3,200	140	3,400		
Lawrence Berkeley National Laboratory	220	2,200	2,400		
Lawrence Livermore National Laboratory - Main Site		160	160		
Miamisburg Environmental Management Project	72,000		72,000		
Oak Ridge Reservation	110,000	75,000	190,000		
Paducah Gaseous Diffusion Plant	100,000	6,500	110,000		
Portsmouth Gaseous Diffusion Plant	110	11,000	11,000		
Princeton Plasma Physics Laboratory		51	51		
Rocky Flats Environmental Technology Site		110	110		
Sandia National Laboratory - New Mexico	1,500		1,500		
Savannah River Site	30,000	14,000	43,000		
West Valley Demonstration Project		5,700	5,700		
Totals [c]	**9,000,000**	**1,100,000**	**10,100,000**		

[a] Volume projections and disposal facility designations are based on the June 26, 2000, *Integrated Planning, Accountability, and Budgeting System Stream Disposition Data* (IPABS SDD). Some projections do not represent final decisions and will require further assessment under the National Environmental Policy Act. These data and the subsequent volumetric analysis do not include LLW resulting from treatment of high-level waste, which is discussed in Section 2.8.1, other excluded waste and materials discussed in Section 2.8, and disposition projections not documented in the June 26, 2000, IPABS SDD. It is expected that the responsible DOE sites will document these disposition projections in future versions of the IPABS SDD.

[b] Volumes have been rounded to two significant figures. The volumes of waste attributed to environmental restoration in this table differ from the corresponding volumes identified in DOE's Central Internet Database, which served as the primary data source for this analysis. The volumes cited here reflect an analysis of how the "parent" waste streams were originally generated prior to treatment, off-site shipment, or co-mingling with other waste streams.

[c] Because of rounding, some totals may not equal the sum of their components.

[d] See Table 1-1 for full facility names. Facility names have been shortened in this table to improve data presentation.

[e] Massachusetts Institute of Technology and Parks Township are not DOE sites.

[f] INEEL RWMC disposal volumes include LLW from the Argonne National Laboratory - West, which is contiguous to INEEL.

[g] For the Fernald OSDF, the 2000-2070 projected volume of 1.6 million m^3 differs from the 1.9 million m^3 volume reported in the CID. The 1.6 million m^3 volume reflects the projected compacted waste volume in the OSDF, while the 1.9 million m^3 volume reflects the uncompacted volume prior to disposal.

Table 2-3. Projected MLLW Disposal Volumes by Generator Site (2000-2070, cubic meters) [a]

Generator Site	Envir. Restoration [b]	Other Activities [b]	Total [c]	Projected Disposal	
				Disposal Facility [c]	Facility Type [c]
Hanford Site	340	62,000	63,000	Hanford Site Mixed Waste Trenches 31 & 34 (63,000 m^3)	Waste Operations Disposal Facilities (63,000 m^3)
Nevada Test Site		0.3	0.3	NTS Area 5 Mixed Waste Disposal Unit (0.3 m^3)	
Fernald Environmental Management Project	90		90	Fernald OSDF (90 m^3)	Existing/Approved Environmental Restoration CERCLA Facilities (200,000 m^3)
Oak Ridge Reservation	200,000		200,000	ORR EMWMF (200,000 m^3)	
Idaho National Engineering and Environmental Laboratory	37,000		37,000	INEEL ICDF (37,000 m^3)	Planned Environmental Restoration CERCLA Facilities (37,000 m^3)
Columbus Environmental Management Project - West Jefferson	3		3	To Be Determined (5,100 m^3)	
Energy Technology Engineering Center	2		2		
Fernald Environmental Management Project	20		20		
Grand Junction Office	<1		<1		
Hanford Site		1	1		
Idaho National Engineering and Environmental Laboratory		3	3		
Laboratory for Energy-Related Health Research	<1		<1		
Lawrence Berkeley National Laboratory		<1	<1		
Los Alamos National Engineering Laboratory		8	8		
Nevada Test Site		<1	<1		
Oak Ridge Reservation	94		94		
Portsmouth Gaseous Diffusion Plant		1,200	1,200		
Sandia National Laboratory - New Mexico		19	19		
Savannah River Site		3,700	3,700		
Separations Process Research Unit	70		70		

Table 2-3. Projected MLLW Disposal Volumes by Generator Site (2000-2070, cubic meters) [a] (Continued)

Generator Site	Envir. Restoration [b]	Other Activities [b]	Total [c]	Projected Disposal	
				Disposal Facility [c]	Facility Type [c]
Ames Laboratory		1	1	Commercial Disposal (150,000 m^3)	
Argonne National Laboratory - East	180	390	560		
Argonne National Laboratory - West		3	3		
Ashtabula Environmental Management Project	50		50		
Brookhaven National Laboratory	120	340	460		
Columbus Environmental Management Project - West Jefferson	11		11		
Energy Technology Engineering Center	1,400		1,400		
Fernald Environmental Management Project	4,700		4,700		
General Atomics		1	1		
Grand Junction Office	2		2		
Idaho National Engineering and Environmental Laboratory	20	2,400	2,400		
Inhalation Toxicology Research Institute		71	71		
Laboratory for Energy-Related Health Research		1	1		
Lawrence Berkeley National Laboratory		110	110		
Lawrence Livermore National Laboratory - Main Site		140	140		
Los Alamos National Engineering Laboratory	2,400	2,500	4,800		
Miamisburg Environmental Management Project		<1	<1		
Oak Ridge Reservation	940	52,000	53,000		
Paducah Gaseous Diffusion Plant	23,000	5,100	28,000		
Portsmouth Gaseous Diffusion Plant	970	9,100	10,000		
Rocky Flats Environmental Technology Site	35,000	3,800	39,000		
Sandia National Laboratory - New Mexico	3,300	930	4,200		
Totals [c]	**310,000**	**140,000**	**450,000**		

[a] See Table 1-1 for full facility names. Facility names have been shortened in this table to improve data presentation. Volume projections and disposal facility designations are based on the June 26, 2000 *Integrated Planning, Accountability, and Budgeting System Stream Disposition Data* (IPABS SDD). Some projections do not represent final decisions and will require further assessment under the National Environmental Policy Act. These data and the subsequent volumetric analysis do not include waste and materials discussed in Section 2.8 and disposition projections not documented in the June 26, 2000, IPABS SDD. It is expected that the responsible DOE sites will document these disposition projections in future versions of the IPABS SDD.
[b] The volumes of waste attributed to environmental restoration in this table differ from the corresponding volumes identified in DOE's Central Internet Database, which served as the primary data source for this analysis. The volumes cited here reflect an analysis of how the "parent" waste streams were originally generated prior to treatment, off-site shipment, or co-mingling with other waste streams.
[c] Because of rounding, some totals may not equal the sum of their components.

2.2.2 Environmental Restoration Generation Projections

DOE environmental restoration activities generate larger volumes of LLW and MLLW than any other DOE activities. Waste-generating environmental restoration activities include assessment, remediation, and facility decommissioning. Across the complex, environmental restoration activities are projected to generate a total of 35 million m^3 of LLW media and 2.5 million m^3 of MLLW media, excluding large volume wastewater, groundwater, and surface water media. Estimates of media volumes refer to "in-place" volumes of contaminated soil, previously disposed materials, buildings, and other in-place materials. These in-place volumes reflect DOE's current understanding of contaminated media and facilities, and these volumes may increase or decrease in the future as site characterization activities continue. At each site, the volume of LLW or MLLW, if any, that will be generated and eventually disposed will depend on the specific response strategies and methodologies used. These response strategies and methodologies will be developed by the Department through discussions with Federal and State regulators. The general response strategies used by the Department range from "no further action" to removal of all contaminated media for disposal in an engineered facility.

Tables 2-4 and 2-5 present the estimated media volumes expected to be managed in place (in-situ) and waste volumes expected to be generated by environmental restoration activities at each site (excluding large volume wastewater, groundwater, and surface water media). For the environmental restoration waste generated at each site, Tables 2-4 and 2-5 each show five different disposition pathways, including DOE treatment or processing prior to disposal, direct disposal in DOE CERCLA facilities, direct disposal in DOE waste operations facilities, transfer to commercial facilities, or *to be determined*.

The volumes of material presented in Tables 2-4 and 2-5 are related to, but often different from, those shown in Tables 2-2 and 2-3. Tables 2-2 and 2-3 reflect final disposition volumes for newly generated and existing inventories of waste, and Tables 2-4 and 2-5 reflect initial disposition strategies of newly generated environmental restoration waste. These quantities can differ whenever the waste undergoes processing or treatment or there is already an existing inventory of waste. For environmental restoration wastes that are treated prior to disposal, Tables 2-2 and 2-3 include post-treatment volumes going to disposal, while Tables 2-4 and 2-5 include pre-treatment volumes. For some generators, waste volumes in Tables 2-2 and 2-3 are the same as those in Tables 2-4 and 2-5 because the waste goes directly from initial generation to final disposition without treatment and there are no existing inventories. For other generators, the volumes in the tables differ for the reasons outlined above.

Of the 35 million m^3 of LLW media shown in Table 2-4, 9.0 million m^3 of LLW is projected to be generated through ex-situ response strategies. Similarly, of the 2.5 million m^3 of MLLW media shown in Table 2-5, 280,000 m^3 of MLLW is projected to be generated through ex-situ response strategies.

Table 2-4. LLW Media from Environmental Restoration Activities (cubic meters) [a]

Site	Solid LLW Media Volume Managed In-Situ	Volume of Solid LLW Generated from Environmental Responses (2000-2070)						Totals [d]
		Treatment or Processing in DOE Facilities	Disposal in DOE CERCLA Cells	Disposal in DOE Waste Operations Facilities	Transfer to Commercial Facilities [b]	Disposition to be Determined [c]	Total Ex-Situ Volume Generated	
Argonne National Laboratory - East				1,200			1,200	**1,200**
Argonne National Laboratory - West	14,000	3		110			110	**14,000**
Ashtabula Environmental Management Project		23,000		420	200		24,000	**24,000**
Brookhaven National Laboratory				1,100	36,000		37,000	**37,000**
Columbus Environmental Management Project				1,000	11,000		12,000	**12,000**
Energy Technology Engineering Center				2,300	13,000		15,000	**15,000**
Fernald Environmental Management Project		450,000	1,800,000	20,000	43,000		2,400,000	**2,400,000**
General Electric Vallecitos Nuclear Center						20	20	**20**
Grand Junction Office					5		5	**5**
Hanford Site	20,000,000		5,000,000				5,000,000	**25,000,000**
Idaho National Engineering and Environmental Laboratory	400,000	53,000	76,000	3		10	130,000	**530,000**
Laboratory for Energy-Related Health Research		1,900					1,900	**1,900**
Lawrence Berkeley National Laboratory					220		220	**220**
Los Alamos National Laboratory	290,000			34,000			34,000	**330,000**
Miamisburg Environmental Management Project				18,000	72,000		90,000	**90,000**
Nevada Test Site	2,100,000	110,000		8,500			120,000	**2,200,000**
Oak Ridge Reservation	1,600,000	190,000	700,000	460	110,000	40,000	1,000,000	**2,700,000**
Paducah Gaseous Diffusion Plant					5,700		5,700	**5,700**
Pantex Plant				1			1	**1**
Portsmouth Gaseous Diffusion Plant					110		110	**110**
Sandia National Laboratories - New Mexico				330	1,500		1,800	**1,800**
Savannah River Site	1,400,000				52,000		52,000	**1,400,000**
Separations Process Research Unit						7,800	7,800	**7,800**
Totals [d]	**26,000,000**	**830,000**	**7,700,000**	**88,000**	**350,000**	**48,000**	**9,000,000**	**35,000,000**

[a] Data compiled from DOE IPABS/SDD June 26, 2000, data set. Volumes exclude large-volume liquids categorized as wastewater, groundwater, or surface water. Volumes shown as being disposed in DOE CERCLA and DOE waste operations facilities are a subset of the corresponding environmental restoration LLW volumes shown in Table 2-2. When comparing these categories, volume differences occur where either there is already an existing inventory of LLW or some LLW is to be processed in DOE facilities prior to disposal (third column from left in this table). The processing can change the waste volume.

[b] Transfer to Commercial Facilities category includes commercial treatment, disposal, and recycle.

[c] To Be Determined category includes volumes for which the management location (i.e., DOE or commercial) is not yet determined.

[d] Because of rounding, some totals may not equal the sum of their components.

Table 2-5. MLLW Media from Environmental Restoration Activities (cubic meters) [a]

Site	Solid MLLW Media Volume Managed In-Situ	Volume of MLLW Generated from Environmental Responses (2000-2070)						Totals [d]
		Treatment or Processing in DOE Facilities	Disposal in DOE CERCLA Cells	Disposal in DOE Waste Operations Facilities	Transfer to Commercial Facilities [b]	Disposition to be Determined [c]	Total Ex-Situ Volume Generated	
Argonne National Laboratory - East					160	11	170	**170**
Argonne National Laboratory - West	150							**150**
Ashtabula Environmental Management Project		1,600			50		1,600	**1,600**
Brookhaven National Laboratory					110		110	**110**
Columbus Environmental Management Project		5			11		16	**16**
Energy Technology Engineering Center					1,300		1,300	**1,300**
Fernald Environmental Management Project		25			7,800			**7,900**
Grand Junction Office					<1	<1	<1	**<1**
Hanford Site		51	260				310	**310**
Idaho National Engineering and Environmental Laboratory	730,000	120	37,000			77	37,000	**770,000**
Los Alamos National Laboratory	30,000				2,400		2,400	**32,000**
Nevada Test Site	13,000	50					50	**14,000**
Oak Ridge Reservation	1,400,000	110,000	86,000		110	250	200,000	**1,600,000**
Paducah Gaseous Diffusion Plant	3,000				23,000		23,000	**26,000**
Portsmouth Gaseous Diffusion Plant	27				970		970	**1,000**
Sandia National Laboratories - NM	2,800				3,300		3,300	**6,100**
Savannah River Site	25,000							**25,000**
Separations Process Research Unit						50	50	**50**
Totals [d]	**2,200,000**	**110,000**	**120,000**		**39,000**	**410**	**280,000**	**2,500,000**

[a] Data compiled from DOE IPABS/SDD June 26, 2000, data set. Volumes exclude large-volume liquids categorized as wastewater, groundwater, and surface water. Volumes shown here as being disposed in DOE CERCLA and DOE waste operations facilities are a subset of the corresponding environmental restoration MLLW volumes shown in Table 2-3. When comparing these categories, volume differences occur where either there is already an existing inventory of waste or some waste is to be processed in DOE facilities prior to disposal (third column from left in this table). The processing can change both the waste volume and the waste type.
[b] Transfer to Commercial Facilities category includes commercial treatment, disposal, and recycle.
[c] To Be Determined category includes volumes for which the management location (i.e., DOE or commercial) is not yet determined.
[d] Because of rounding, some totals may not equal the sum of their components.

2.3 LLW Disposal Volumes

This section presents a summary of the projected volume of the Department's LLW by disposal site. The Department estimates that a total of approximately 10.1 million m^3 of LLW will require disposal by DOE from 2000 through 2070. This includes approximately 8.8 million m^3 of LLW to be disposed in 13 DOE facilities at 7 DOE sites (of which 1.2 million m^3 is to be disposed in 8 waste operations facilities, 7.5 million m^3 is to be disposed in 3 existing/approved CERCLA facilities, and 170,000 m^3 is to be disposed in 2 planned CERCLA facilities), 1.0 million m^3 to be disposed in commercial facilities, and 280,000 m^3 for which the disposal destination has not yet been determined (this waste is categorized as "*to be determined*" or "TBD" LLW in this analysis).

2.3.1 Waste Operations Disposal Facilities

The Department projects that 1.2 million m^3 of LLW will require disposal at eight waste operations disposal facilities between 2000 and 2070. An additional 280,000 m^3 of LLW will require disposal at a *to be determined* disposal facility. *To be determined* LLW could be disposed at either DOE waste operations or commercial (non-DOE) disposal facilities, but it cannot be disposed in DOE CERCLA facilities due to regulatory restrictions. *To be determined* LLW is discussed further in Section 2.6.

Table 2-6 presents a summary of waste operations disposal sites and the LLW volumes corresponding to each site. These volumes include past disposal (pre-1988 and 1988 to 1999) and projected future disposal from 2000 through 2070. The future disposal includes waste from both environmental restoration and non-environmental restoration related activities. Appendix D lists the specific LLW streams destined for disposal in these facilities. This data is used in Section 2.5 in the evaluation of the capacity of the disposal facilities to receive the projected waste.

In comparison to the Revision 1 report, there have been several changes in DOE's LLW disposal at waste operations facilities. First, the overall quantity of waste projected to be disposed at these facilities has decreased by 100,000 m^3, half of which can be attributed to the quantity of waste disposed during the interval between this report and the Revision 1 report. The other half results from changes in how waste is generated and managed. The projected volume of environmental restoration LLW disposed in waste operations facilities has increased by 120,000 m^3, and the volume of LLW from other activities has decreased by 220,000 m^3. Projected volumes have increased at NTS and ORR, and have decreased at Hanford, INEEL, LANL, and SRS. Finally, the quantity of LLW in the *to be determined* category has decreased from 330,000 to 280,000 m^3.

Table 2-6. Past and Projected LLW Volumes Destined for Disposal (cubic meters)

Disposal Facility	Past Disposal [a,b]		Projected 2000-2070 [b]		Life-Cycle Totals [c]
	Pre-1988	1988-1999	Envir. Restor.	Other Activities	
WASTE OPERATIONS FACILITIES					
Hanford 200 Area Burial Grounds	130,000	120,000	8,400	120,000	380,000
INEEL RWMC	13,000	18,000	10,000	9,800	51,000
LANL TA-54 Area G	150,000	46,000	34,000	88,000	320,000
NTS Areas 3 and 5 RWMS [d]	0	360,000	350,000	430,000	1,100,000
ORR IWMF	0	3,700	0	1,800	5,400
SRS LAW Vaults	0	10,000	0	38,000	48,000
SRS ILW Vaults	0	1,800	0	5,100	6,900
SRS E-Area Trenches [e]	0	1,400	0	63,000	64,000
Subtotal Waste Operations Facilities [c]	**290,000**	**560,000**	**400,000**	**760,000**	**2,000,000**
EXISTING/APPROVED ENVIRONMENTAL RESTORATION CERCLA FACILITIES [f]					
Fernald OSDF [g]	0	290,000	1,600,000	0	1,900,000
Hanford ERDF [f]	0	800,000	5,000,000	0	5,800,000
ORR EMWMF	0	0	890,000	0	890,000
Subtotal Existing/Approved CERCLA Facilities [c]	**0**	**1,100,000**	**7,500,000**	**0**	**8,600,000**
PLANNED ENVIRONMENTAL RESTORATION CERCLA FACILITIES [e]					
INEEL ICDF [h]	N/A	N/A	76,000	0	76,000
INEEL Remediation Unit [f]	N/A	N/A	90,000	0	90,000
Subtotal Planned Environmental Restoration CERCLA Facilities [c]	**N/A**	**N/A**	**170,000**	**0**	**170,000**
OTHER LLW					
To Be Determined	N/A	N/A	49,000	230,000	280,000
Commercial	N/A	N/A	890,000	120,000	1,000,000
TOTAL LLW [c]	**2,000,000**		**10,100,000**		**12,000,000**

[a] The past disposal values reflect disposal only in units in operation during or after 1995. It does not consider waste disposed at other units closed prior to 1995.
[b] The individual waste streams contributing to the projected (2000-2070) and recent past (1998-1999) disposal are listed in Appendix D.
[c] Because of rounding, some totals may not equal the sum of their components.
[d] For the NTS Areas 3 and 5 RWMS, all pre-2000 LLW is reported here in the 1988 to 1999 category. This volume includes some waste disposed of before 1988. The reported volume of pre-2000 NTS disposed waste includes 8,300 m^3 of MLLW disposed of in Area 5 Pit 3.
[e] The Savannah River Site E-Area Trenches were identified as Slit Trenches in the Revision 1 report.
[f] The Hanford ERDF and INEEL Remediation Unit only accept LLW. The other environmental restoration CERCLA facilities except for the accept both LLW and MLLW. The volumes shown here include only LLW.
[g] For the Fernald OSDF, the 2000-2070 projected volume of 1.6 million m^3 differs from the 1.9 million m^3 volume reported in the CID. The 1.6 million m^3 volume reflects the projected compacted waste volume in the OSDF, while the 1.9 million m^3 volume reflects the uncompacted volume prior to disposal.
[h] The INEEL ICDF was identified as the INEEL CERCLA Soil Debris Consolidation Unit in the 1998 Revision 1 Report.

2.3.2 Environmental Restoration CERCLA Facilities

The Department projects that five environmental restoration facilities will receive 7.7 million m^3 of LLW between 2000 and 2070. The status of each facility and the quantities of LLW projected to be disposed are presented in Table 2-6. Appendix D lists the specific LLW streams destined for disposal in these facilities. Four of the five facilities also are projected to receive an additional volume (240,000 m^3) of MLLW (see Section 2.4).

As indicated in Table 2-6, three facilities are existing/approved and two facilities are planned. Because of the uncertainty associated with decisions and development of the two planned disposal facilities identified in Table 2-6, the volumes of LLW destined for them are included in the Alternative Scenario analysis of volumetric disposal capacity presented in Section 2.6.

2.3.3 Disposal in Commercial Disposal Facilities

The Department estimates that approximately 1.0 million m^3 of LLW will be disposed in commercial (non-DOE) facilities from 2000 to 2070. This volume is twice that projected in the 1998 Revision 1 report. The current projection includes 890,000 m^3 of waste from the environmental restoration activities and 120,000 m^3 of waste from other activities and programs. In addition, a portion of the 280,000 m^3 of *to be determined* LLW may also be disposed at commercial sites. Evaluation of commercial disposal site capacity is outside the scope of this Report, which does not address whether adequate commercial disposal capacity will be available.

2.4 MLLW Disposal Volumes

This section presents a summary of the projected volume of Department's MLLW by disposal site. DOE estimates that a total of 450,000 m^3 of MLLW volume will require disposal by DOE from 2000 through 2070. This includes 63,000 m^3 to be disposed at two waste operations disposal facilities; 240,000 m^3 to be disposed in either existing/approved (200,000 m^3) or planned (37,000 m^3) environmental restoration disposal facilities, 150,000 m^3 to be disposed at commercial disposal facilities; and 5,100 m^3 of MLLW in the *to be determined* category.

2.4.1 Waste Operations Disposal Facilities

The Department projects that approximately 63,000 m^3 of MLLW will require disposal at waste operations disposal facilities between 2000 and 2070. Table 2-7 presents a summary of the two waste operations disposal facilities–located at Hanford Site and NTS–and the MLLW volumes corresponding to each site. These volumes include past disposal (pre-2000) and projected future disposal from 2000 through 2070.

Table 2-7. Past and Projected MLLW Volumes Destined for Disposal (in cubic meters)

Disposal Facility (Site)	Past Disposal (Pre-2000)	Projected 2000 to 2070		Totals [a]
		Envir. Restor.	Other Activities	
WASTE OPERATIONS FACILITIES				
Hanford Mixed Waste Trenches 31 and 34 [b]	180	340	63,000	63,000
NTS Area 5 Mixed Waste Disposal Unit [c]	0	0	0.3	0.3
Subtotal Waste Operations Facilities [a]	**180**	**340**	**63,000**	**63,000**
EXISTING/APPROVED ENVIRONMENTAL RESTORATION CERCLA FACILITIES				
Fernald OSDF	0	90	0	90
ORR EMWMF	0	200,000	0	200,000
Subtotal Existing/Approved Environmental Restoration CERCLA Facilities [a]	**0**	**200,000**	**0**	**200,000**
PLANNED ENVIRONMENTAL RESTORATION CERCLA FACILITIES				
INEEL ICDF [d]	N/A	37,000	0	37,000
Subtotal Planned Environmental Restoration CERCLA Facilities [a]	**N/A**	**37,000**	**0**	**37,000**
OTHER MLLW				
To Be Determined	N/A	190	4,900	5,100
Commercial	N/A	72,000	77,000	150,000
TOTAL MLLW [a]	**180**	**310,000**	**140,000**	**450,000**

[a] Because of rounding, some totals may not equal the sum of their components.
[b] Nearly all of the MLLW destined for the Hanford Mixed Waste Trenches 31 and 34 is generated on-site.
[c] The indicated volume of past disposal at NTS does not include past MLLW disposal in the Area 3 U-3ax/bl disposal site, which is filled and is awaiting closure, and 8,300 m^3 of MLLW disposed in Area 5 Pit 3 prior to 2000. The MLLW volume previously disposed in Area 5 Pit 3 is accounted for in the past-disposed LLW volume for Areas 3 and 5 RWMS (Table 2-6) because it affects the remaining available disposal capacity of that facility.
[d] The INEEL ICDF was identified as the INEEL CERCLA Soil Debris Consolidation Unit in the 1998 Revision 1 report.

Neither of DOE's MLLW disposal facilities currently accepts waste generated from off-site. However, these facilities may accept off-site MLLW in the future in accordance with DOE's February 2000 WM PEIS ROD for LLW and MLLW treatment and disposal, which identifies both sites as regional MLLW disposal sites. NTS has a restriction in its existing Resource Conservation and Recovery Act (RCRA) Part A permit that restricts the site from disposing of off-site MLLW until it receives its Part B permit. NTS is expected to begin disposing of off-site MLLW in December 2001 once the site completes modifications to its facility, develops new processes and procedures, and receives a final RCRA Part B permit from the State of Nevada. Hanford is expected to begin disposing of off-site MLLW in September 2001 once the site completes and issues a ROD from their ongoing Solid Waste Environmental Impact Statement. The Hanford facility does not require any upgrades, and Hanford does not need to modify any processes or procedures to begin disposing of off-site MLLW.

Appendix D lists the specific MLLW streams destined for disposal in these facilities. This data will be used in Section 2.6 in the evaluation of the capacity of the disposal facilities to receive the projected waste.

The projected disposal of MLLW shown in Table 2-7 reflects projections made prior to DOE's issuance of the WM PEIS ROD in February 2000 and only includes disposal of on-site MLLW at NTS and Hanford. These projections are expected to change as DOE continues to implement the MLLW configuration in the WM PEIS ROD.

2.4.2 Environmental Restoration CERCLA Facilities

The Department projects that three environmental restoration CERCLA facilities will receive 240,000 m^3 of MLLW between 2000 and 2070. The status of each facility and the quantities of MLLW projected to be disposed are presented in Table 2-7. Appendix D lists the specific MLLW streams destined for disposal in these facilities.

2.4.3 Disposal in Commercial Disposal Facilities

The Department estimates that approximately 150,000 m^3 of MLLW will be disposed in commercial (not DOE-owned) facilities from 2000 to 2070. This volume is twice that projected in the 1998 Revision 1 report. The current projection includes 72,000 m^3 of waste from the environmental restoration activities and 77,000 m^3 of waste from other activities. In addition, a portion of the 5,100 m^3 of MLLW categorized as *to be determined* may also be disposed at commercial sites. Evaluation of commercial disposal site capacity is outside the scope of this analysis, which does not address whether adequate commercial disposal capacity will be available.

2.5 Base Case Comparison of Volumetric Projections and Disposal Capacity

This section compares the volumes of LLW and MLLW projected to be sent to each disposal facility discussed in Sections 2.3 and 2.4 with the disposal capacity of the facility. The capacity of each facility was evaluated based on a combination of factors, including facility capacity analyses outlined in DOE assessments, decision documents, and supporting studies prepared under the National Environmental Policy Act; facility-specific radiological performance assessments prepared according to DOE Orders 5820.2A and 435.1, both entitled Radioactive Waste Management; RCRA permitting and compliance documents (for MLLW only); and other documents. In addition, DOE discussed capacity issues with key facility personnel. The capacity calculations take into account the dimensions and measured capacity of existing (already constructed) units within each facility that were open during or after 1995, the available space identified for future expansion, the design or efficiency factor for the facilities, development and expansion plans, and regulatory limitations for MLLW. Table 2-8 summarizes the capacities of the Department's existing/approved LLW and MLLW disposal facilities.

Table 2-8. Volumetric Capacities of Existing/Approved DOE LLW and MLLW Disposal Facilities

Site	Disposal Facility	Capacity (cubic meters)	
		LLW	MLLW
WASTE OPERATIONS FACILITIES			
Hanford Site	200 Area Burial Grounds [a]	2,000,000	
	Mixed Waste Trenches 31 & 34 [a,b]		42,000
INEEL	RWMC	97,000	
LANL	TA-54 Area G	1,600,000	
NTS	Areas 3 and 5 RWMS	3,700,000	
	Area 5 Mixed Waste Disposal Unit		20,000
ORR	IWMF	5,400	
SRS	LAW Vaults	61,000	
	ILW Vaults	14,600	
	E-Area Trenches	170,000	
Subtotal Waste Operations Disposal Facilities [c]		**7,700,000**	**62,000**
EXISTING/APPROVED ENVIRONMENTAL RESTORATION CERCLA FACILITIES [d]			
Fernald	OSDF	1,900,000	
Hanford Site	ERDF	21,400,000	
ORR	EMWMF [e]	1,100,000	
Subtotal Existing/Approved CERCLA Disposal Facilities Capacity [c]		**24,400,000**	

[a] The Hanford Site Mixed Waste Trenches 31 & 34 and the NTS Area 5 Mixed Waste Disposal Unit both are located within the larger LLW disposal facilities at Hanford and NTS. The capacities for these MLLW facilities are not included in cited capacities of the larger LLW disposal facilities.

[b] The 20,000 m^3 capacity cited here for the NTS Mixed Waste Disposal Unit corresponds to the capacity identified in that facility's RCRA Part B permit application. There is potential for future expansion to increase capacity that would require a modification to the application and subsequent permit.

[c] Because of rounding, totals may not equal the sum of their components.

[d] For the Fernald OSDF and ORR EMWMF environmental restoration CERCLA facilities, the capacities cited here represent the combined LLW and MLLW capacity for each facility.

[e] The volumetric capacity of the ORR EMWMF has not been established. The 1.1 million m^3 volume shown here corresponds to the volume of LLW and MLLW projected to be disposed in the facility.

Table 2-9 lists DOE's planned disposal facilities, both of which are dedicated for specific waste streams. Capacity data for the planned facilities is not considered in the volumetric capacity analysis presented in this report. While development of these two facilities is part of DOE's current cleanup strategy, DOE has not completed the decision-making process required to proceed with their development and has not established capacities for these facilities. A major factor in determining their capacities will be the volume of waste which they are projected to receive. Because of the uncertainty concerning these facilities, no meaningful capacity analysis can be performed on them beyond stating that they will be designed to accommodate the waste volume they are projected to receive.

Table 2-9. Planned DOE LLW and MLLW Disposal Facilities

Site	Disposal Facility	Waste Type
INEEL	ICDF [a]	LLW and MLLW
	Remediation Unit [a]	LLW Only

[a] Both the INEEL ICDF and the INEEL Remediation Unit are planned for management of only environmental restoration waste. The capacity of the INEEL ICDF has been estimated at 390,000 m^3. The capacity of the INEEL Remediation Unit has not been established, but the facility will be designed to accommodate the volume of waste destined for it.

Section 2.5.1 of this Report presents facility-specific comparisons of waste volume to facility capacity for DOE's eight existing/approved waste operations disposal facilities for LLW. Sections 2.5.2, and 2.5.3 present similar comparisons for existing/approved waste operations disposal facilities for MLLW (two facilities), and existing/approved disposal facilities for environmental restoration waste (three facilities). For the reasons indicated above, volume-to-capacity comparisons are not presented for the two planned CERCLA facilities, the facilities dedicated for disposal of low-activity waste fraction derived from high-level waste (three facilities), and other waste (Naval Reactor waste in the SRS E-Area Pad).

2.5.1 Waste Operations LLW Disposal Facilities

2.5.1.1 Hanford Site 200 Area Burial Grounds

The Hanford Site 200 Area Burial Grounds are divided geographically into two areas; the 200-West area and the 200-East area. The two areas are further divided into smaller burial grounds. For past-disposed waste, only those units that were open during or after 1995 are considered in the following discussion about disposal capacity and disposal volumes. The facility accepts waste from both on-site and off-site generators.

The capacity at this facility is based on the standard trench design currently used at the facility. The design involves use of unlined trenches having sloped (about 45º) sides. The dimensions of the standard trench design are 20 feet (6 m) deep, 40 feet (12 m) wide at the base, 100 feet (30 m) wide at the surface. Trench lengths vary in length up to approximately 1,600 feet (500 m). The design assumes that 360 cubic feet of waste in each linear foot of trench length. Based on the standard trench design, the 200 Area Burial Grounds have a combined disposal capacity of 2.0 million m^3. The capacities of the seven individual burial grounds within the 200 Area Burial Grounds are listed in Table 2-10. An alternative design using deeper trenches and an assumed disposal efficiency of 0.5 (i.e., 2 m^3 of trench volume are consumed by each 1 m^3 of waste) in some of the burial grounds results in a larger capacity of 14.2 million m^3.

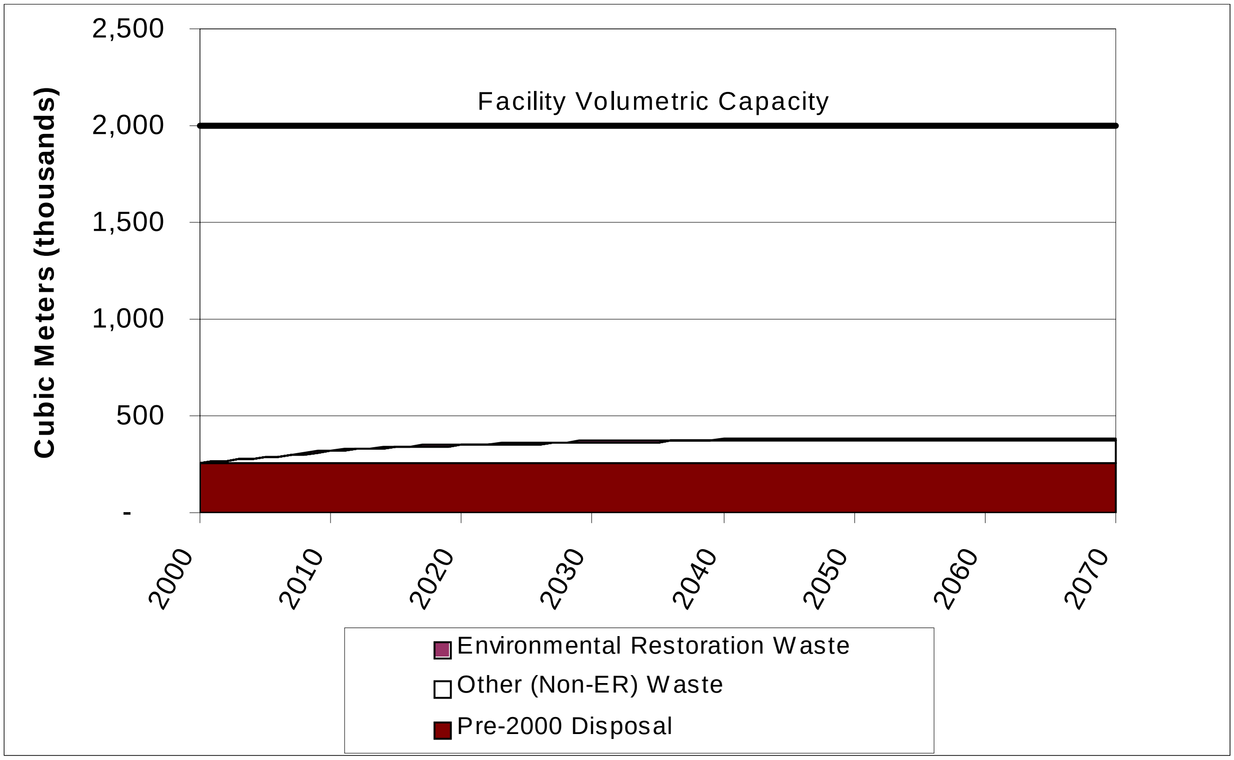
Table 2-10. Capacity of Hanford Site 200 Area Burial Grounds [a]

Area	Burial Ground	Disposal Capacity (cubic meters)	
		Standard [b]	Deep
West	218-W-3AE	72,600	110,000
	218-W-4C	110,000	110,000
	218-W-5	107,000	180,000
	218-W-5 Expansion	1,170,000	9,900,000
	218-W-6	143,000	440,000
East	218-E-10	143,000	560,000
	218-E-12B [c]	304,000	1,470,000
Totals		**2,050,000**	**14,200,000**

[a] Burial grounds 218-W-3A and 218-W-4B have not been included in the volumetric analysis because they are nearly full.
[b] The basis for the facility capacity used in this analysis is the standard trench design.
[c] The 218-E-12B burial ground capacity and the data on past and projected LLW disposal in the 200 Area Burial Grounds do not include consideration of Trench 94, which is used for disposal of de-fueled submarine reactor compartments from the U.S. Navy.

Figure 2-1 compares the volumetric capacity of the 200 Area Burial Grounds (assuming the standard trench design) against the volume of waste projected to be disposed at these facility. A total of 380,000 m^3 of LLW is projected to be disposed in this facility through 2070. This includes 250,000 m^3 of LLW disposed before 2000 and 130,000 m^3 projected to be disposed from 2000 through 2046, after which no waste is projected to be disposed. The waste volume projected for planned disposal includes approximately 8,400 m^3 from environmental restoration activities and approximately 120,000 m^3 from other generators.

Figure 2-1. Hanford Site 200 Area Burial Grounds LLW Disposal Volume Capacity and Projections [a]



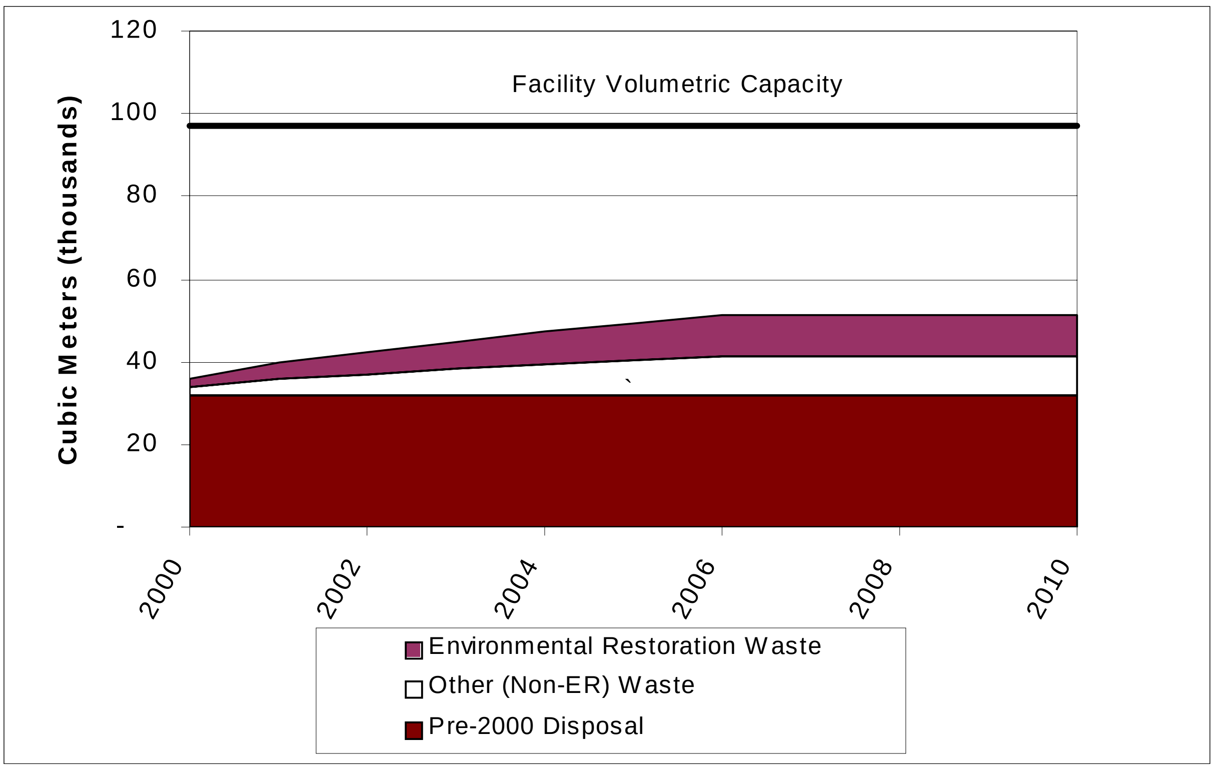
[a] The volume of environmental restoration LLW (top band) shown in Figure 2-1 is relatively small compared to the other volumes and is not readily visible in this chart.

2.5.1.2 INEEL RWMC

The RWMC accepts LLW for disposal from on-site sources and from the Naval Reactors Program at Argonne National Laboratory - West. The current data shows waste disposal occurring until 2008. However, the facility is scheduled to remain open until 2020. The facility includes a number of individual disposal units. However, the capacity analysis presented here only considers those units that remained open as of 1995: Pits 17-20 and the Concrete Vaults. The disposal capacity of these units is about 97,000 m^3.

The Department estimates that a total of 51,000 m^3 of LLW will be disposed at the this facility. This includes 31,000 m^3 disposed before 2000 and 20,000 m^3 projected to be disposed from 2000 through 2006. Approximately 10,000 m^3 of the projected waste is expected to come from environmental restoration activities and 9,800 m^3 is expected to come from other sources. Figure 2-2 illustrates the projected schedule for disposal of LLW at this facility.

Figure 2-2. INEEL RWMC
LLW Disposal Volume Capacity and Projections

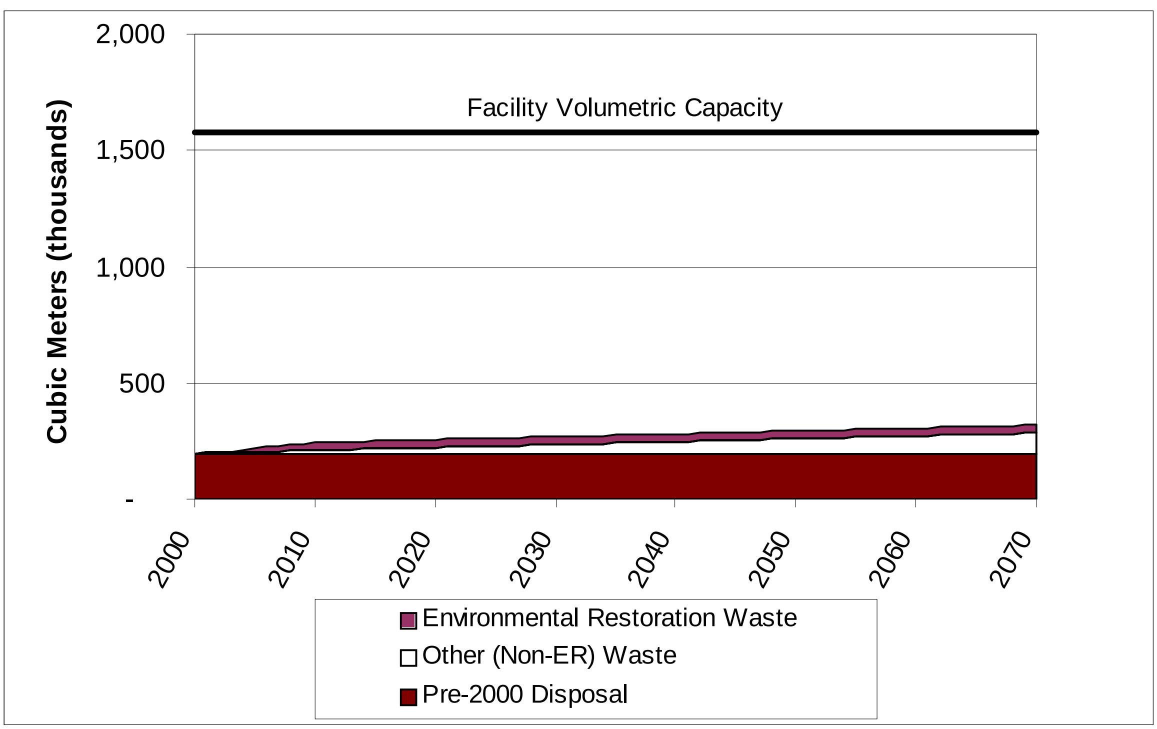


2.5.1.3 LANL TA-54 Area G

LANL TA-54 Area G accepts on-site LLW for disposal, although in special cases off-site waste has been accepted from Defense Programs sites. Within TA-54, the facility is located at Material Disposal Area G. The total capacity of this facility is 1.6 million m^3. This capacity includes 225,000 m^3 at the portion of the facility currently in use, 800,000 m^3 at a 24-acre adjacent planned expansion area in Zone 4, and 550,000 m^3 in a 17-acre adjacent planned expansion area in Zone 6. Capacities of the expansion areas are specified in the *Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EIS-0238, January 1999), Volume 2, Part I. These capacities assume a design or efficiency factor of 0.4 and a disposal depth of 20 meters. For past-disposed waste, only units that were open during or after 1995 are counted toward the facility capacity. For the currently in-use portion of the facility, units included in the capacity analysis include Pits 15, 31, 37, 38, and 39.

The Department estimates that a total of approximately 320,000 m^3 of LLW will be disposed at this facility. This includes 200,000 m^3 disposed before 2000 and 120,000 m^3 projected to be disposed from 2000 to 2070. The waste volume projected for future disposal includes 34,000 m^3 from the environmental restoration activities and 88,000 m^3 from other generators. Figure 2-3 illustrates the projected schedule for disposal of LLW at this facility.

Figure 2-3. LANL TA-54
LLW Disposal Volume Capacity and Projections



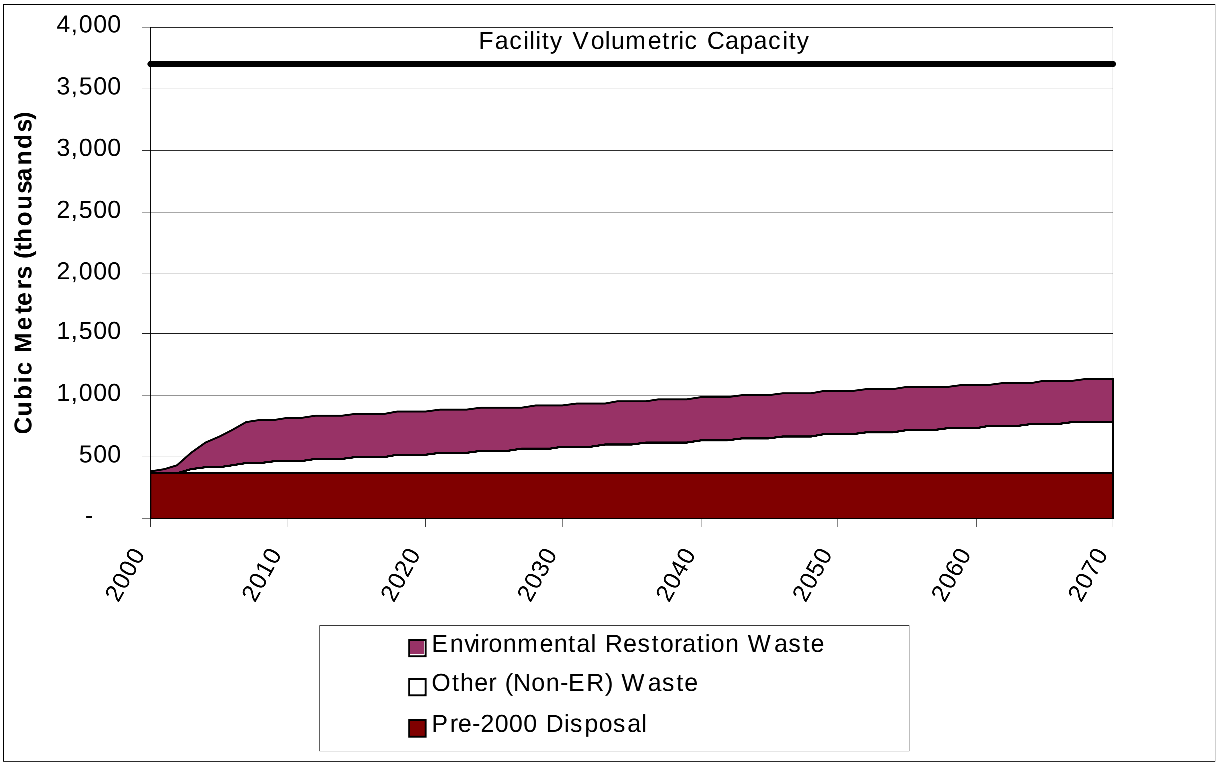
2.5.1.4 NTS Areas 3 and 5 RWMS

The LLW disposal facilities at NTS include two separate disposal facilities in Area 3 and Area 5, both of which accept on-site and off-site LLW. However, in this analysis they have been counted as a single LLW disposal facility. For past-disposed waste, only the units in these facilities that were open during or after 1995 are considered in the comparison of disposal volumes and capacity. At the Area 3 facility, LLW is disposed in cells constructed from subsidence craters formed from past underground nuclear tests. The four Area 3 cells identified for LLW disposal are those designated U3ah/at, U3bh, U3bg, and U3az. The estimated disposal capacity of these units is 710,000 m^3. At the Area 5 facility, LLW is disposed in conventional pits and trenches. The Area 5 units identified for LLW disposal are those designated Pits 3, 5, 6, and 7, and Trenches 7, 8, and 9. The estimated disposal capacity of the Area 5 units is 250,000 m^3. (The Area 5 capacity cited here does not include the 20,000 m^3 capacity of the Area 5 Mixed Waste Disposal Unit portion of Pit 3, which is discussed in Section 2.5.2.2.) In addition, undeveloped land within Area 5 provides an estimated additional disposal capacity of 2.8 million m^3. In total, Areas 3 and 5 have a combined LLW disposal capacity of 3.7 million m^3.

Beyond the 3.7 million m^3 estimated capacity of the Areas 3 and 5 RWMS, NTS has the capability of expanding operations to accommodate disposal of larger LLW volumes. Given the site conditions and performance attributes of disposal facilities at the NTS, the maximum expandable volumetric capacity is limited only by the size of the usable disposal land at the NTS. This usable area is expected to greatly exceed the volume of DOE LLW requiring disposal.

The Department estimates that a total of 1,100,000 m^3 of LLW will be disposed of at the Areas 3 and 5 RWMS within the units identified above. This volume includes 360,000 m^3 disposed before 2000 and 780,000 m^3 projected to be disposed from 2000 to 2070. The waste volume projected for future disposal includes 350,000 m^3 from environmental restoration activities and 430,000 m^3 from other generators. Figure 2-4 illustrates the projected schedule for disposal of LLW at this facility.

Figure 2-4. NTS Areas 3 and 5 RWMS
LLW Disposal Volume Capacity and Projections

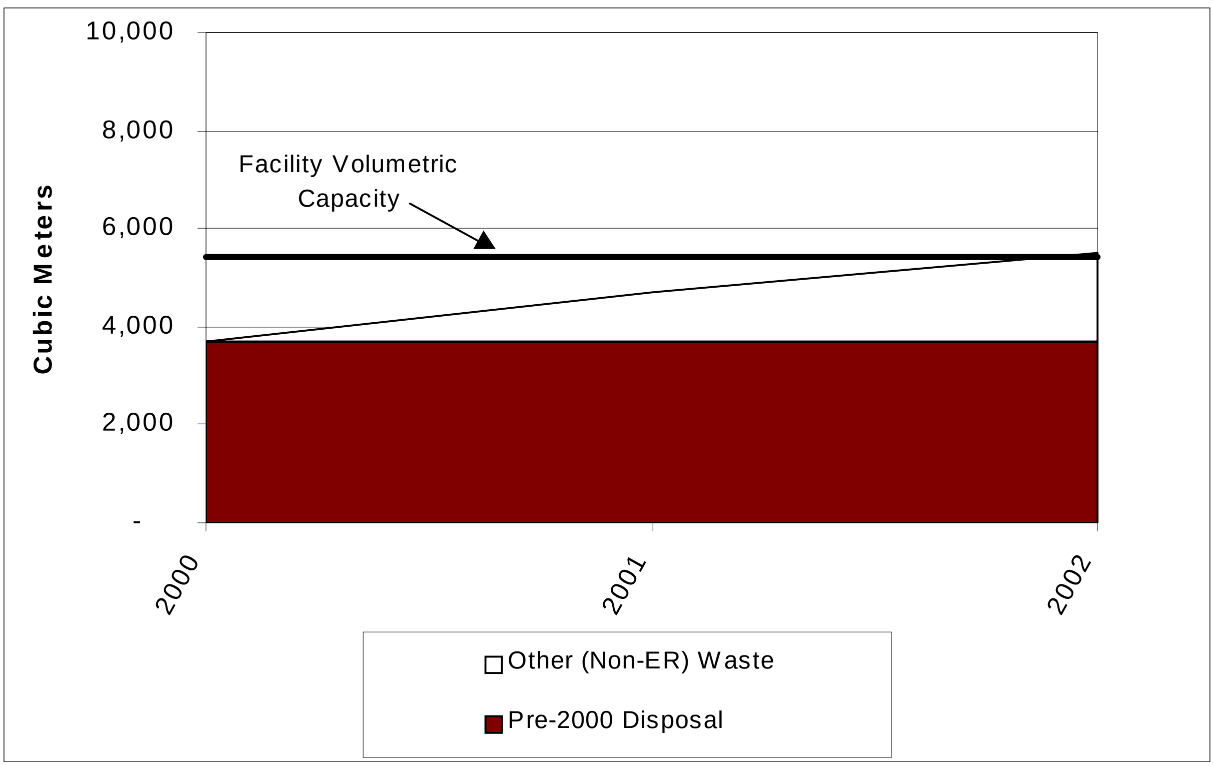


2.5.1.5 ORR IWMF

The IWMF at ORR is located within the area designated as Solid Waste Storage Area 6. The facility accepts only on-site LLW for disposal. The facility has a disposal capacity of 5,400 m^3, based on the placement of 1,980 96-cubic-foot (0.27 m^3) capacity vaults on six disposal pads (see *Performance Assessment for Continuing and Future Operations at Solid Waste Storage Area 6*, (ORNL-6783/R1), September 1997)).

The Department estimates that a total of 5,400 m^3 of LLW will be disposed in the IWMF. This includes 3,700 m^3 of LLW disposed before 2000 and 1,800 m^3 of LLW projected to be disposed between 2000 and 2002. None of the projected waste originates from environmental restoration activities. The facility will be full at this time, after which no additional disposal is projected. After the facility has been filled, LLW generated from non-environmental-restoration activities at the ORR will be directed to other facilities for disposal. Figure 2-5 illustrates the projected schedule for disposal of LLW at this facility.

Figure 2-5. ORR IWMF
LLW Disposal Volume Capacity and Projections [a]



[a] No environmental restoration waste is projected to be disposed in the ORR IWMF.

2.5.1.6 SRS Waste Operations LLW Disposal Facilities

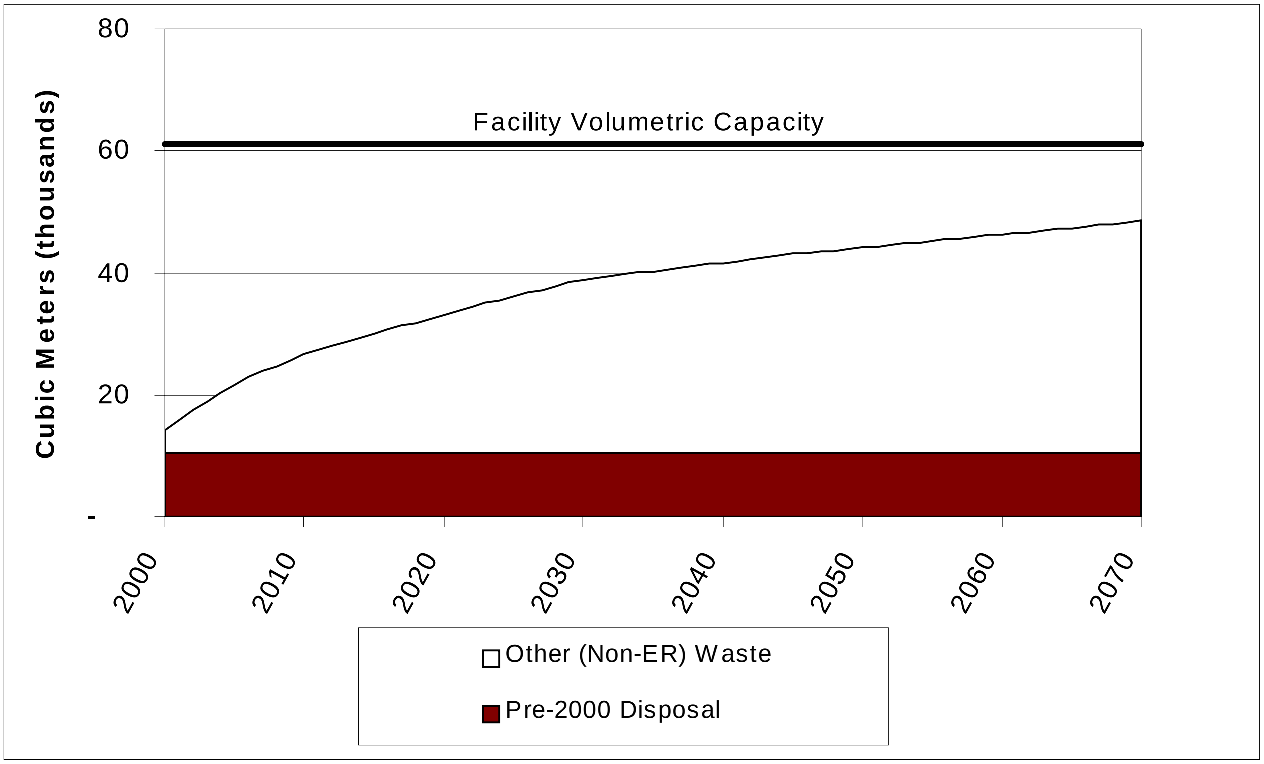
Three waste operations disposal facilities at SRS are included in this analysis: the LAW Vaults, the ILW Vaults, and the E-Area Trenches. These facilities are located within E-Area at SRS and accept primarily on-site LLW for disposal. For past-disposed LLW, only those units that were open during or after 1995 are considered in the discussion of disposal volumes and capacity. A fourth waste operations LLW disposal facility at SRS, the E-Area Pad, is dedicated for storage and disposal of specific off-site LLW from the DOE-U.S. Navy Naval Reactors Program. The E-Area Pad is discussed in Section 2.8.2 of this Report.

2.5.1.6.1 LAW Vaults

Each LAW Vault has an interior volume of 48,000 m^3 and an estimated effective capacity of 30,500 m^3. The 30,500 m^3 vault capacity is based on each vault containing 12 cells, each of which can accept of 1,000 B-25 boxes. One LAW Vault is constructed/operational, and a second is planned to be constructed as needed, providing a total capacity of 61,000 m^3. (See *Radiological Performance Assessment for the E-Area Low-Level Waste Facility* (WSRC-RP-94-218), Rev. 1, January 31, 2000.)

The Department estimates that a total of 48,000 m^3 of LLW will be disposed at the LAW Vaults. This includes 10,000 m^3 disposed before 2000 and 38,000 m^3 projected to be disposed from 2000 to 2070. All of the waste projected for future disposal at this facility originates from sources other than environmental restoration. Figure 2-6 illustrates the projected schedule for disposal of LLW at this facility.

Figure 2-6. SRS LAW Vaults
LLW Disposal Volume Capacity and Projections [a]



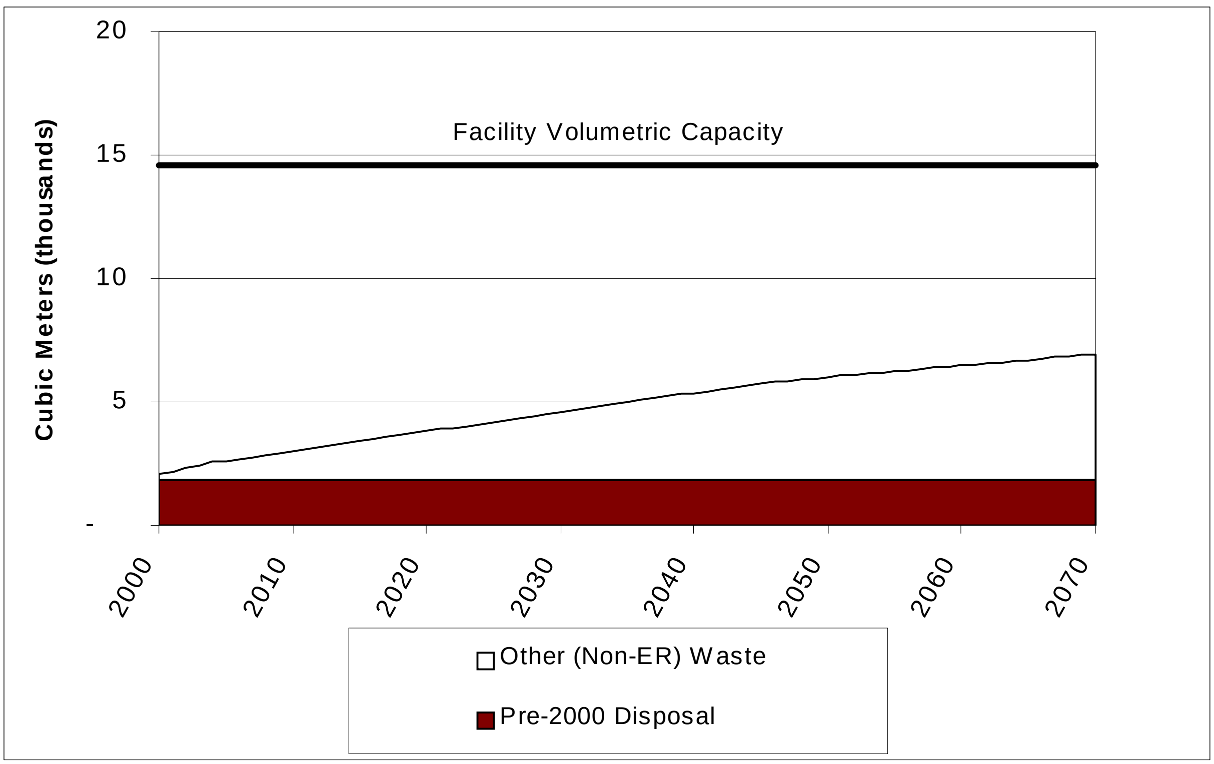
[a] No environmental restoration waste is projected to be disposed in the SRS LAW Vaults.

2.5.1.6.2 ILW Vaults

Each ILW Vault has an interior volume and effective capacity of 7,300 m^3 and is divided into two sections, a 1,600 m^3 cell for disposal of tritium-containing LLW and a 5,700 m^3 cell for disposal of non-tritium-containing LLW. One ILW Vault is constructed/operational, and a second is planned to be constructed as needed, providing a total capacity of 14,600 m^3. (See *Radiological Performance Assessment for the E-Area Low-Level Waste Facility* (WSRC-RP-94-218, Rev. 1), January 31, 2000.)

The Department estimates that a total of 6,900 m^3 of LLW will be disposed at the ILW Vaults. This includes 1,800 m^3 disposed before 2000 and 5,100 m^3 projected to be disposed from 2000 to 2070. All of the waste projected for future disposal at this facility originates from sources other than environmental restoration. Figure 2-7 illustrates the projected schedule for disposal of LLW at this facility.

Figure 2-7. SRS ILW Vault
LLW Disposal Volume Capacity and Projections [a]



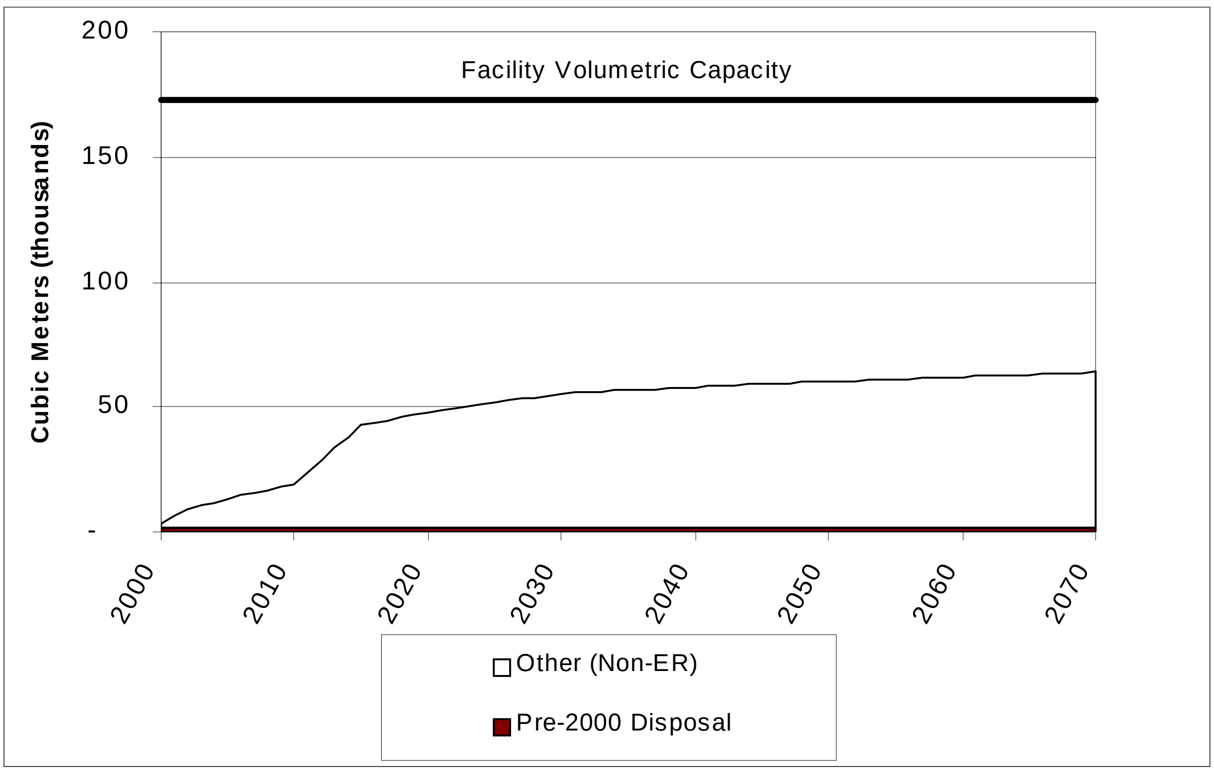
[a] No environmental restoration waste is projected to be disposed in the SRS ILW Vaults.

2.5.1.6.3 E-Area Trenches

Each E-Area trench has a volume and effective capacity of 5,760 m^3, and trenches are developed in sets of 5. Six sets of trenches with a combined disposal capacity of 170,000 m^3 are projected to be eventually constructed (See *Radiological Performance Assessment for the E-Area Low-Level Waste Facility* (WSRC-RP-94-218, Rev. 1), January 31, 2000.)

The Department estimates that a total of 64,000 m^3 of LLW will be disposed in the E-Area Trenches. This includes 1,400 m^3 disposed before 2000 and 63,000 m^3 projected to be disposed from 2000 to 2070. All of the waste projected for future disposal at this facility originates from sources other than environmental restoration. Figure 2-8 illustrates the projected schedule for disposal of LLW in the E-Area Trenches.

Figure 2-8. SRS E-Area Trenches
LLW Disposal Volume Capacity and Projections [a, b]



[a] No environmental restoration waste is projected to be disposed in the SRS E-Area Trenches.
[b] The volume of pre-2000 disposed LLW (bottom band) shown in Figure 2-8 is relatively small compared to the Other (Non-ER) volume and is not readily visible in this chart.

2.5.2 Waste Operations MLLW Disposal Facilities

2.5.2.1 Hanford Site Mixed Waste Trenches 31 and 34

This facility is a RCRA interim status facility for disposal of MLLW. This facility is located at the western end of the 218-W-5 Burial Ground in the 200 West Area and consists of two trenches (Trenches 31 and 34) with an estimated disposal capacity of 42,000 m^3.[4]

Disposal of MLLW from on-site sources, as well as one off-site source previously stored at Hanford, began at this facility in 1999. Prior to February 2000, disposal of MLLW from off-site sources had been delayed pending DOE WM PEIS ROD for DOE MLLW disposal. This decision was subsequently released on February 25, 2000 (see *Federal Register*, Volume 65, No. 38, pages 10061-10066). DOE's current projection for MLLW disposal at this facility does not reflect the WM PEIS ROD and only includes on-site MLLW. The current projection of 63,000 m^3 of MLLW includes 180 m^3 disposed in 1999 and the remainder disposed between 2000 and 2047, after which no additional disposal is projected. None of this waste is expected to come from environmental restoration activities. According to current projections, the 42,000 m^3 capacity of the facility is expected to be exceeded in 2021.

As the DOE's MLLW disposal projections are updated subsequent to the WM PEIS ROD, which call for Hanford to be a regional MLLW disposal site, off-site MLLW may be directed to the Hanford MLLW facility. Hanford is expected to begin disposing of off-site MLLW in September 2001 once the site completes and issues a ROD from their ongoing Solid Waste Environmental Impact Statement. The Hanford MLLW disposal facility does not require any upgrades, and Hanford does not need to modify any processes or procedures to begin disposing of off-site MLLW.

In addition, the volume of future MLLW from on-site generators projected for disposal at Hanford is expected to change as a result from other ongoing and future planning decisions. In particular, 17,000 m^3 MLLW failed melters (resulting from immobilization of Hanford high level waste and low-activity waste) is projected to be disposed in an expanded MLLW disposal facility in the Hanford 218-E-12B Burial Grounds.[5]

While the 42,000 m^3 capacity of this facility is not large enough for all waste expected to be received, there are four potential options for addressing this exceedance. First, it is possible that the Department's actual long-term MLLW disposal needs will be less than the current projections and current disposal capacity would be adequate. Second, some of the waste destined for this facility may be redirected to other DOE or commercial MLLW disposal facilities. Third, the 200 Area includes an area available for expansion of the facility by another 100,000 m^3. Fourth, Hanford Site includes an additional, completely unused burial ground which conceptually could accept up to 80,000 m^3 of MLLW.

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[4] The analysis of Hanford MLLW disposal capacity does not include consideration of Trench 94 in the 218-E-12B Burial Ground. This unit is used for disposal of de-fueled submarine reactor compartments from the U.S. Navy.

[5] Documentation of this volume in the SDD had not been completed by Hanford Site at the time this report was prepared. Hanford Site is expected to include this data in future versions of the SDD.

2.5.2.2 NTS Area 5 Mixed Waste Disposal Unit

The NTS Area 5 Mixed Waste Disposal Unit is a RCRA interim status facility for disposal of MLLW. This facility, also known as Pit 3, is located within the Area 5 RWMS LLW disposal facility, along the northern edge of the developed area. A Part B permit application will request a MLLW capacity of 20,000 m^3 for the Area 5 Mixed Waste Disposal Unit, and the volumetric capacity analysis for this facility is based on 20,000 m^3 capacity. In a preliminary plan not currently being pursued by the Department, an area north of Pit 3 was identified for future MLLW disposal with a capacity of 120,000 m^3. This additional capacity is not being considered in this analysis.

DOE's current projection for MLLW disposal at this facility was developed prior to issuance of the WM PEIS ROD and only includes on-site MLLW. This includes 0.3 m^3 of MLLW to be disposed in 2000.[6] The current projection does not identify any MLLW destined for disposal in this facility after 2000. None of this waste is expected to come from environmental restoration activities. The current capacity of the facility is adequate to accommodate this projected waste volume.

As the DOE's MLLW disposal projections are updated subsequent to the WM PEIS ROD, which calls for NTS to be a regional MLLW disposal site, additional off-site and on-site MLLW may be directed to the NTS Mixed Waste Disposal Unit. NTS has a restriction in their existing RCRA Part A permit that restricts the site from disposing of off-site MLLW until it receives a RCRA Part B permit. NTS is expected to begin disposing of off-site MLLW in December 2001 once the site completes modifications to the facility, develop new processes and procedures, and receives a final RCRA Part B permit from the State of Nevada.

2.5.3 Existing/Approved Environmental Restoration CERCLA Facilities

Three of the five facilities identified as environmental restoration CERCLA disposal facilities are considered existing/approved facilities in this analysis. Two of the existing/approved facilities, the Fernald OSDF and Hanford Site ERDF, are currently in operation for disposal of LLW and MLLW. The third existing/approved facility is the ORR EMWMF, which was approved for development in a CERCLA ROD.

The remaining two environmental restoration CERCLA facilities considered in this analysis are considered planned facilities. The capacities of the two planned disposal facilities, both of which are to be located at INEEL, are not discussed. However, the capacities of these facilities will be developed to accommodate the volume of waste which they are expected to receive.

[6] Pit 3 received MLLW between 1987 and 1990 (8,000 m^3) and again beginning in 1996 until the present (310 m^3). The 20,000 m^3 capacity cited for this unit applies only to future disposal and is not affected by these past disposal volumes.

2.5.3.1 Fernald OSDF

This facility is composed of nine cells including eight standard cells and one contingency cell. The total volume of the nine cells is 1.9 million m^3. The Department estimates that a total of 1.9 million m^3 of LLW and 90 m^3 of MLLW will be disposed in this facility. This includes 290,000 m^3 of LLW disposed prior to 2000, and 1.6 million m^3 of LLW and 90 m^3 of MLLW projected to be disposed between 2000 and 2015. After that time, DOE plans to permanently close the disposal facility. All of the waste disposed at this facility originates from environmental restoration sources.

2.5.3.2 Hanford Site ERDF

The ERDF is designed to dispose of LLW generated from environmental restoration CERCLA activities at the Hanford Site. The capacity of the facility is designed to equal the final disposal volume of environmental restoration waste, up to a maximum volume of 21.4 million m^3. DOE currently plans to construct enough capacity to accommodate 4.37 million m^3 of waste, which is more than adequate for the volume of waste for which a disposal decision has already been made. As future remediation and disposal decisions are made, DOE plans to construct additional cells as needed.

DOE estimates that the total volume of environmental restoration LLW projected to require disposal at the ERDF is 5.8 million m^3. This includes 800,000 m^3 of LLW disposed prior to 2000, and 5.0 million m^3 of LLW to be disposed between 2000 and 2046. Of the projected quantity, ERDF's initial two cells have a combined usable capacity of about 1.0 million m^3 and began receiving waste in July 1996. Two additional cells are currently under construction.

In comparison to the capacity evaluation in the 1998 Revision 1 Report, the facility's capacity has been revised from 3.9 to 21.4 million m^3. The 3.9 million m^3 capacity cited in the 1998 Revision 1 report represented the waste volume expected at that time. Since that time, the expected waste volume has increased. The 21.4 million m^3 capacity cited here is based on the maximum estimated quantities of waste that could be disposed at the facility resulting from environmental restoration activities at the Hanford Site 100, 200, and 300 Areas. (See *Environmental Restoration Disposal Facility Performance Assessment* (BHI-00169), August 1995, Appendix B.)

2.5.3.3 ORR EMWMF

DOE decided to proceed with development of this facility in the *Record of Decision for the disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee* (DOE/OR/01-1791&D3, November 1, 1999). The ROD calls for this facility to be constructed west of the ORR Y-12 Plant in East Bear Creek Valley. The facility is being developed to manage projected environmental restoration waste to be generated at ORR as a result of other future CERCLA RODs.

The capacity of the facility is designed to equal the final disposal volume of environmental restoration waste, up to a maximum volume of 1.1 million m^3. The SDD database identified

890,000 m^3 of LLW and 200,000 m^3 of MLLW to be disposed in this facility, a total of 1.1 million m^3.

2.6 Alternative Scenarios for LLW

This section discusses two alternative disposal scenarios under which LLW categorized as *to be determined* waste or destined for planned facilities is directed to existing/approved waste operations disposal facilities at either of two DOE sites, the Hanford Site and NTS. Because the projected disposition for these wastes is not to an existing/approved disposal site, there is greater uncertainty in how these wastes will actually be disposed than for other wastes. Hanford Site and NTS are being considered the destination sites for these two alternative scenarios because DOE selected them in the WM PEIS ROD as regional LLW disposal sites available for use by all DOE sites.

In addition to the waste volumes targeted to specific existing/approved LLW disposal facilities at Hanford Site and NTS, these alternative scenarios include an additional 450,000 m^3 of LLW projected to require disposal from 2000 through 2070. This additional volume, which was not considered in the LLW Base Case comparison presented in Section 2.5.1, includes 280,000 m^3 of *to be determined* LLW and 170,000 m^3 of LLW destined for two planned facilities. Table 2-11 summarizes the additional LLW included in the two LLW alternative scenarios.

Table 2-11. Additional LLW Included in Alternative Scenarios

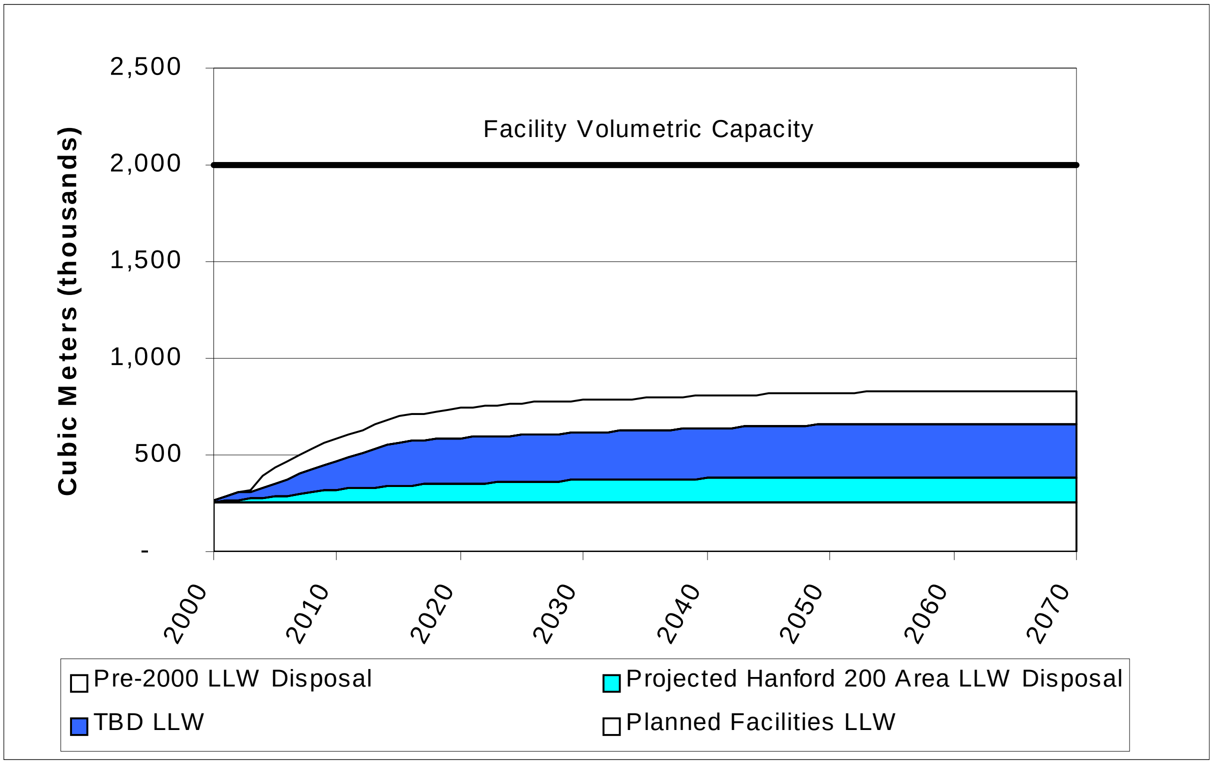
Projected Disposition	Facility	Projected LLW Volume (cubic meters)
Planned Environmental Restoration CERCLA Facilities	INEEL ICDF	76,000
	INEEL Remediation Unit	90,000
Subtotal (All Planned Facilities) [a]		**170,000**
To Be Determined	Not Specified	280,000
Total (Planned Facilities and TBD LLW) [a]		**450,000**

[a] Because of rounding, some totals may not equal the sum of their components.

2.6.1 Hanford Site 200 Area Burial Grounds

As discussed in Section 2.5.1.1, the Hanford 200 Area disposal facility has a LLW disposal capacity of 2.0 million m^3 and is projected to receive 380,000 m^3 (including both past and future disposal volumes), leaving an estimated excess capacity of about 1.6 million m^3. This facility, therefore, has enough excess volumetric disposal capacity to accommodate all of the additional 450,000 m^3 of LLW considered in this alternative scenario. Figure 2-9 presents a hypothetical timeline for disposal of this waste.

Figure 2-9. LLW Alternative Scenario for Hanford Site 200 Area Burial Grounds [a]

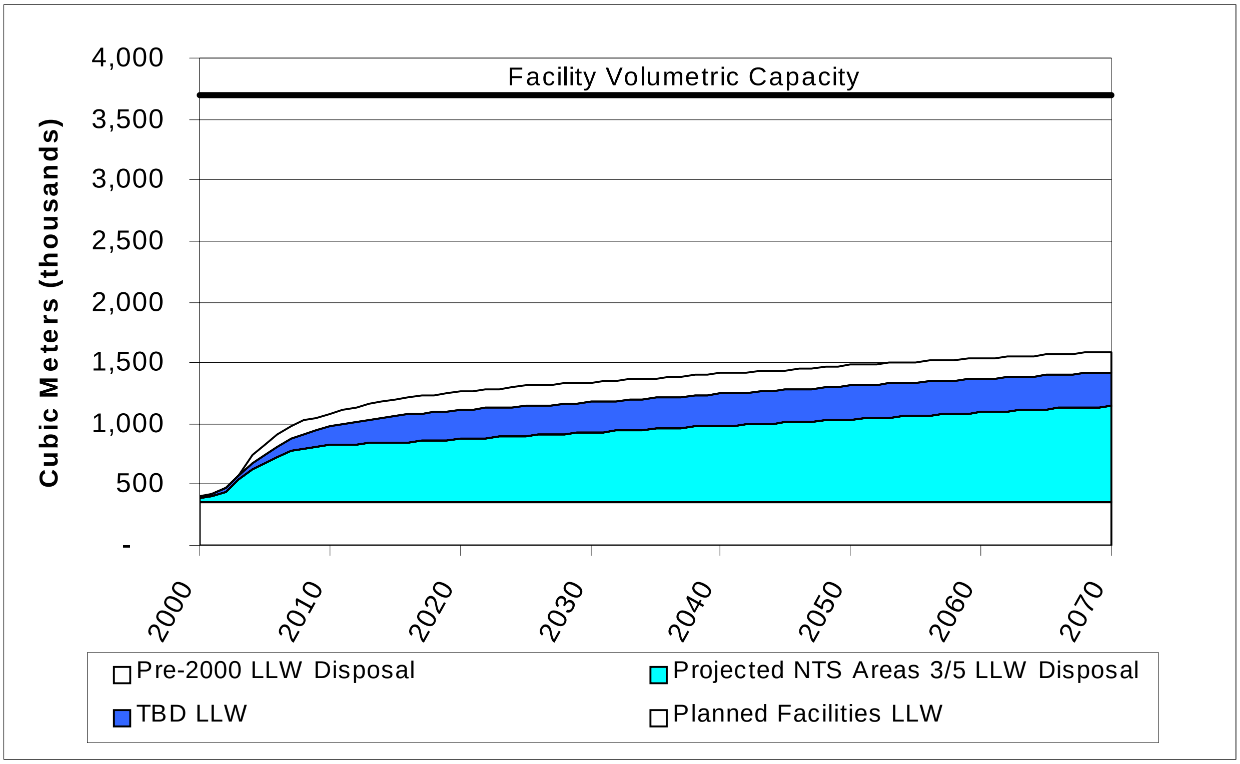


[a] The volume-over-time schedule shown here for disposal of planned facilities waste at the Hanford 200 Area is based on the current schedule for disposal of these wastes at the planned facilities. If the waste were to be redirected to the Hanford Site 200 Area facility, it is likely that the disposal schedule would change.

2.6.2 NTS Areas 3 and 5 RWMS

As discussed in Section 2.5.1.4, the NTS Areas 3 and 5 RWMS has a LLW disposal capacity of about 3.7 million m^3 and is projected to receive 1.1 million m^3 (including both past and future disposal volumes), leaving an estimated excess capacity of about 2.6 million m^3. This facility, therefore, has enough excess volumetric disposal capacity to accommodate all of the additional 450,000 m^3 of LLW considered in this alternative scenario. Figure 2-10 presents a hypothetical timeline for disposal of this waste.

Figure 2-10. LLW Alternative Scenario for NTS Areas 3 and 5 RWMS [a]



[a] The volume-over-time schedule shown here for disposal of planned facilities waste at the NTS Areas 3 and 5 RWMS is based on the current schedule for disposal of these wastes at the planned facilities. If the waste were to be redirected to the NTS LLW facilities, it is likely that the disposal schedule would change.

2.7 Alternative Scenarios for MLLW

This section discusses two alternative disposal scenarios under which MLLW categorized as *to be determined* waste or destined for planned facilities is directed to existing/approved waste operations disposal facilities at either of two DOE sites, the Hanford Site and NTS. Because the projected disposition for these wastes is not to an existing/approved disposal site, there is greater uncertainty in how these wastes will actually be disposed than for other wastes. Hanford Site and NTS are being considered the destination sites for these two alternative scenarios because DOE selected them in the WM PEIS ROD as regional MLLW disposal sites available for use by all DOE sites.

In addition to the waste volumes targeted to specific existing/approved MLLW disposal facilities at Hanford Site and NTS, these alternative scenarios include an additional 42,000 m^3 of MLLW projected to require disposal from 2000 through 2070. This additional volume, which was not considered in the MLLW Base Case comparison presented in Section 2.5.2, includes 5,100 m^3 of *to be determined* MLLW and 37,000 m^3 of MLLW destined for one planned facility. Table 2-12 summarizes the additional MLLW included in the two MLLW alternative scenarios.

Table 2-12. Additional MLLW Included in Alternative Scenarios

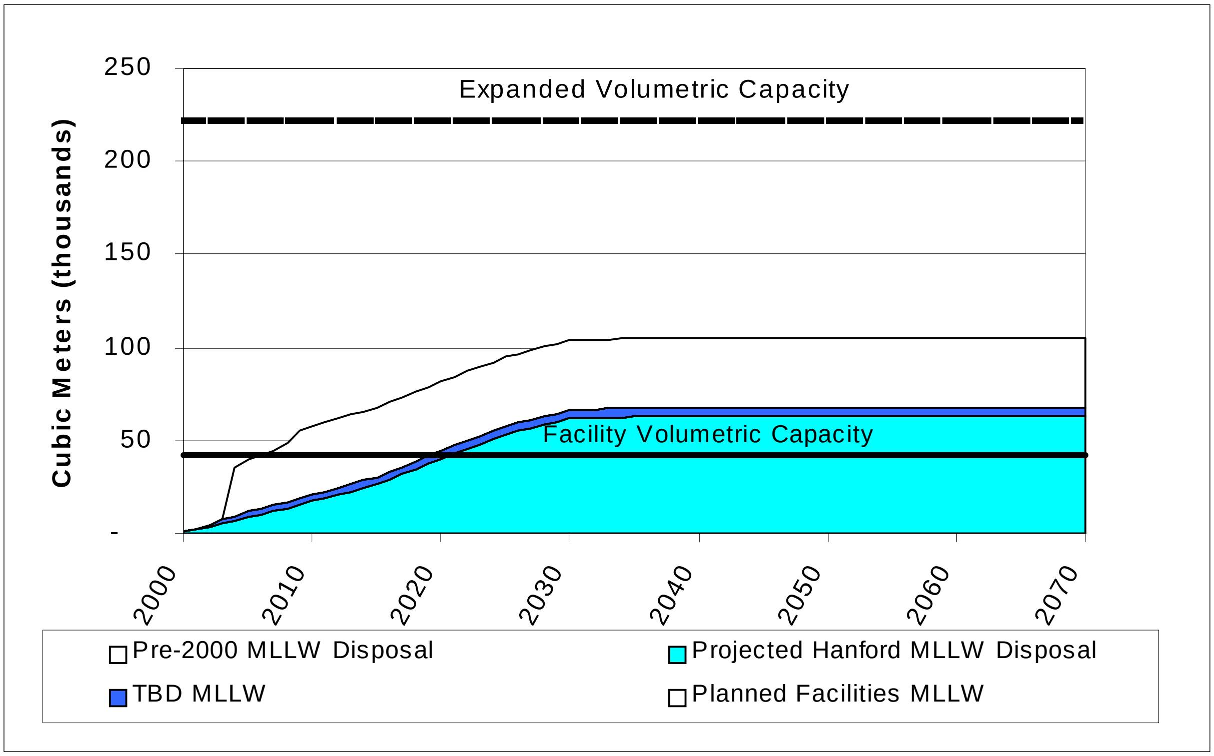
Projected Disposition	Projected MLLW Volume (cubic meters)
Planned INEEL ICDF	37,000
To Be Determined	5,100
Total (Planned Facilities and TBD MLLW) [a]	**42,000**

[a] Because of rounding, some totals may not equal the sum of their components.

2.7.1 Hanford Site Mixed Waste Trenches 31 & 34

As discussed in Section 2.5.2.1, this facility has a disposal capacity of 42,000 m^3, which is too small to accommodate the 63,000 m^3 of MLLW that the Department projects will be disposed at that facility. The additional 42,000 m^3 of MLLW considered in this scenario could only be disposed at this site if additional capacity was provided. Either or both of two potential expansions providing 180,000 m^3 of additional capacity have been identified and would provide adequate volumetric capacity to dispose of the alternative scenario waste. The potential MLLW disposal capacity at Hanford including both the existing facility and the potential expansions is 220,000 m^3. Figure 2-11 presents a hypothetical timeline for disposal of this waste.

Figure 2-11. MLLW Alternative Scenario for Hanford Site Mixed Waste Trenches 31 & 34 [a,b,c]

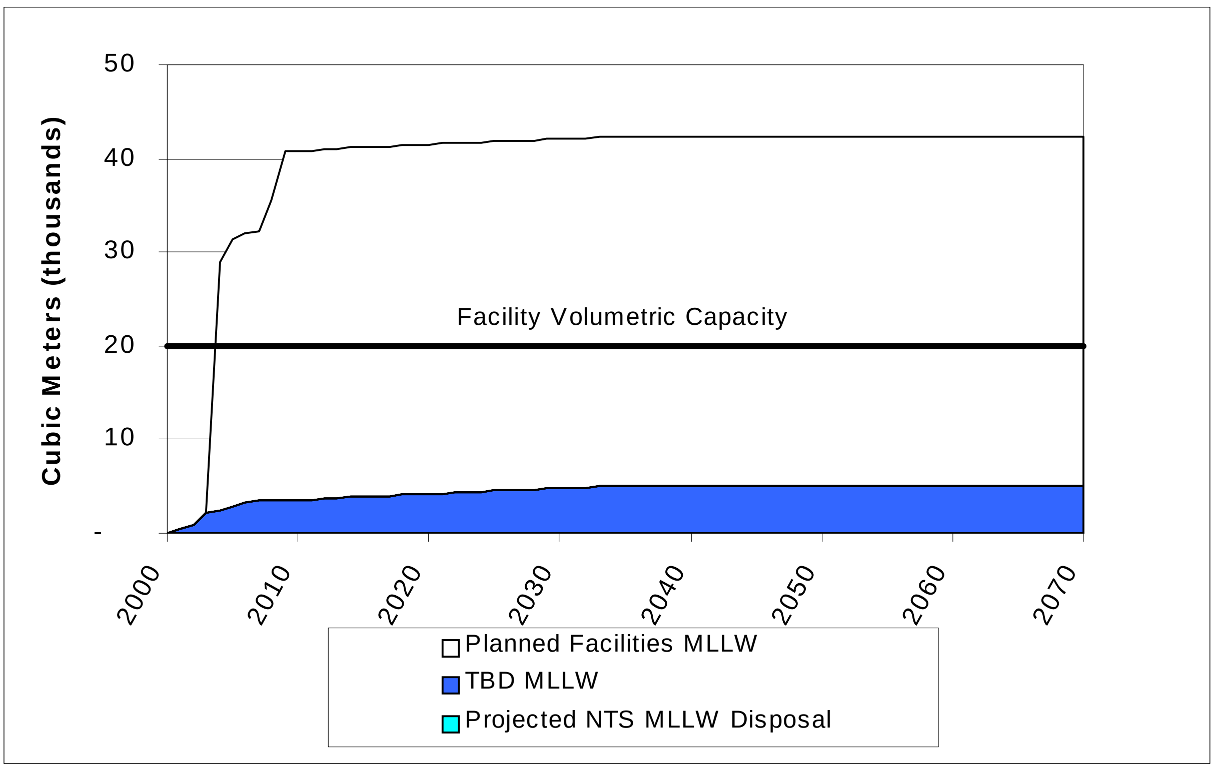


[a] The volume-over-time schedule shown here for disposal of planned facilities waste at the Hanford Site Mixed Waste Trenches 31 and 34 is based on the current projection for disposal of these wastes at the planned facilities. If the waste were to be redirected to the Hanford Site facilities, it is possible that the disposal schedule would change.
[b] This disposal scenario is hypothetical. DOE has not formally proposed to expand MLLW disposal capacity at Hanford Site to the volumes indicated in this hypothetical scenario.
[c] The volume of pre-2000 disposed MLLW (bottom band) shown in Figure 2-11 is relatively small compared to the other volumes and is not visible in this chart.

2.7.2 NTS Area 5 Mixed Waste Disposal Unit

As discussed in Section 2.5.2.2, a RCRA Part B permit application will request a disposal capacity of 20,000 m^3 for the Area 5 Mixed Waste Disposal Unit. This is in addition to all MLLW volumes previously disposed at this unit. Since current projections call for additional disposal of 0.3 m^3 of MLLW in this unit, slightly less than 20,000 m^3 is available for the additional 42,000 m^3 of MLLW considered in this alternative scenario. The 20,000 m^3 of available capacity could accommodate nearly half of the additional 42,000 m^3 volume. The remaining volume could only be accommodated if the NTS MLLW disposal capacity was further expanded.[7] As illustrated in Figure 2-12, applying the projected disposal schedule for *to be determined* and planned facilities MLLW to this alternative scenario would hypothetically result in the filling of the 20,000 m^3 capacity by 2004.

Figure 2-12. MLLW Alternative Scenario for NTS Area 5 Mixed Waste Disposal Unit [a,b]



[a] The volume-over-time schedule shown here for disposal of planned facilities waste at the NTS Area 5 Mixed Waste Disposal Unit is based on the current projection for disposal of these wastes at the planned facilities. If the waste were to be redirected to the NTS Area 5 Mixed Waste Disposal Unit, it is possible that the disposal schedule would change.
[b] The volume of projected MLLW disposal (bottom band) at the NTS Area 5 Mixed Waste Disposal Unit shown in Figure 2-12 is relatively small compared to the other volumes and is not readily visible in this chart. Past-disposed MLLW volumes are not shown on this figure and do not count against the 20,000 m^3 capacity of the unit.

[7] A 120,000 m^3 expansion that had been previously considered by the Department would have provided adequate volumetric capacity to dispose of the alternative scenario MLLW. However, DOE is not currently pursuing this expansion plan, and it is not being considered in this report.

2.8 Other Waste and Material Excluded from the Capacity Analysis

This section discusses three categories of waste and material that have been excluded from the analysis. This waste and material has been excluded from the analysis because DOE projects that they will be disposed in facilities separate from other DOE LLW or because it is not currently considered a waste by DOE. The following three categories of waste and materials have been excluded from the analysis and are discussed below:

- Low-activity waste fraction derived from high-level waste processing at Hanford Site, SRS and INEEL;
- Naval reactor waste disposed in the E-Area Pad at Savannah River Site; and
- Depleted uranium oxide produced from stabilization of depleted uranium hexafluoride.

2.8.1 Low-Activity Waste Fraction at Hanford Site, SRS, and INEEL

The Department projects that three facilities in this category will receive 610,000 m^3 of low-activity waste fraction between 2000 and 2070. The status of each facility and the quantities of waste projected to be disposed are presented in Table 2-13.

Table 2-13. Past and Projected Low-Activity Waste Fraction Destined for Dedicated Facilities

Facility	Status	Life-Cycle Low-Activity Waste Fraction Disposal Volume (cubic meters)		
		Past (Pre-2000)	Projected (2000-2070)	Total [a]
Hanford Site Remote Handled Waste Trench [b]	Planned	-	200,000	200,000
INEEL HLW Tanks Closure	Planned	-	25,000	25,000
Savannah River Site Saltstone Facility	Existing / Approved	1,500	380,000	380,000
Totals [a]		**1,500**	**610,000**	**610,000**

[a] Because of rounding, some totals may not equal the sum of their components.
[b] The Hanford projection in the DOE's 2000 IPABS SDD shows 250,000 m^3 of low-activity waste fraction expected to be disposed in the planned Hanford Near Surface Vault. The data shown here reflect more recent projections that are expected to be shown in future updates of the IPABS SDD.

These facilities and the waste destined for them represent a special category of waste that the Department manages separately from LLW. These wastes have relatively large volumes and have relatively homogeneous physical and radiological properties in comparison to most LLW streams managed by the Department. These wastes are present only at the DOE sites where spent fuel has been reprocessed.

At Hanford Site and SRS, analyses and decisions for disposal of the low-activity waste fraction have already been completed (see Federal Register, Volume 62, No. 38, pages 8693-8704, February 26, 1997, and Volume 60, No. 70, pages 18589-18594, April 12, 1995). At INEEL, DOE is currently performing an assessment addressing disposal alternatives for this waste (see *Idaho High-Level Waste & Facilities Disposition Draft Environmental Impact Statement*, DOE/EIS-0287, December 1999).

At Hanford Site, DOE projects that two low-activity waste fraction streams with a volume of 200,000 m^3 will be disposed of in the planned Remote Handled Waste Trench facility between 2008 and 2030. At SRS, DOE projects that two low-activity waste fraction streams with a volume of 380,000 m^3 will be disposed of in the Saltstone Facility between 2000 and 2025. At INEEL, DOE has not yet decided on the disposal of one low-activity waste fraction stream with a volume of 25,000 m^3.

2.8.2 Naval Reactor Waste Disposed in the E-Area Pad at SRS

This facility is located at the western end of the E-Area LLW facility and is dedicated for the disposal of LLW from the Naval Reactors Program. The facility consists of a single square gravel pad measuring 43 meters on a side. The facility is designed to accept up to 100 waste casks (see *Radiological Performance Assessment for the E-Area Low-Level Waste Facility* (WSRC-RP-94-218, Revision 1), January 31, 2000). The facility is projected to receive 5,100 m^3, including 980 m^3 already received in 1999 and 4,100 m^3 between 2000 and 2030. The waste is projected to fill 65 disposal casks, which are projected to be mounded in place on the pad. This waste is not included in the capacity analysis.

2.8.3 Depleted Uranium Oxide Produced from Stabilization of Depleted Uranium Hexafluoride

DOE has not designated this material as waste and has not designated a facility for disposal of this material, which DOE plans to produce from processing and stabilizing depleted uranium hexafluoride stockpiles currently stored at Paducah Gaseous Diffusion Plant, Portsmouth Gaseous Diffusion Plant, and ORR. DOE has projected the volume of this material will have a volume of between 140,000 and 270,000 m^3 (see *Assessment of Preferred Depleted Uranium Disposal Forms*, ORNL/TM-2000/161, June 2000). This material is not included in the capacity analysis. Consideration of this material in future versions of this analysis is subject to pending disposition decisions and documentation of disposition projections in the IPABS SDD.

3.0 RADIOLOGICAL PROJECTIONS AND CAPACITY ANALYSIS

In Chapter 2, the volumetric capacities of low-level waste (LLW) and mixed low-level waste (MLLW) disposal facilities were analyzed in relation to the waste volumes projected to be disposed of by 2070 at those facilities. In this chapter, the radiological capacities of DOE LLW and MLLW disposal facilities are assessed. This assessment compares facility-specific radiological disposal limits with radionuclide inventories projected to be disposed of by 2070 at those facilities. This comparison indicates if and where projected radionuclide inventories may exceed the radiological limits of the disposal facilities where the waste is currently planned to be disposed, so that complex-wide planning ensures DOE does not exceed these radiological limits at any of its disposal facilities.

Section 3.1 presents the procedure used to estimate the projected radionuclide inventories of LLW and MLLW to be disposed of in each facility and the methodology used to estimate disposal facility-specific radiological capacity. Section 3.2 presents the projected radionuclide inventories of LLW and MLLW to be disposed of in each facility. Section 3.3 identifies and discussed sources of uncertainty in the data and analysis. Section 3.4 contains site-specific results of LLW and MLLW radiological capacity and a discussion of the important radionuclides identified in the analysis. Section 3.5 describes alternative disposal scenarios for LLW and MLLW.

3.1 Methodology of the Radiological Disposal Capacity Analysis

Eight waste operations disposal facilities were evaluated to estimate their radiological disposal capacity. For each facility, the methodology for measuring radiological disposal capacity consists of four steps: (1) estimating the amounts of 49 radionuclides potentially present in the LLW and MLLW disposed of and projected to be disposed of at the facility; (2) determining the average concentration of each radionuclide in the total volume of waste expected to be disposed in the facility; (3) comparing the radionuclide concentrations to the radionuclide-specific concentration limits of the facility; and (4) determining a *sum-of-fractions* by adding together the 49 ratios produced from the comparisons. The sum-of-fractions is the indicator used in this analysis to evaluate a disposal facility's radiological capacity.

The radiological disposal capacity analysis did not evaluate the existing and approved CERCLA facilities (Fernald OSDF, Hanford ERDF, and ORR EMWMF) because these facilities accept waste under records of decision prepared according to cleanup activities under CERCLA. All waste destined to be disposed in these facilities is within the facilities' established radiological capacity limits.

3.1.1 Estimation and Projection of Radioactivity for Disposal

Radionuclides included in this analysis were those with a half-life greater than five years identified in site-specific disposal performance documents. In the 2000 Integrated Planning, Accountability, and Budgeting System (IPABS) data update, sites were requested to report the radiological concentrations of their LLW and MLLW using a pick-list of radionuclides and one radionuclide group, natural uranium. The waste stream concentrations reported for natural uranium were distributed into the radionuclides shown in Table 3-1.

Table 3-1. Assumed Distribution for Natural Uranium (DOE, 1997)

Radionuclide	Relative Activity (%)
Natural Uranium	
U-234	48.7
U-235	2.2
U-238	49.1

No attempt was made to associate radioactive decay products with parent radionuclides because the decay products are already considered in the estimation of the disposal limits for the parent radionuclides used in this analysis. However, if radioactive decay products were listed explicitly by the sites, they were also included in the analysis.

Historical radiological inventories developed for and reported in Revision 1 were used for waste disposed of between 1988 and 1997. Radiological data for LLW and MLLW disposed in 1998-1999 and projected to be disposed from 2000 to 2070 were compiled from the June 26, 2000, Stream Disposition Data (SDD) contained in the IPABS database when provided by the sites. When radionuclide concentration data were not provided in SDD, waste stream radionuclide data were developed from stream profiles developed for Revision 1, from generator profiles contained in disposal facility performance assessments, or from discussions and correspondence with personnel at LLW and MLLW generating sites and waste disposal facilities. Appendix D presents the specific bases for the radionuclide concentrations applied to each waste stream. Appendix D also contains an excerpt of the relevant guidance for reporting the radionuclide concentration of waste streams in the SDD portion of the FY 2000 update to the IPABS database.

3.1.2 Formulas Used in Sum-of-Fractions Capacity Analysis

The sum-of-fractions method determines if a volume of waste with multiple radionuclides meets the combined limits for each individual radionuclide. The sum-of-fractions method is defined in 10 CFR Part 61.55 and described in the following paragraphs.

For a given disposal facility, the total activity of each radionuclide in the disposed waste in curies (Ci) is the sum of its activities from all waste expected to be disposed of in the facility from all sources. The average curie concentration of a radionuclide in the disposed waste (in Ci/m^3) equals the total activity of that radionuclide in the disposed waste (in Ci) divided by the total volume of waste disposed in the facility (in m^3). The following equation shows this relationship:

$$C_I = \frac{R_I}{V}$$

where: C_I =the average concentration of radionuclide *I* in the disposed waste, in Ci/m^3;
R_I =the total activity of radionuclide *I* in the disposed waste, in Ci; and
V =the total volume of waste disposed in the facility, in m^3.

Each radionuclide concentration is then compared to disposal limits for each facility to determine the ratio of the radionuclide concentration to its respective disposal limit. Each ratio is determined by the following relationship:

$$\frac{C_I}{L_I}$$

where: L_I =the facility-specific concentration limit for radionuclide *I*, in Ci/m^3. (The sources of the disposal limits used in this analysis are discussed in Section 3.1.3.)

The sum-of-fractions is calculated as follows:

$$Sum-of-Fractions = \sum \frac{C_I}{L_I}$$

Values less than one indicate the limits are not exceeded. For example, if radionuclide A has an average concentration of 1 and a limit of 3, and radionuclide B has an average concentration of 1 and a limit of 2, then the sum-of-fractions method results in a value of 5/6 (1/3 + 1/2), indicating the combined radiological limits based on the two radionuclides in the waste is not exceeded.

3.1.3 Disposal Limits Used in the Radiological Capacity Analysis

The initial estimates of radiological disposal capacity are based on the *Performance Evaluation of the Technical Capabilities of DOE Sites for Disposal of Mixed Low-Level Waste* (DOE, 1996). This *Performance Evaluation* used the performance objectives from the previous radioactive waste management order, DOE Order 5820.2A, and screening-level representations of the transport mechanisms used in the site-specific performance assessments to make estimates of disposal limits for several radionuclides. The performance objectives from the current DOE

Radioactive Waste Management Order 435.1 are essentially the same as Order 5820.2A. This *Performance Evaluation* report was used as part of the Federal Facility Compliance Act process to identify potential sites for disposal of DOE's MLLW.

Because the *Performance Evaluation* methodology was generally more conservative than the site-specific performance assessments from which it was derived, it was not used as the final arbiter for sum-of-fractions calculations. Rather, it was used to identify where the contribution of a radionuclide to the sum-of-fractions was 0.1 or greater. For these radionuclides, the disposal limit values from the site-specific performance assessments and the waste acceptance criteria derived from them were substituted in this evaluation. Table 3-2 lists the site-specific documents from which radionuclide-specific values were identified.

Table 3-2. Site-Specific Documents Used for Disposal Limits in the Radiological Capacity Analysis

Disposal Facility	Document(s)
Hanford Site 200 Area Burial Grounds/ Mixed Waste Trenches 31 and 34	Hanford Site Solid Waste Acceptance Criteria (SNF-EP-0063-Revision 5)
INEEL RWMC	Addendum to Radioactive Waste Management Complex Low-Level Waste Radiological Performance Assessment (EGG-WM-8773) (INEEL/EXT-97-8773) Idaho National Engineering and Environmental Laboratory Reusable Property, Recyclable Materials, and Waste Acceptance Criteria (RRWAC), (DOE/ID-10881, Revision 11)
LANL TA-54 Area G	Performance Assessment and Composite Analysis for Los Alamos National Laboratory Material Disposition Area G (LA-UR-97-85)
NTS Areas 3 and 5 RWMS/ Area 5 Mixed Waste Disposal Unit	Nevada Test Site Waste Acceptance Criteria—(DOE/NV-325, Revision 2)
ORR IWMF	Performance Assessment for Continuing and Future Operations at Solid Waste Storage Area 6 (DOE/OR/01-1913/V1)
SRS LAW Vaults	Radiological Performance Assessment for the E-Area Vaults Disposal Facility (WSRC-RP-94-218, Rev. 1) E-Area Vaults Low-Level Radioactive Solid Waste Acceptance Criteria (WSRC 1S, Procedure 3.10, Revision No. 2)
SRS ILW Vaults	Radiological Performance Assessment for the E-Area Vaults Disposal Facility (WSRC-RP-94-218, Rev. 1) E-Area Vaults Low-Level Radioactive Solid Waste Acceptance Criteria (WSRC 1S, Procedure 3.10, Revision No. 2)
SRS E-Area Trenches	Radiological Performance Assessment for the E-Area Vaults Disposal Facility (WSRC-RP-94-218, Rev. 1), Appendix I SRS Radioactive Soil and Rubble Management Program and Waste Acceptance Criteria (WSRC 1S, Procedure 3.15, Revision 1) SRS Waste Acceptance Criteria Manual, Low-Level Radioactive Waste Acceptance Criteria (WSRP Procedure WAC 3.17, Revision 3)

The performance assessments and waste acceptance criteria for most sites consist of only one set of disposal limits. However, the waste acceptance criteria for the Hanford Site are provided as two sets of limits corresponding to two different intruder scenarios: Category 1 limits assume a homesteader intrusion scenario and Category 3 limits assume a post-drilling intruder scenario. Normally, waste classification at Hanford is based on the volume of the container in which the waste is initially placed. However, application of the post-drilling intruder scenario permits the classification to be based on a larger volume.

In Appendix B where the sum-of-fractions calculations and results for each disposal facility are presented, the column in each table labeled “Source” indicates the source of the disposal limits (Performance Evaluation [PE], Performance Assessment [PA], or Waste Acceptance Criteria [WAC]) for each radionuclide. An additional column labeled “Pathway” indicates which pathway analysis (water, atmospheric, or intruder) provides the most limiting concentration.

3.2 Radionuclide Inventory Projections for Low-Level and Mixed Low-Level Waste

Table 3-3 presents the radionuclide inventories of LLW and MLLW already disposed and projected to be disposed through 2070 at eight facilities which dispose of operations-generated waste. This group of inventories is considered the Base Case, as it includes only waste destined for specific DOE disposal facilities. Also shown in Table 3-3 is the radionuclide inventory of LLW and MLLW for the Alternative Scenarios, comprising LLW and MLLW whose disposition is *to be determined* and LLW and MLLW from environmental restoration activities to be disposed in planned CERCLA disposal facilities. The alternative-scenario waste does not include waste currently planned to be disposed at commercial facilities.

Appendix B provides additional details on the inventories, including the inventory by disposal site and by radionuclide for projected waste and already disposed waste. The radionuclide information for already disposed waste is reported as two quantities: the waste disposed of from 1988 through 1997 as developed for Revision 1; and the waste disposed of in 1998 and 1999 as reported in IPABS SDD FY 2000 update.

Table 3-3. Base Case and Alternative Scenario Low-Level and Mixed Low-Level Waste Radioactivity Inventories (1988-2070) by Disposal Facility

Nuclide	Radionuclide Inventories (Ci)										
	Base Case								Alternative Scenario		Total
	Hanford *	INEEL	LANL	NTS	ORR	SRS LAW	SRS ILW	SRS Trenches	LLW	MLLW	
	LLW/MLLW	LLW	LLW	LLW /MLLW	LLW	LLW	LLW	LLW			
H-3	8.81e+04	3.10E+05	4.69E+05	1.25E+07	1.29E+01	5.13E+05	1.95E+06	3.98E+01	1.25E+07	1.14E+05	2.85E+07
C-14	2.26e+02	4.50E+00	1.00E-01	1.96E+02	5.65E-02	3.64E-01	1.56E+00	3.91E-02	1.34E+03	1.84E-01	1.77E+03
C-14 am	4.94e-02	6.92E+01	1.77E-01	4.02E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E+04	6.00E-03	1.35E+04
Al-26	0.00e+00	0.00E+00	3.80E-08	9.53E-06	1.00E-03	0.00E+00	0.00E+00	0.00E+00	5.04E-05	9.88E-07	1.06E-03
Cl-36	3.67e-07	6.38E-02	3.16E-03	2.74E+02	0.00E+00	1.72E-04	0.00E+00	0.00E+00	1.21E+01	1.25E-04	2.86E+02
K-40	3.31e-04	0.00E+00	6.54E-02	8.23E+00	3.41E-03	2.56E-04	0.00E+00	3.03E-02	9.21E+01	2.18E-03	1.00E+02
Co-60	9.92e+05	1.50E+06	1.06E+03	2.51E+05	2.11E+02	2.10E+01	4.98E+02	2.80E-01	3.47E+07	3.95E+02	3.75E+07
Ni-59	4.95e+03	2.73E+03	8.22E-02	8.24E+02	6.10E-04	1.58E-01	2.55E-01	2.23E-02	1.86E+05	1.96E+00	1.95E+05
Ni-63	8.25e+05	6.42E+05	1.21E-02	1.56E+06	1.14E+01	1.11E+01	6.28E+01	6.78E-02	6.65E+06	8.83E+01	9.69E+06
Ni-63am	1.91e-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-02
Se-79	7.81e-05	0.00E+00	2.52E-06	1.56E-03	0.00E+00	1.24E-01	6.03E-04	8.97E-04	8.26E-03	2.77E-03	1.38E-01
Sr-90	1.02e+06	7.14E+02	1.01E+01	1.06E+06	9.79E+01	1.09E+02	6.34E+01	5.26E-01	5.56E+06	2.63E+04	7.66E+06
Zr-93	0.00e+00	0.00E+	2.83E-	2.17E-01	0.00E+0	1.44E-05	3.22E-05	6.20E-08	5.31E+0	5.22E-04	5.33E+0

Note:
*** -** Hanford reports disposal of Uranium 234, 235, 236, and 238 as two separate radionuclides; in monoliths and in trenches. The values shown for Hanford are the sum of the radionuclides.
am = Activated Metal
m = Metastable

Nuclide	Radionuclide Inventories (Ci)										
	Base Case								Alternative Scenario		Total
	Hanford *	INEEL	LANL	NTS	ORR	SRS LAW	SRS ILW	SRS Trenches	LLW	MLLW	
	LLW/MLLW	LLW	LLW	LLW /MLLW	LLW	LLW	LLW	LLW			
Nb-93m	0.00e+00	0.00E+00	0.00E+00	5.66E+00	0.00E+00	2.19E-03	0.00E+00	1.90E-04	1.38E+03	1.36E-02	1.39E+03
Nb-94	0.00e+00	1.95E+00	2.77E-02	3.15E-01	0.00E+00	7.60E-09	0.00E+00	0.00E+00	6.16E+01	6.09E-04	6.39E+01
Tc-99	1.01e+02	2.62E+00	4.75E-01	9.87E+00	8.90E-03	1.38E-01	2.83E-01	9.82E-03	4.04E+03	2.12E-01	4.16E+03
Cd-113m	0.00e+00	0.00E+00	5.17E-01	1.85E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.89E+00	2.56E-03	8.25E+00
Sn-121m	0.00e+00	0.00E+00	0.00E+00	2.30E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E+02	4.04E-03	2.46E+02
Sn-126	0.00e+00	0.00E+00	0.00E+00	1.07E-04	0.00E+00	3.49E-03	2.57E-03	1.46E-03	5.65E-04	2.88E-05	8.21E-03
I-129	1.02e-01	1.72E-02	1.51E-06	1.91E-01	0.00E+00	4.10E-04	1.06E-02	1.28E-04	1.68E+00	1.93E-04	2.00E+00
Cs-135	0.00e+00	0.00E+00	1.42E-02	2.04E-03	0.00E+00	1.88E-09	0.00E+00	0.00E+00	1.08E-02	3.07E+03	3.07E+03
Cs-137	8.89e+05	3.30E+03	8.67E+01	1.49E+06	1.16E+02	1.27E+02	7.58E+02	1.36E+01	4.90E+06	1.43E+05	7.43E+06
Ba-133	1.70e-04	0.00E+00	2.69E+02	1.97E+02	0.00E+00	5.89E-06	0.00E+00	0.00E+00	7.55E+01	3.39E-02	5.42E+02
Sm-151	0.00e+00	0.00E+00	9.97E-02	2.17E+01	2.33E-03	2.28E-04	0.00E+00	0.00E+00	4.18E+02	3.09E-02	4.39E+02
Eu-152	1.32e+03	8.31E+01	2.94E-01	4.67E+04	1.04E+01	6.79E+00	0.00E+00	0.00E+00	2.88E+04	7.63E-01	7.69E+04
Eu-154	1.93e+03	2.45E+02	2.20E-01	2.52E+03	4.36E+00	4.91E+00	6.96E-01	1.49E-03	3.12E+03	2.48E+00	7.82E+03
Ra-226	6.37e-04	1.36E+00	6.29E-02	9.33E+03	4.44E-03	3.28E-04	6.19E+00	2.54E-02	2.82E+02	8.99E-02	9.62E+03

Note:
*** -** Hanford reports disposal of Uranium 234, 235, 236, and 238 as two separate radionuclides; in monoliths and in trenches. The values shown for Hanford are the sum of the radionuclides.
am = Activated Metal
m = Metastable

Nuclide	Radionuclide Inventories (Ci)										
	Base Case								Alternative Scenario		Total
	Hanford *	INEEL	LANL	NTS	ORR	SRS LAW	SRS ILW	SRS Trenches	LLW	MLLW	
	LLW/MLLW	LLW	LLW	LLW /MLLW	LLW	LLW	LLW	LLW			
Ra-228	0.00e+00	3.45E-05	0.00E+00	5.11E+00	3.62E-04	1.00E-02	0.00E+00	2.30E-03	1.35E-01	5.38E-04	5.26E+00
Th-229	2.11e-05	0.00E+00	3.14E-03	2.33E-01	9.54E-08	0.00E+00	0.00E+00	0.00E+00	5.21E-03	4.90E-07	2.41E-01
Th-230	5.26e-05	3.57E-02	3.02E-05	1.88E+03	1.92E-06	6.62E-03	0.00E+00	1.90E-03	5.74E+01	2.61E-02	1.93E+03
Th-232	1.46e-01	3.75E-02	2.61E-01	4.88E+01	9.15E-03	6.85E-03	1.71E-04	1.90E-03	1.88E+01	1.58E+01	8.39E+01
Pa-231	4.48e-07	0.00E+00	9.00E-09	3.63E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.23E-01	4.16E-04	3.73E+01
U-232	2.41e-05	2.21E+00	1.62E-02	8.28E-01	1.27E-01	1.73E-02	6.72E-06	8.79E-06	1.72E-01	7.66E-04	3.37E+00
U-233	3.85e+01	2.27E-02	8.43E-02	6.58E+00	1.27E-01	8.26E-01	7.69E-01	1.01E-04	1.82E+00	3.36E-02	4.87E+01
U-234 *	6.02e+02	3.98E+00	1.10E+01	1.86E+03	7.01E-03	1.04E+01	1.25E+00	1.34E-01	1.32E+02	9.61E-01	2.62E+03
U-235 *	5.38e+01	2.03E-01	1.23E+00	3.85E+02	5.21E-04	3.22E-01	4.95E-02	4.43E-03	2.47E+01	2.35E-02	4.65E+02
U-236 *	1.09e+00	2.62E-02	2.57E-03	1.29E-01	1.20E-04	4.91E-01	1.16E-02	1.18E-02	6.57E-01	2.42E-03	2.42E+00
U-238 *	6.69e+01	1.15E+01	2.06E+01	1.00E+04	1.13E-01	1.28E+01	4.08E+00	6.53E-02	1.09E+03	7.32E+00	1.12E+04
Np-237	1.52e-01	2.91E-02	1.23E-03	4.74E+00	5.45E-04	6.46E-01	6.65E-03	1.04E-03	9.34E-01	1.35E-03	6.51E+00
Pu-238	1.46e+02	5.39E-01	3.62E+01	1.11E+02	2.09E-02	1.77E+01	6.52E+00	1.19E-01	2.42E+01	4.68E-01	3.43E+02
Pu-239	1.42e+02	2.88E+00	7.27E+01	1.30E+02	3.17E-02	1.93E+01	5.44E-01	2.57E-02	5.27E+02	6.75E-01	8.94E+02

Note:
* **-** Hanford reports disposal of Uranium 234, 235, 236, and 238 as two separate radionuclides; in monoliths and in trenches. The values shown for Hanford are the sum of the radionuclides.
am = Activated Metal
m = Metastable

Nuclide	Radionuclide Inventories (Ci)										
	Base Case								Alternative Scenario		Total
	Hanford *	INEEL	LANL	NTS	ORR	SRS LAW	SRS ILW	SRS Trenches	LLW	MLLW	
	LLW/MLLW	LLW	LLW	LLW /MLLW	LLW	LLW	LLW	LLW			
Pu-240	3.44e+01	2.08E-01	8.07E-01	6.16E+01	4.19E-03	3.29E+00	3.60E-02	5.51E-03	2.79E+01	4.48E-02	1.28E+02
Pu-241	9.07e+02	2.44E+01	9.00E+00	7.40E+02	0.00E+00	7.00E+01	3.12E+00	1.44E-01	3.16E+03	1.43E+00	4.91E+03
Pu-242	1.09e-03	1.44E-07	1.24E-03	1.66E+02	5.56E-06	5.62E-02	8.17E-03	5.02E-05	8.54E-03	5.48E-04	1.66E+02
Pu-244	3.76e-06	0.00E+00	0.00E+00	9.57E-04	2.12E-06	3.73E-15	7.24E-15	1.43E-17	2.18E-05	9.83E-09	9.84E-04
Am-241	7.12e+01	4.10E+00	1.79E+01	1.21E+02	8.27E-02	2.75E+00	2.10E+00	7.91E-02	1.45E+02	7.12E-01	3.65E+02
Am-243	4.73e-01	2.18E-05	7.05E-04	1.79E+01	1.37E-03	1.22E-03	2.09E-06	4.64E-05	8.06E-02	8.77E-05	1.84E+01
Cm-243	1.39e-02	0.00E+00	0.00E+00	3.13E-02	1.21E-04	2.18E-05	0.00E+00	5.21E-03	2.88E-01	7.26E-05	3.39E-01
Cm-244	6.84e-01	1.11E-01	0.00E+00	6.80E+03	6.55E-01	1.17E+00	3.10E+00	1.93E-02	3.26E+00	4.83E-02	6.81E+03

Note:
* **-** Hanford reports disposal of Uranium 234, 235, 236, and 238 as two separate radionuclides; in monoliths and in trenches. The values shown for Hanford are the sum of the radionuclides.

am = Activated Metal
m = Metastable

3.3 Sources of Uncertainty in the Analysis

The uncertainty in this radiological capacity analysis stems from two primary sources: (1) the estimation of facility-specific disposal limits, and (2) the estimation and projection of facility-specific radionuclide inventories. In most of the examples discussed below, the uncertainties identified in the radiological assessment methodology result in an overestimate of the total radiological profile, and thus present a more conservative picture than may be faced when projected waste is actually generated and ready for disposal. Therefore, the site-specific radiological capacity results discussed in Section 3.4 may underestimate the available radiological disposal capacity for each disposal facility. As discussed below, future analysis and research will help reduce these uncertainties and will be reflected in future revisions of this Report.

3.3.1 Uncertainty in Disposal Limits

The methodology for estimating radiological capacity described in Section 3.1 uses values from the *Performance Evaluation* project report (DOE, 1996) as the initial set of disposal limits to identify radionuclides with sum-of-fractions values of 0.1 or greater. Substituting facility-specific values from the performance assessments or waste acceptance criteria refines the disposal limits for these radionuclides. Initially, performance assessments generally are based on limited data and understanding of the interactions of radionuclides and the surrounding environment. To address these general shortcomings, DOE requires periodic review and revision of these site-specific performance assessments, a process known as performance assessment maintenance. Results of the performance assessment maintenance process are incorporated into future revisions of the performance assessments.

As additional operational experience is gained and as new research on environmental transport is incorporated into the performance assessments, disposal limits change. Conservatism is typically used to address uncertain processes and data. As this uncertainty is reduced or removed, the disposal limits tend to be less restrictive. However, future research may also reveal mechanisms that require some disposal limits to become more restrictive. The ultimate disposal limits in use at facility closure are not known now, and this lack of knowledge results in a significant source of uncertainty.

3.3.2 Uncertainty in Estimation and Projection of Radionuclide Inventories

Section 3.1.1 describes the procedure for estimating and projecting radionuclide inventories for comparison with facility-specific disposal limits. Several sources of uncertainty exist in this estimation and projection procedure. The most significant sources arise from (1) assigning radionuclide concentration profiles to waste streams with no profiles; (2) estimating aggregate radionuclide profiles at year 2070 by projecting existing radiological profiles; and (3) assigning disposal locations for waste streams.

3.3.2.1 Assigning Radionuclide Concentration Profiles to Waste Streams with No Profiles

As discussed in Section 3.1.1, radiological profiles were reported in SDD for approximately 25 percent of the LLW and MLLW streams targeted for disposal. For the waste streams with no reported radiological data, the preparers of this Report, in consultation with the waste stream subject matter experts at the sites, used either supplemental radiological profiles provided by the sites or used the radiological profiles developed for the Revision 1 analysis. Appendix D describes the approaches and assumptions used to develop the radiological profiles.

The profiles developed for Revision 1 were based on waste characterization data from two sources available in 1998: the Environmental Restoration Core Database and the Waste Management Technical Data Call. As described in detail in Revision 1, waste stream radiological profiles were developed primarily by assigning streams without radiological characterization data the same radiological profile as a similar waste stream at the same site having radiological characterization. Uncertainty is associated with this approach because waste streams coming from different sources within a site may have different radiological profiles.

3.3.2.2 Estimating Aggregate Radionuclide Profiles at Year 2070 by Projection

Existing waste streams with radiological profiles in the SDD are used as an estimate for future streams. Consequently, these estimated profiles are an uncertainty in the radionuclide profiles because the waste generated in the future may be different as processes change, future missions change, and quantities and profiles change due to waste minimization. Because long-term radiological profiles generally are not available, the inventory estimates as of 2070 are another source of uncertainty in the analysis.

3.3.2.3 Assigning Disposal Locations for Waste Streams

Disposal locations used in this analysis were based on the disposal facilities specified by the waste generating sites in the SDD. These waste disposal locations may change in the future as sites further evaluate alternatives allowed in the WM PEIS ROD for disposal of their waste.

Additionally, this radiological capacity analysis may indicate potential limitations of a disposal site that can be resolved by strategically disposing of specific waste streams at other disposal facilities or through additional treatment and waste form adjustments. The lack of certainty related to future disposal locations for specific waste streams is another uncertainty in the analysis.

3.4 Base Case Facility-Specific Radiological Projections and Capacities

In this section, the radiological capacity of each of the eight waste operations LLW disposal facilities is compared with total radionuclide inventories projected for the 1988-2070 time frame. For Hanford and NTS, the combined radionuclide inventories of both LLW and MLLW are compared with the radiological capacity.

Table 3-4 presents the results of the Base Case sum-of-fractions analysis for these facilities. The sum-of-fractions value is less than or equal to 1.0 for all eight disposal facilities. Sum-of-fractions values of less than or equal to 1.0 indicate that these disposal facilities appear to possess adequate radiological capacity to dispose of the projected waste. The facility-specific bases for these results are presented in the following sections with a discussion of significant uncertainties. The detailed results of the sum-of-fractions analyses, including the ratio of each radionuclide to its site-specific limit, are found in Appendix B.

Table 3.4. Base Case Sum-of-Fractions Results for Low-Level and Mixed Low-Level Waste Disposal

Disposal Site/Facility	Sum-of-Fractions
Hanford/200 Area Burial Grounds and Mixed Waste Trenches 31 and 34	0.5
INEEL/RWMC	0.7
LANL/TA-54 Area G	0.3
NTS/Areas 3 and 5 RWMS and Area 5 Mixed Waste Disposal Unit	0.7
ORR/IWMF	0.6
SRS/LAW Vaults	0.5
SRS/ILW Vaults	0.9
SRS/E-Area Trenches	0.6

3.4.1 Hanford 200 Area Burial Grounds and Mixed Waste Trenches 31 and 34

The sum-of-fractions value for the Hanford 200 Area Burial Grounds and Mixed Waste Trenches 31 and 34 is estimated to be 0.5 for the LLW and MLLW projected to be disposed of at that facility through 2046. One radionuclide contributes at least 0.1 to the sum-of-fractions value for the LLW and MLLW: U-238 in monoliths, which contributes 0.1.

Based on the projected inventory used in this analysis and the current waste acceptance criteria, the radiological capacity of this disposal facility will not be exceeded throughout the duration of LLW and MLLW disposal.

3.4.2 INEEL RWMC

The sum-of-fractions value for the INEEL RWMC is estimated to be 0.7 for the LLW projected to be disposed at the facility through 2070. One radionuclide contributes more than 0.1 to the sum-of-fractions value: Ra-226, which contributes 0.3. The site-specific 1997 INEEL RWMC performance assessment determined that the Ra-226 inventory was not a significant contribution to facility exposure risk. Consequently, INEEL RWMC performance assessment did not establish limits for Ra-226. Thus, for the purposes of this Report, the Ra-226 contribution to the INEEL sum-of-fractions is based on the concentration limit established in the generic 1996 Performance Evaluation. Therefore, the Ra-226 contribution to the sum-of-fractions is overstated and does not reflect site-specific considerations at the INEEL.

Based on the projected inventory used in this analysis and the current waste acceptance criteria, the radiological capacity of this disposal facility will not be exceeded throughout the duration of LLW disposal.

3.4.3 LANL TA-54 Area G

The sum-of-fractions value for the LANL TA-54 Area G is estimated to be 0.3 for the LLW projected to be disposed at that facility through 2070. No radionuclides contribute more than 0.1 to the sum-of-fractions value for the LLW.

Based on the projected inventory used in this analysis and the current waste acceptance criteria, the radiological capacity of this disposal facility will not be exceeded throughout the duration of LLW disposal.

3.4.4 NTS Areas 3 and 5 RWMS and Area 5 Mixed Waste Disposal Unit

The sum-of-fractions value for NTS Areas 3 and 5 RWMS and the Area 5 Mixed Waste Disposal Unit is estimated to be 0.7 for the LLW and MLLW projected to be disposed at NTS through 2070. Radionuclides contributing at least 0.1 to the sum-of-fractions value are Ra-226, which contributes 0.3, and Cs-137, which contributes 0.2.

Based on the projected inventory used in this analysis and the current waste acceptance criteria, the radiological capacity of this disposal site will not be exceeded throughout the duration of LLW and MLLW disposal.

3.4.5 ORR IWMF

The sum-of-fractions value for the ORR IWMF is estimated to be 0.6 for the LLW currently disposed at the facility. Radionuclides contributing at least 0.1 to the sum-of-fractions value are Sr-90, which contributes 0.3; and K-40, which contributes 0.1.

DOE is planning to dispose of a small additional volume of LLW to completely fill this facility. DOE is determining which wastes can be disposed of in this facility. Based on the inventory used in this analysis and the current waste acceptance criteria, the radiological capacity of this disposal facility will not be exceeded throughout the duration of LLW disposal.

3.4.6 SRS

DOE separately evaluated the following three LLW disposal facilities at SRS: the LAW Vaults, the ILW Vaults, and the E-Area Trenches.

3.4.6.1 LAW Vaults

The sum-of-fractions value for the SRS LAW Vaults is estimated to be 0.5 for the LLW projected to be disposed at the facility through 2070. One radionuclide contributes more than 0.1 to the sum-of-fractions value: U-234, which contributes 0.2.

Based on the projected inventory used in this analysis and the current waste acceptance criteria, the radiological capacity of this disposal facility will not be exceeded throughout the duration of LLW disposal.

3.4.6.2 ILW Vaults

The sum-of-fractions value for the SRS ILW Vaults is estimated to be 0.9 for the LLW projected to be disposed at the facility through 2070. Radionuclides contributing at least 0.1 to the sum-of-fractions value are I-129, which contributes 0.3; U-233, which contributes 0.2; U-234, contributes 0.2; and U-238, which contributes 0.1. These results are based on the values contained in the performance assessment for the ILW Vaults.

Based on the projected inventory used in this analysis and the current waste acceptance criteria, the radiological capacity of this disposal facility will not be exceeded throughout the duration of LLW disposal.

3.4.6.3 E-Area Trenches

The sum-of-fractions value for the SRS E-Area Trenches is estimated to be 0.6 for the LLW projected to be disposed in that facility through 2070. One radionuclide contributes more than 0.1 to the sum-of-fractions value: K-40, which contributes 0.4.

Based on the projected inventory used in this analysis and the current waste acceptance criteria, the radiological capacity of this disposal facility will not be exceeded throughout the duration of LLW disposal.

3.5 Alternative Scenarios Facility-Specific Radiological Projections and Capacities

This section presents the sum-of-fractions value results for Alternative Scenarios involving two different disposal facilities for certain LLW and MLLW streams. The two Alternative Scenarios calculate the effect on the sum-of-fractions values at two waste operations disposal facilities (Hanford and NTS) if these facilities received additional LLW and MLLW. The additional LLW disposed at these facilities in the Alternative Scenarios has a volume of 450,000 m^3, comprised of LLW defined as *to be determined* (280,000 m^3) and LLW projected to be disposed in the planned CERCLA disposal facility and remediation units (170,000 m^3). The additional MLLW disposed at these facilities in the Alternative Scenarios has a volume of 42,000 m^3, comprised of MLLW defined as *to be determined* (5,100 m^3) and MLLW projected to be disposed in the planned CERCLA disposal facility (37,000 m^3). Hanford and NTS disposal facilities were selected for the Alternative Scenarios because they are specified as regional disposal facilities in the WM PEIS LLW and MLLW disposal ROD. Chapter 2 discusses the volumetric capacity of these facilities.

No waste projected to be disposed at commercial facilities was included in the additional waste volumes considered in the two Alternative Scenarios. The sum-of-fractions results are shown in Table 3-5 and discussed below.

Table 3.5. Alternative Scenario Sum-of-Fractions Analysis for Low-Level and Mixed Low-Level Waste Disposal

Disposal Facility/Site	Sum-of-Fractions for Base Case	Sum-of-Fractions for LLW Alternative Scenario	Sum-of-Fractions for MLLW Alternative Scenario
Hanford Site	0.5	0.9	0.8
Nevada Test Site	0.7	2	2

Based on this analysis, Hanford could dispose of all of the alternative-scenario LLW and MLLW in addition to its current and projected inventory of waste without exceeding radiological limits, but NTS could not. The following sections present the facility-specific basis for these results. Appendix B presents the detailed sum-of-fractions results of the analyses, including the ratio of each radionuclide concentration to its site-specific limit.

3.5.1. Hanford Site 200 Area Burial Grounds and Mixed Waste Trenches 31 and 34

As discussed in Section 3.4.1, the sum-of-fractions result for the Hanford 200 Area Burial Grounds and Mixed Waste Trenches 31 and 34 is estimated to be 0.5 for the current and projected LLW and MLLW currently planned to be disposed at the 200 Area. When the entire inventory of alternative-scenario LLW is added to this inventory, the sum-of-fractions value increases to 0.9. When the entire inventory of alternate scenario MLLW is added to this inventory, the sum-of-fractions value decreases to 0.8. The sum-of-fractions value decreases in the MLLW alternative scenario because the value is calculated using concentration values, and the concentration of the alternative-scenario MLLW is, in total, less than the base case concentration.

Based on the projected inventory used in this analysis and the current waste acceptance criteria, disposing of the alternative-scenario LLW and MLLW at this facility would not cause its radiological capacity to be exceeded.

3.5.2 NTS Areas 3 and 5 RWMS and Area 5 Mixed Waste Disposal Unit

As discussed in Section 3.4.4, the sum-of-fractions results for NTS Areas 3 and 5 RWMS and Area 5 Mixed Waste Disposal Unit is estimated to be 0.7 for the current and projected LLW and MLLW currently planned to be disposed at NTS. When the entire inventory of alternative-scenario LLW is added to this inventory, the sum-of-fractions value increases to 2. When the entire inventory of alternative-scenario MLLW is added to this inventory, the sum-of-fractions value remains 2. Radionuclides contributing at least 0.1 to the sum-of-fractions values in the Alternative Scenarios are Cs-137, which contributes 0.5 to both Alternative Scenarios; Nb-94, which contributes 0.5 to both Alternative Scenarios; Ra-226, which contributes 0.2 to both Alternative Scenarios; C-14, which contributes 0.2 to the MLLW Alternative Scenario; Sr-90, which contributes 0.1 to both Alternative Scenarios; Tc-99, which contributes 0.1 to both Alternative Scenarios; and C-14am, which contributes 0.1 to the MLLW Alternative Scenario.

These results indicate that all of the alternative-scenario waste cannot be disposed of at NTS based on the radiological capacity of the disposal facilities. Waste streams with high concentrations of Cs-137, Nb-94, Ra-226, C-14, Sr-90, Tc-99, and C-14am that are candidates for disposal at NTS should be evaluated carefully to ensure the facility's radiological capacity is not exceeded. Efforts to reduce the uncertainties in the radiological inventories of the alternative-scenario LLW and MLLW and strict adherence to the NTS waste acceptance criteria will ensure the radiological limits are not exceeded.

4.0 SUMMARY AND CONCLUSIONS

4.1 Summary

The Department's current strategy for disposition of the projected 10.1 million m^3 of low-level waste (LLW) and 450,000 m^3 of mixed low-level waste (MLLW) from 2000 to 2070 is outlined as follows:

- Approximately 1.2 million m^3 of LLW and 63,000 m^3 of MLLW will be disposed in waste operations disposal facilities.
- Approximately 7.5 million m^3 of LLW and 200,000 m^3 of MLLW generated by environmental restoration activities will be disposed in existing and approved disposal facilities authorized under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).
- Approximately 170,000 m^3 of LLW and 37,000 m^3 of MLLW generated by environmental restoration activities will be disposed in a planned CERCLA disposal facility or in a planned CERCLA remediation unit.
- Approximately 280,000 m^3 of LLW and 5,100 m^3 MLLW will be disposed in facilities yet *to be determined*.
- Approximately 1.0 million m^3 of LLW and 150,000 m^3 of MLLW will be disposed in commercial facilities.

In the active disposal units of the waste operations disposal facilities included in this analysis, past waste disposal includes 290,000 m^3 of LLW before 1988; 560,000 m^3 of LLW between 1988 and 1999; and 180 m^3 of MLLW before 2000. To accommodate disposal of the past and projected waste, the Department has existing and planned disposal capacity in waste operations disposal facilities for 7.7 million m^3 of LLW and 62,000 m^3 of MLLW. The existing and approved capacity in the CERCLA disposal facilities is 24.4 million m^3 for LLW and MLLW. In addition, DOE plans to develop an additional CERCLA disposal facility and CERCLA remediation unit for disposal of selected LLW and MLLW streams. Table 4-1 summarizes the Department's site-specific volumetric and radiological capacity to manage LLW and MLLW through 2070.

Table 4-1. Volumetric and Radiological Capacity for Disposal of LLW and MLLW

Site	Disposal Facility	Waste Type	Past & Projected Waste Disposed (m^3) (Pre-1988 -2070)	Estimated Capacity (m^3)	Radiological Capacity Sum-of-Fractions [b]
Waste Operations LLW and MLLW Disposal Facilities					
Hanford Site	200 Area Burial Grounds	LLW	380,000	2,000,000	0.5 / 0.9 / 0.8
	Mixed Waste Trenches 31 and 34	MLLW	63,000	42,000	
INEEL	RWMC	LLW	51,000	97,000	0.7
LANL	TA-54 Area G	LLW	320,000	1,600,000	0.3
NTS	Areas 3 and 5 RWMS	LLW	1,100,000	3,700,000	0.7 / 2 / 2
	Area 5 Mixed Waste Disposal Unit	MLLW	< 1	20,000	
ORR	IWMF	LLW	5,400	5,400	0.6
SRS	LAW Vaults	LLW	48,000	61,000	0.5
	ILW Vaults	LLW	6,900	14,600	0.9
	E-Area Trenches	LLW	64,000	170,000	0.6
Subtotal Waste Operations Disposal Facilities		**LLW**	**2,000,000**	**7,700,000**	**N/A**
		MLLW	**63,000**	**63,000**	
CERCLA Disposal Facilities					
Fernald	OSDF	LLW	1,900,000	1,900,000	N/A [a]
		MLLW	90		
Hanford Site	ERDF	LLW	5,800,000	21,400,000	
INEEL	ICDF (planned)	LLW	76,000	Not determined	
		MLLW	37,000		
	Remediation Unit (planned)	LLW	90,000	Not determined	
ORR	EMWMF (approved)	LLW	890,000	1,100,000	
		MLLW	200,000		
Subtotal CERCLA Disposal Facilities		**LLW**	**8,800,000**	**24,400,000**	**N/A**
		MLLW	**240,000**		
To Be Determined		*LLW*	*280,000*	*N/A*	*N/A*
		MLLW	*5,100*		
Commercial Disposal Facilities		LLW	1,000,000	N/A	N/A
		MLLW	150,000		

[a] Sum-of-fractions values are not calculated for CERCLA disposal facilities.
[b] The three sum-of-fractions values shown for Hanford and NTS represent; 1) the Base Case radiological inventory of DOE LLW and MLLW, 2) Base Case volume of LLW and MLLW projected to be disposed at these two waste operations facilities combined with LLW volumes targeted for not-yet-constructed CERCLA disposal facilities or waste classified as *to be determined*, and 3) Base Case volume of LLW and MLLW projected to be disposed at these two waste operations facilities combined with LLW and MLLW volumes targeted for not-yet-constructed CERCLA disposal facilities or waste classified as *to be determined*.
Note: Because of rounding, some totals may not equal the sum of their components.

The Department has sufficient complex-wide volumetric capacity to dispose of projected LLW and MLLW through 2070, assuming that all approved and planned facilities will be constructed.

The complex-wide radiological capacity through 2070 for LLW and MLLW appears to be adequate for the Base Case scenario. Based on this analysis, however, the complex-wide radiological capacity for the LLW and MLLW Alternative Scenarios appears to be inadequate. Disposing of the LLW and the MLLW included in the Alternate Scenarios results in sum-of-fraction values exceeding 1 for NTS. Further analysis is required to determine whether the Department's disposal projections for that facility would result in exceedance of that facility's radiological limits.

4.2 Conclusions

As a result of the analyses performed in this Report, based on an early 2000 snapshot of current Department waste projections and capacity information, the following conclusions can be drawn:

1. *The Department has sufficient complex-wide volumetric capacity for LLW disposal through 2070. The radiological capacity through 2070 for LLW disposal also appears to be sufficient.*

The Department's existing, approved, and planned LLW disposal facilities provide sufficient volumetric and radiological capacity to accommodate all LLW the Department projects will require disposal at DOE facilities. A number of these facilities also appear to have significant volumetric and radiological disposal capacity surpluses. This assessment considered 13 disposal facilities at 7 DOE sites, including 8 waste operations facilities (Hanford 200 Area Burial Grounds, INEEL RWMC, LANL TA-54 Area G, NTS Areas 3 and 5 RWMS, ORR IWMF, SRS LAW Vaults, SRS ILW Vaults, and SRS E-Area Trenches), three existing/approved environmental restoration CERCLA disposal facilities (Fernald OSDF, Hanford ERDF, and Oak Ridge Reservation EMWMF), one planned environmental restoration CERCLA disposal facility (INEEL ICDF), and one planned CERCLA remediation unit (INEEL CERCLA Remediation Unit).[1] DOE's disposal facilities also have sufficient volumetric capacity to accommodate LLW currently destined for disposal in a planned facility (if the planned facility were not constructed) and LLW that does not have an identified disposal option (disposition in a to be determined facility).

[1] Waste operations facilities are not limited by non-DOE regulation as to what DOE LLW and MLLW they may receive with respect to the waste origin. Environmental restoration CERCLA disposal facilities are limited by federal regulation to acceptance of LLW and MLLW generated from designated on-site environmental restoration activities.

2. *The Department has sufficient complex-wide radiological capacity for MLLW disposal through 2070. However, to accommodate the volume of MLLW projected to require disposal at the Department's waste operations facilities, implementation issues regarding use and expansion of the Hanford Mixed Waste Trenches 31 and 34 and the Nevada Test Site Area 5 Mixed Waste Disposal Unit must be resolved.*

The Department has two MLLW disposal facilities: the Hanford Mixed Waste Trenches 31 and 34, and the NTS Area 5 Mixed Waste Disposal Unit. These two facilities provide the Department a total disposal capacity of 62,000 m^3, and both facilities include room for further expansion. The Department has projected that 63,000 m^3 of MLLW will be disposed at these two facilities through 2070. While the combined capacity of these facilities is less than the total projected waste volume, future disposal needs may change as a result of changes in both waste volume and disposal capacity. DOE expects changes to include additional off-site MLLW that may be disposed at Hanford and NTS as a result of implementation of DOE's Waste Management Programmatic Environmental Impact Statement Record of Decision for MLLW disposal, changes in the quantities of on-site MLLW destined for these facilities, and, if necessary, expansion of the MLLW disposal facilities at these sites.

3. *Development of planned environmental restoration CERCLA disposal facilities may affect the available disposal capacity at Waste Operations MLLW disposal facilities.*

DOE plans to develop an environmental restoration CERCLA disposal facility at Idaho National Engineering and Environmental Laboratory, the INEEL ICDF. This facility is projected to receive 37,000 m^3 of MLLW as well as a larger quantity of LLW. The potential effects that not constructing this facility could have on MLLW disposal capacity was assessed in the alternative scenarios presented in this Report. Developing this facility would allow more flexibility in using DOE's currently available remaining MLLW disposal capacity.

4. *The Department should make efforts to improve data quality and reduce uncertainties*.

The Department's confidence in the quality of data used in the report has improved considerably since the 1998 Revision 1 report. However, DOE expects that uncertainty in the analysis will continue to be reduced as data quality continues to improve. Uncertainty can be reduced in three distinct areas. First, the uncertainty of many of the waste stream radionuclide profiles used in this Report can be reduced in those cases where the profiles are estimates based on composited, incomplete, and extrapolated radionuclide data. This report used considerably more field-developed site-specific radiological profile data than in the previous report. However, much of the radionuclide inventory used in this report was still based on composited and extrapolated radionuclide data. Second, uncertainty can be reduced in developing improved volumetric projections. As implementation of the Environmental Management Program's site cleanup plans proceed, these projections have improved and are expected to continue to improve. Finally, uncertainty can be reduced by an improved understanding of disposal facility performance assessment attributes. All waste operations disposal facilities performance assessments have been approved and several revisions and addenda have been completed as part of the performance assessment maintenance process.

APPENDIX A: Disposal Facility Summaries

A.1 Hanford Site

A.1.1 Background

Location: Managed by DOE, Hanford covers approximately 1,500 km^2 (500 mi^2) of government-owned land and is located northwest of the city of Richland, Washington, on the Columbia Plateau. It is bounded on the north by the Saddle Mountains, on the east by the Columbia River, and on the south and west by the Yakima River and the Rattlesnake Hills, respectively.

Historical Activities: In early 1943, the U.S. Army Corps of Engineers selected Hanford as the location for reactor, chemical separation, and related facilities and activities involving the production and purification of plutonium. The Waste Management program operates disposal facilities at the 200 Area Burial Grounds.

A.1.2 200 Area Burial Grounds

A.1.2.1 Facility Description

Status: The 200 Area Burial Grounds are classified as a shallow landfill disposal facility. Shallow land disposal of solid waste has occurred at Hanford since the late 1940s. The 200 Area Burial Grounds cover an area of about 1,050 acres, of which about 550 acres are active.

Waste Materials: Until 1970, when the Atomic Energy Commission (AEC) required transuranic waste be retrievably stored, no distinction was made between transuranic waste (TRU) and LLW. LLW currently being disposed at Hanford consists of many waste streams derived from numerous sources, both on site and off site.

General Design Features: The landfill is divided into eight burial grounds: two located in the 200 East Area; and six located in the 200 West Area. The burial grounds considered in the analysis of Hanford are listed below.

The current method of disposing LLW is in unlined, sloped (≈ 45°) trenches about 6 to 7 m deep and vary in length up to about 500 m. Trenches are typically wide-bottomed (about 8 m wide) or V-shaped (about 3 m wide).

In 1987, MLLW was distinguished from LLW, and its disposal was largely discontinued except on a case-by-case basis. Two types of MLLW typically considered for disposal in the pre-1987 trenches are remote-handled MLLW (with exposures greater than 200 mrem/hr at the container surface) and special waste. Special waste includes unique waste requiring special handling or unusual waste such as decommissioned reactor vessels. Non-remote-handled MLLW is currently stored in aboveground buildings until treated to meet Land Disposal Restrictions (LDR). Treated LDR-compliant MLLW is currently disposed of a RCRA-compliant disposal facility, Trench 34 of Burial Ground 218-W-5.

Burial Ground 218-W-5 is located west of the Central Waste Complex within the fenced area of 200 West. This burial ground began disposing of waste in trenches in 1986. MLLW Trenches 31 and 34 are within Burial Ground 218-W-5. MLLW disposed of in the trenches includes lead bricks and shielding. LLW also is placed in this landfill. Burial Ground 218-W-5 has two distinct site characteristics. The south portion is a deep depression with elevations varying up to 24.4 m (80 feet) from a mean elevation at the Waste Receiving and Processing (WRAP) facility. The north portion is a ridge or plateau area that varies up to 22.9 m (75 feet) higher than the mean elevation of the WRAP facility. Future planning by Decontamination and Decommissioning utilizes a portion of the 218-W-5 (expansion) development area for disposal of the 100 Area production reactors.

Burial Ground 218-W-3A began disposing waste in trenches in 1983 and covers 20.4 ha (50.3 acres). Waste stored or disposed includes mixed, transuranic, low-level, and retrievable waste. Examples of waste placed in this burial ground include ion-exchange resins, industrial waste, failed equipment, tanks, pumps, ovens, agitators, heaters, hoods, jumpers, vehicles, and accessories. The burial ground also stores remote-handled (RH) TRU. Currently the burial ground is approximately 96% full.

Burial Ground 218-W-3AE began disposing waste in trenches in 1981 and covers 20 ha (49.4 acres). Waste in this burial ground includes LLW and MLLW. Examples of waste placed in this burial ground include rags, paper, rubber gloves, disposable supplies, broken tools, and industrial waste.

Burial Ground 218-W-6 has not received any waste to date. When developed, this burial ground is expected to cover approximately 18 ha (44.5 acres).

Burial Ground 218-W-4B began disposing waste in trenches in 1967 and covers 3 ha (8 acres). Waste in this facility includes TRU and LLW. Examples of waste placed in trenches include contaminated soil, decommissioned pumps, pressure vessels and hardware, Caissons, and stored RH TRU. Some of the trenches are designed to be retrievable storage.

Burial Ground 218-W-4C began disposing waste in trenches in 1978 and covers 21 ha (51.7 acres). Waste in this facility includes TRU, MLLW, and LLW. Examples of waste placed in trenches include contaminated soil, decommissioned pumps, pressure vessels and hardware, and stored RH TRU. Some of the trenches are designed to be retrievable storage.

Burial Ground 218-E-10 began disposing waste in trenches in 1960 and covers 36 ha (90 acres). Waste at this site was received from the Plutonium/Uranium Extraction Plant, B Plant, and N Reactor and includes LLW and MLLW, such as failed equipment and industrial waste.

Burial Ground 218-E-12B began disposing wastes in trenches in 1962 and covers 70.1 ha (173.1 acres). Waste contained in this burial ground includes TRU, MLLW (including deactivated naval reactor components), and LLW.

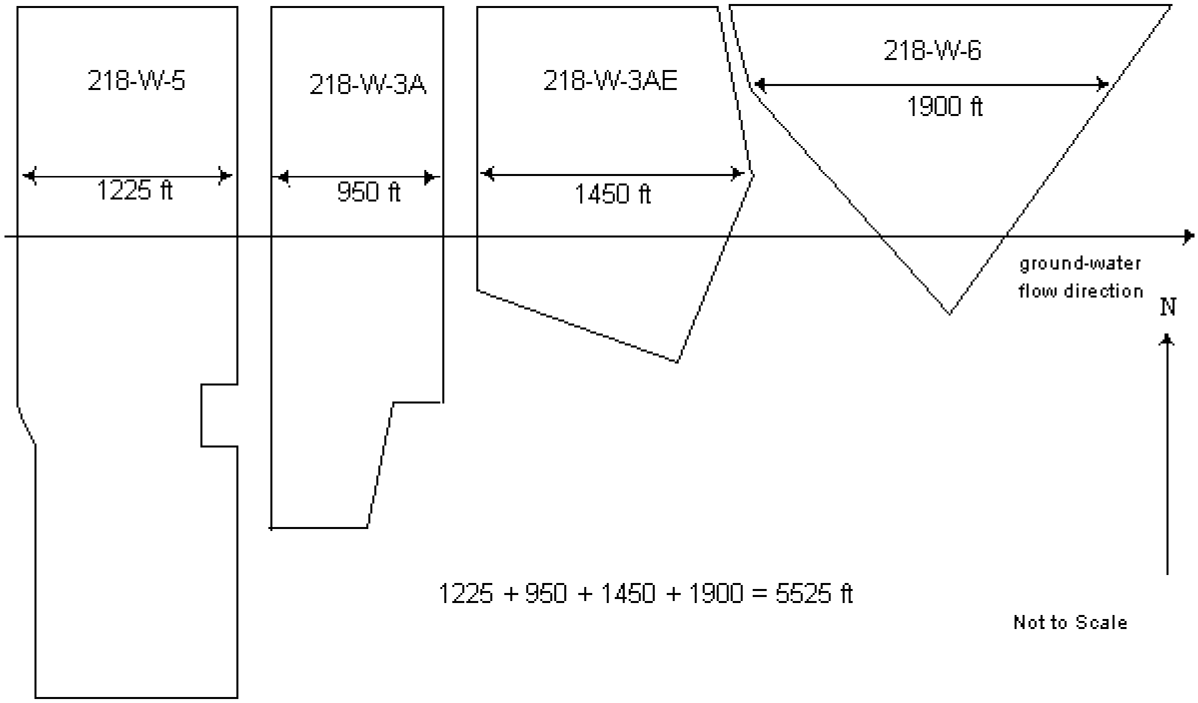
A.1.2.2 Scaling Factor

Assumptions for determining scaling factors:

Treat the 200 Area as two separate disposal facilities – west and east.

- Orientation is as shown in Figures A-1 and A-2.
- Ground-water flow is generally from west to east (to the river) but varies across the site.
- For 200-W, assume length parallel to ground-water flow is comprised of 218-W-5, 218-W-3A, 218-W-3AE, and 218-W-6 (Wood et al., 1995).
- For 200-E, assume length parallel to ground-water flow is comprised of 218-E-12B (DOE, 1994).
- Add the 200-W and 200-E lengths to determine length parallel to ground-water flow.
- Southern part of 218-W-5 is for MLLW, but as in the 200-W performance assessment, MLLW is not considered separately from LLW for radiological purposes.
- Use Performance Evaluation (PE) trench values for both 200 East and 200 West disposal facilities.

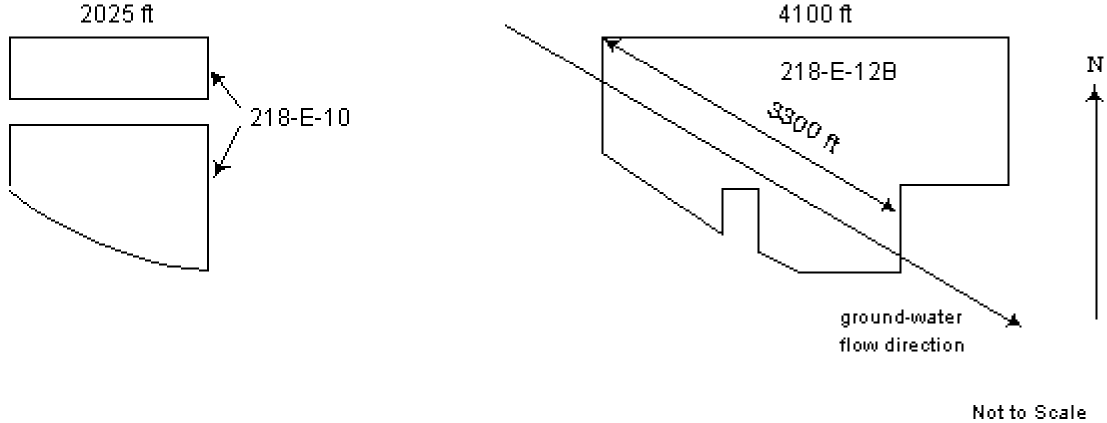
Figure A-1. Hanford 200 West Area Facility Analysis Configuration



Hanford 200 West Area

- Length parallel to ground-water flow (i.e., east-west dimensions of 218-W-5, 218-W-3A, 218-W-3AE, and 218-W-6) is ~5525 feet (based on DOE, 1994, page A-14, Fig. A-8). (The dimensions of 218-W-4B and 218-W-4C, which are south of the above burial grounds, are not shown because these burial grounds contribute to the width of the 200 West Area rather than to its length parallel to ground-water flow and therefore does not influence the scaling factor.)
- Effective length parallel to ground-water flow = 5525 ft × 0.3048 m/ft = 1684 m
- Incorporate above effective length into SF determination shown in Figure A-2.

Figure A-2. Hanford 200 East Area Facility Analysis Configuration



Hanford 200 East Area

- Length parallel to ground-water flow is ~ 3300 ft (based on DOE, 1994, page A-13, Fig. A-7)
- Effective length parallel to ground-water flow = 3300 ft × 0.3048 m/ft = 1006 m
- SF = 50 m/(1684 m + 1006 m) = 0.019

A.2 Idaho National Engineering and Environmental Laboratory

A.2.1 Background

Location: Idaho National Engineering and Environmental Laboratory (INEEL) covers nearly 2,300 km^2 (~890 mi^2) in southern Idaho. INEEL is within the Medicine Lodge and Big Butte Resource Areas, which are administered by the Department of Interior Bureau of Land Management.

Historical Activities: In 1949, the site was established as the National Reactor Testing Station, where the AEC built, tested, and operated various types of nuclear reactors. As of April 1991, 52 reactors had been built at the site, and three are currently funded to operate. INEEL is now a multiprogram laboratory with numerous research and site cleanup activities. One LLW disposal facility, the Radioactive Waste Management Complex (RWMC) is presently operating at INEEL. The RWMC is located in the southwest portion of the site. The INEEL does not plan to build another waste operations disposal facility, and is currently planning for disposal at Hanford and NTS once the RWMC fills.

A.2.2 Radioactive Waste Management Complex

A.2.2.1 Facility Description

Status: The RWMC was established in 1952 for disposal of defense wastes (mostly TRU), solid LLW, and MLLW generated at INEEL. Since 1970, TRU waste has been stored above ground in specially designed storage facilities, and no MLLW has been disposed at the complex since April 1984. Today, the facility provides waste management, interim storage of TRU waste, and disposal of INEEL-generated LLW, but provides no means for disposing of MLLW. The facility also retrieves, examines, and certifies stored transuranic waste for ultimate shipment to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico.

Waste Materials: Buried waste and retrievably stored waste include solid, beta-gamma contaminated LLW from INEEL operations, TRU waste, and contaminated soil. Buried waste is subdivided into contact-handled and remote-handled waste. The beta-gamma contaminated LLW and contaminated soils contain transuranic contaminants less than 100 nCi/g. The buried waste, beta-gamma LLW, and soil are classified as LLW.

General Design Features: The 58-ha (144-acre) complex consists of two main disposal and storage areas: the Transuranic Storage Area, for storage, examination and treatment of TRU waste; and the Subsurface Disposal Area (SDA) for disposal of LLW. The Subsurface Disposal Area is a fenced, 97-acre area in the western part of the RWMC surrounded by a flood control dike and drainage channel. Waste has been buried in the SDA since 1952 in trenches, pits, soil vault rows, and concrete vaults. Beginning in 1977, areas not suited for pits were set aside for drilling of soil vaults. Use of soil vaults was discontinued in September 1995. All waste types previously disposed in soil vaults are now disposed in concrete vaults. The major burial areas presently open are Pits 17, 18, 19, and 20, which includes the concrete vaults.

Pits are normally used for routine, solid, contact-handled, beta-gamma-contaminated LLW with radiation levels below 500 mR/h at 1 m. The pits are 30 m x 4 m to 6 m (98-f t x 12-ft to 20-ft) and vary from 60 m to 360 m (200 ft to 1,200 ft) long. Pits are generally excavated to bedrock depth, about 9 m, and then backfilled with 0.6 m of soil over rock. After the waste is placed on the soil by high-density stacking, the pits are backfilled with at least 0.9 m of soil. Remote-handled waste in concrete vaults is also disposed in the pit area. Currently 100 concrete vaults are installed, with a disposal volume of 5.32 m^3 per vault. A second set of 100 concrete vaults is scheduled for installation in 2003.

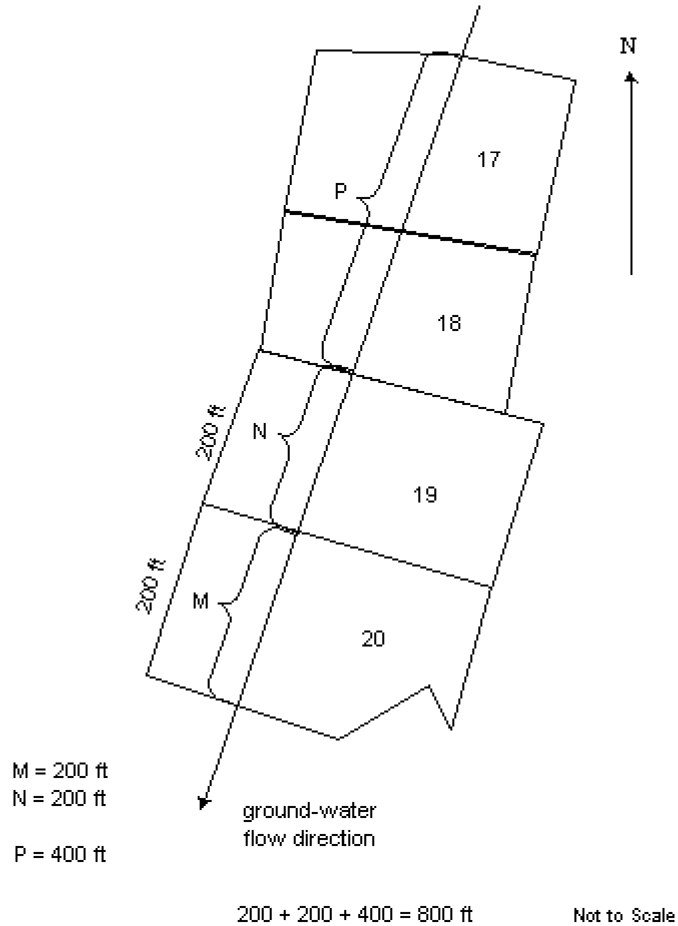
Soil vaults were unlined, augured boreholes between 0.41 and 1.8 m (16 to 72 in.) in diameter used to dispose of remote-handled LLW. The waste was usually placed in bottom discharge shielded casks for placement in the vaults.

A.2.2.2 Scaling Factor

Assumptions for determining scaling factor:

- Active disposal of LLW is in Pits 17, 18, 19, and 20, which also includes disposal in concrete vaults (Maheras et al., 1994, McCarthy et al., 1998)
- Ground-water flow is from north-northeast to south-southwest (Maheras et al., 1994).
- Orientation as shown.
- Use PE trench values.

Figure A-3. INEEL Facility Analysis Configuration



- Length parallel to ground-water flow is 800 ft (based on Maheras et al., 1994, Fig. 2-24, p. 2-74, confirmed by DOE, 1993, page B-4, Figure B-2)
- Effective length parallel to ground-water flow = 800 ft x 0.3048 m/ft = 244 m
- SF = 50 m/244 m = 0.204

A.3 Los Alamos National Laboratory

A.3.1 Background

Location: Los Alamos National Laboratory (LANL) is located on the Pajarito Plateau in Los Alamos County in north-central New Mexico, approximately 97 km (60 mi) north-northeast of Albuquerque and 40 km (25 mi) northwest of Santa Fe. LANL occupies an area of 112 km^2 (43 mi^2), bounded on the southeast by the Rio Grande river.

Historical Activities: The University of California has managed LANL since 1943, and the Department has been the designated federal landlord since 1978. LANL's mission involves the application of science and technology to weapons development, energy supply, and conservation programs. LANL has one operating LLW disposal facility, Technical Area-54, Material Disposal Area G.

A.3.2 Technical Area-54 Area G

A.3.2.1 Facility Description

Status: Since 1957, Area G within Technical Area-54 has been used to dispose of waste generated from operations involving radioactive materials. In 1970, the Atomic Energy Commission directed its facilities to begin storing transuranic waste so that it could eventually be retrieved. LANL then began segregating LLW from transuranic waste and dedicating specific areas within Area G for management of these wastes. Since 1977, transuranic waste has been segregated for storage at Area G. Since the application of RCRA at federal facilities, LANL has segregated its LLW from mixed LLW. Mixed LLW is stored at Area G aboveground and shipped off-site for treatment/disposal. Area G is currently the only authorized site at LANL for the disposal of LLW.

Waste Materials: LLW is managed according to applicable regulations and DOE Orders. The low-level waste streams managed at LANL include:

- Combustible/compactible waste contaminated with transuranic radionuclides, uranium, activation products, or fission products.
- Environmental restoration wastes
- Metallic/noncompactible waste from the decommissioning or decontamination activities
- Targets and other metallic waste generated through accelerator activities
- High activity tritium waste
- PCB-contaminated waste
- Asbestos-contaminated waste

To optimize its disposal capacity, the facility uses a compactor to reduce some LLW volumes by as much as 8 to 1.

General Design Features: The facility disposes of LLW using shallow land disposal in either pits or shafts. Approximately 40 disposal pits have been used in TA-54 Area G, four of which are currently active. The unlined pits, which are a maximum of 65 feet in depth, are filled with, on average, 10 to 12 tiers of tightly stacked waste. The layers of waste are covered with backfill to build the tiers.

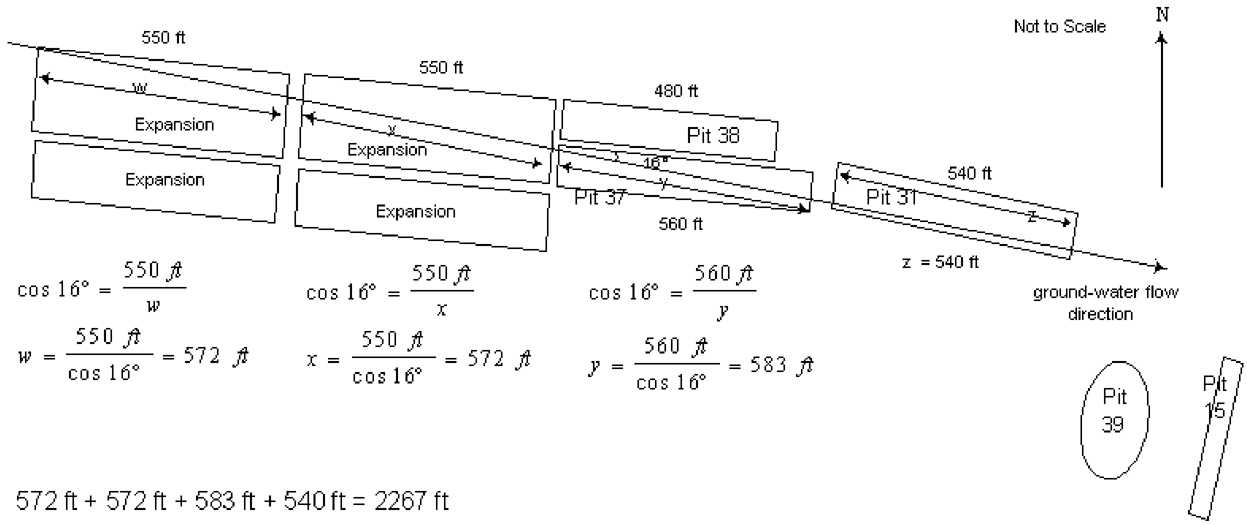
The area also has over 180 shafts ranging from 1 to 16 feet in diameter and up to 65 feet in depth. The shafts are used for higher activity waste forms and special waste forms (e.g., animal tissue) which require additional confinement from the site workers.

A.3.2.2 Scaling Factor

Assumptions for determining scaling factor:

- Pits 15, 31, 38, and 39 and several shafts are the only active disposal areas in Area G (LANL, 1997, p. 1-13, Section 1.2.3; p. 2-22, Section 2.1; Appendix 2e, p. 2-2; and information provided by the site).
- Treat Pits 31, 37, 38, and the expansion area as single unit. However, an expansion area is proposed west of the current disposal area (LANL, 1997, Appendix 3g, p. 26).
- Shafts are out of ground-water flow line for pits.
- Ground-water flow is from N 80° W (LANL, 1997, page 2-36, Figure 2-12).
- Orientation as shown (based on LANL, 1997, page 2-22, Figure 2-7; Appendix 3g, p. 26).
- Use PE trench values.

Figure A-4. LANL Facility Analysis Configuration



$$\cos 16° = \frac{550\ ft}{w} \qquad \cos 16° = \frac{550\ ft}{x} \qquad \cos 16° = \frac{560\ ft}{y}$$

$$w = \frac{550\ ft}{\cos 16°} = 572\ ft \qquad x = \frac{550\ ft}{\cos 16°} = 572\ ft \qquad y = \frac{560\ ft}{\cos 16°} = 583\ ft$$

572 ft + 572 ft + 583 ft + 540 ft = 2267 ft

- Effective length parallel to ground-water flow = 2267 ft x 0.3048 ft/m = 691 m
- SF = 50 m/691 m = 0.072

A.4 Nevada Test Site

A.4.1 Background

Location: The Nevada Test Site (NTS) occupies approximately 3,561 km^2 (1,375 mi^2) of federally-owned land in southeastern Nevada. Located about 105 km (65 mi) northwest of Las Vegas, the site is bordered to the west, north, and east by the Nellis Air Force Range.

Historical Activities: The NTS has been the primary location for testing the nation's nuclear weapons and devices since 1951. Other functions include environmental restoration efforts throughout NTS, technology development projects, and operation of the Liquefied Gaseous Fuels Spill Test Facility. Waste disposal facilities for LLW are located in Areas 3 and 5 Radioactive Waste Management Sites.

A.4.2 Area 3 Radioactive Waste Management Site

A.4.2.1 Facility Description

Status: The Area 3 Radioactive Waste Management Site (RWMS) is located on Yucca Flat and covers an area of approximately 49 ha (120 acres).

Waste Materials: Bulk LLW from on- and off-site generators are disposed in subsidence craters produced from underground nuclear testing.

Description: U3ah/at and U3bh are active disposal cells. U3axbl is an inactive, covered disposal cell discontinued in January 1988. Because waste received in the past contained lead, U3axbl may contain mixed waste; formal closure will commence when the Resource Conservation and Recovery Act closure cap plan is approved. Two other sites in Area 3 are in reserve: U3az and U3bg.

A.4.2.2 Scaling Factor - Not applicable since Area 3 has no ground-water pathway (i.e. very deep and thick vadoze zone). Therefore, an analysis configuration is also not applicable.

A.4.3 Area 5 Radioactive Waste Management Site

A.4.3.1 Facility Description

Status: The Area 5 RWMS is located on Frenchman Flat and covers 29 ha (732 acres) although only 37.4 ha (92 acres) are in use.

Waste Materials: Area 5 RWMS accepts LLW generated by on- and off-site generators. There are seven active cells for LLW (Pits 3, 5, 6 and 7 plus Trenches 7, 8, and 9). In addition, Pit 3 has received MLLW in the past, but under agreement with the State has suspended receipt pending resolution of waste acceptance criteria. However, MLLW generated at the NTS may be disposed in Pit 3 if Land Disposal Restrictions requirements are met.

General Design Features: The total area allocated to the Area 5 RWMS is 296 ha (732 acres). The developed portion of Area 5 occupies 37 ha (92 acres) in the southeast corner and contains 17 landfill cells (pits and trenches), 13 Greater Confinement Disposal Units boreholes, and a Transuranic Waste Storage Pad. Four pits are currently in operation in Area 5, one for disposal of MLLW, two for disposal of LLW, and one for disposal of LLW containing regulated asbestos. Three trenches in Area 5 are operational and designated to receive classified LLW: Trench T07C, Trench T08C, and Trench T09C. Trenches T03U and T04C have been closed.

The Mixed Waste Disposal Unit (currently designed to consist of 10 cells) is a landfill proposed for location on about 18 ha (45 acres) of the Area 5 RWMS, immediately north of the developed RWMS landfill area. The design has been completed, the unit is included in the Resource Conservation and Recovery Act permit application, and the environmental assessment is being updated.

A.4.3.2 Scaling Factor - Not applicable since Area 5 has no groundwater pathway (i.e. very deep and thick vadoze zone). Therefore, an analysis configuration is also not applicable.

A.5 Oak Ridge Reservation

A.5.1 Background

Location: Oak Ridge Reservation (ORR) is located in a valley between the Cumberland and southern Appalachian mountain ranges in eastern Tennessee about 25 km west of Knoxville. ORR covers an area of 35,252 acres and contains three major facilities: Oak Ridge National Laboratory (ORNL), the Oak Ridge East Tennessee Technology Park (formerly called the "K-25" site), and the Oak Ridge Y-12 Plant.

Historical Activities: ORR was originally constructed as a research and development facility to support plutonium production and research. Today, ORR conducts research on the fission nuclear fuel cycle and nuclear fusion. ORNL is the only facility of the three at ORR that currently operates a disposal site for LLW: the Interim Waste Management Facility (IWMF) at Solid Waste Storage Area (SWSA) 6.

A.5.2 IWMF

A.5.2.1 Facility Description

Status: Located about 40 km west of Knoxville, in Melton Valley (MV) in the southwest region of ORR, the 28-ha (68-acre) SWSA 6 has been used by the ORNL since 1969 for the disposal of on-site generated LLW. Until 1986, all LLW generated at ORNL (including MLLW) was disposed of by shallow land burial, generally in unlined trenches and auger holes. This practice came under closer scrutiny by federal and state regulators and DOE officials, and as a result, in 1986 major changes in the operation of SWSA 6 were initiated. Because of the disposal practices conducted before 1986, some areas in SWSA 6 were remediated under a Resource Conservation and Recovery Act interim status closure agreement with the Tennessee Department of Environment and Conservation. The remediation activities were coordinated with ongoing Greater Confinement Disposal units waste operations. Remediation of SWSA 6 and all of MV will occur under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A Record of Decision (ROD) for MV is expected to be signed by the end of Fiscal Year 2000.

Waste Materials: SWSA 6 does not accept any mixed waste for disposal. On-site generated MLLW will be treated on site and sent for permanent disposal either to Hanford or NTS. The radioactive solid waste disposal facility, the IWMF, was constructed in 1991 for solid LLW disposal. While SWSA 6 also served as a disposal site for fission-product LLW in Greater Confinement Disposal units and for waste in shallow land burial units, the IWMF is the only currently active disposal unit at SWSA 6. In 1999, the IWMF was filled to 80% capacity.

General Design Features: Below-grade disposal methods used at SWSA 6 include concrete silos, wells in concrete silos, pipe-lined auger hole wells, unlined trenches, and landfills. ORNL began phasing out below-grade disposal operations in December 1992 at a Tennessee Department of Environment and Conservation request. Below-ground disposal operations ceased January 1, 1994. The wells in concrete silos and the pipe-lined auger hole wells in SWSA 5N are still used for retrievable storage of very high-range, remote-handled LLW.

The IWMF is the only active above-grade tumulus disposal facility in SWSA 6, occupying an area of approximately 3.8 ha (9.5 acres) in the southwest portion of SWSA 6. The IWMF began operation in December 1991 and provides for disposal of solid LLW. The original facility was designed for six tumulus pads. Each tumulus pad is approximately 18.2 m x 27.4 m (60 ft x 90 ft) and 38.1 cm (15 in) thick, constructed using high-density concrete and reinforced with epoxy-coated steel. The pad has concrete curbs 0.30 m (1 ft) high on the north, south, and west sides. The east side is used for vehicle access. Each pad provides disposal for approximately 330 vaults, approximately 897 m^3 (31,680 ft^3) stacked three high.

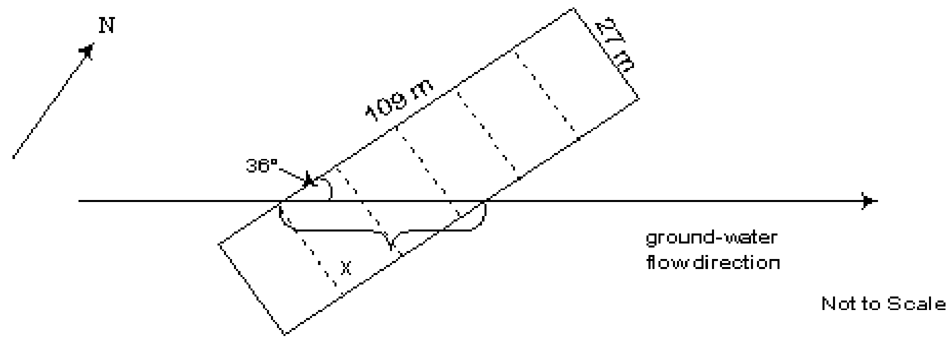
The IWMF is designed to divert water into three sumps, located in a monitoring station adjacent to the tumulus pads. The monitoring station is equipped for receiving, monitoring, and collecting sample from flows received from storm water, underpad, and infiltration drain systems. The underpad sump allows monitoring of any ground water that may accumulate under the pads. The storm water sump collects water from the pad in operation. The infiltration sump collects water from the pads filled with vaults. A principal feature of tumulus disposal is the inherent capability for monitoring ground water and surface water for contamination. The sealed concrete pad is the primary barrier from ground water. The pad is sloped 1 percent to one side where a curb and gutter collect all surface pad runoff and drain the water to a monitoring station. A liner below the pad provides a secondary barrier from the ground water and collects any water that may have penetrated the pad, which is then also diverted to the monitoring station.

A.5.2.2 Scaling Factor

Assumptions for determining scaling factor:

- IWMF is the only active disposal facility (U.S. DOE, 1997, pages 3-45 to 3-68).
- Ground-water flow is roughly west to east.
- IWMF consists of Pads 1 through 6, each 27 m by 18.2 m (U.S. DOE, 1997, p. 3-65).
- Orientation of the IWMF with ground-water flow as shown (U.S. DOE, 1997, p. E-28).
- Use PE tumulus values.

Figure A-5. ORR Facility Analysis Configuration



$$\sin 36° = \frac{27m}{x}$$

$$x = \frac{27m}{\sin 36°} = 46m$$

- Effective length parallel to the ground-water flow = 46 m
- SF = 50 m/46 m = 1.087

A.6 Savannah River Site

A.6.1 Site Description

Location: The Savannah River Site (SRS) is located in south-central South Carolina and occupies an area of approximately 300 mi^2 (192,000 acres). Ranging from 25 m to 130 m above mean sea level, the site's major geophysical feature is the Savannah River, which forms the site's southwestern boundary.

Historical Activities: The U.S. government began constructing SRS in 1950. SRS's current missions are site remediation and safe processing of nuclear materials. In 1987, the Department directed new disposal facilities constructed in humid climates to be "decoupled from the ground-water table." To comply with this directive, a project to build disposal vaults, called the E-Area Vaults, was initiated.

A.6.2 E-Area Low Activity Waste Vaults, Intermediate-Level Waste Vaults, and Trenches

A.6.2.1 Facility Description

Status: The E-Area occupies 81.0-ha (200 acres), approximately 10 km (6 mi) from the nearest plant boundary. Low-level radioactive solid waste produced at the SRS as well as LLW generated by the Naval Nuclear Propulsion Program are disposed in one centrally located site. On-site generated MLLW will be treated on site and sent for final disposal either to Hanford or NTS. The original 31-ha area began to receive waste in 1953 and was filled in 1972, when operations were shifted to a contiguous 48.1-ha site. In 1986, part of the site was closed and designated as a mixed waste facility because it contains hazardous material. Because these older facilities are filled, disposal is now shifted to the 40.5-ha (100-acre) E-Area Low Activity Waste (LAW) Vaults, Intermediate Level Waste (ILW) Vaults, and Trenches to the north in the E Area Low-Level Waste Facility.

Waste Materials: LLW handled at the E-Area Low-Level Waste Facility is segregated for disposal according to three main categories: Low Activity Waste (LAW); Intermediate Level Waste (ILW); and waste material for disposal in trenches. The gravel pad for Nuclear Reactor Component waste containers is not considered in this analysis as discussed in Section 2.8 in the main body of this Report.

LAW is waste material that radiates <200 mR/hr at 5 cm from an unshielded container. ILW is waste material that radiates >200 mR/hr at 5 cm from an unshielded container. ILW is further categorized into Intermediate Level Tritiated (ILT) Waste and Intermediate Level Non-Tritiated (ILNT) Waste. Tritiated waste is waste material that contains greater than a trace quantity of tritium (trace quantity is defined as <10 Ci of tritium per waste container) regardless of the radiation rate. Any LLW, whether it is ILW or not, that is tritiated waste is disposed in an ILW Vault.

Waste material to be disposed in trenches is generally soil and rubble with the potential to be contaminated with radionuclides (i.e., "suspect soil") but is neither tritiated waste nor designated as LAW or ILW.

General Design Features: The E-Area Low-Level Waste Facility as presented in the Performance Assessment (Cook et al, 2000) contains the following: two large concrete vaults for low activity waste (LAW); two large concrete vaults for ILNT and ILT; ten unlined trenches for disposal of very low activity waste, ten unlined trenches for disposal of intimately-mixed cement stabilized waste (MCSW); and ten unlined trenches for disposal of cement-stabilized encapsulated waste (CSEW) (Cook, et al, 2000). Vaults are of concrete construction and are divided into cells.

The LAW vaults are oriented in a general north-west direction and consist of three major subdivisions (modules) with each module containing four cells and will contain approximately 48,000 m^3 (1.7 million ft^3) of usable waste disposal capacity. The E-Area performance assessment is based on two LAW vaults. At this time, one LAW vault has been constructed and is in operation.

The ILT/ILNT Vaults are oriented in a general east-west direction that has segments comprising vaults for ILT waste and ILNT waste. At this time, one vault has been constructed, consisting of one ILNT vault and one ILT vault. The ILT Vault consists of two cells within the structure and provides approximately 1,600 m^3 (56,000 ft^3) of waste disposal capacity. One cell would be fitted with a silo system to permit the disposal of tritium crucibles. The ILT Vault is structurally identical to the ILNT Vault, except the ILT Vault has a combined length of 17 m (57 ft) while the ILNT Vault is 58 m (189 ft) long. The ILNT Vault consists of seven cells within the vault structure and provides approximately 5,700 m^3 (201,000 ft^3) of waste disposal capacity.

The E-Area Low-Level Waste Facility is planned to contain ten shallow land burial trenches for very-low-activity waste disposal. Waste that fits this category is environmental restoration and building decommissioning along with soil and rubble from regulated areas. The trenches are oriented in a northeast-southwest direction. The dimensions of each trench are 6 m wide by 200 m long by 6 m deep. Each trench provides approximately 5,760 m^3 (203,000 ft^3) of waste disposal capacity. Based on its current configuration, it is estimated that the E-Area could accommodate at least 57,600 m^3 (2,030,000 ft^3) of disposed waste in slit trenches.

Ten below-grade trenches are planned for the disposal of intimately-mixed cement stabilized waste. Waste that fits this category is from the Consolidated Incinerator Facility at SRS that produces an ash and a liquid waste. These materials are blended with cement to stabilize the waste form known as Ashcrete and Blowcrete. These trenches are identical to the trench design and will accommodate a total of 57,600 m^3 (2,030,000 ft^3).

Ten trenches are also planned for the disposal of CSEW. Waste that falls in this category is large equipment that has either failed or become obsolete. These waste forms are encapsulated by grout or other cementitious backfill as an alternative to vault disposal. These trenches are also identical to the trench design and will also accommodate a total of 57,000 m^3 (2,030,000 ft^3) of waste.

A.6.2.2 Scaling Factor

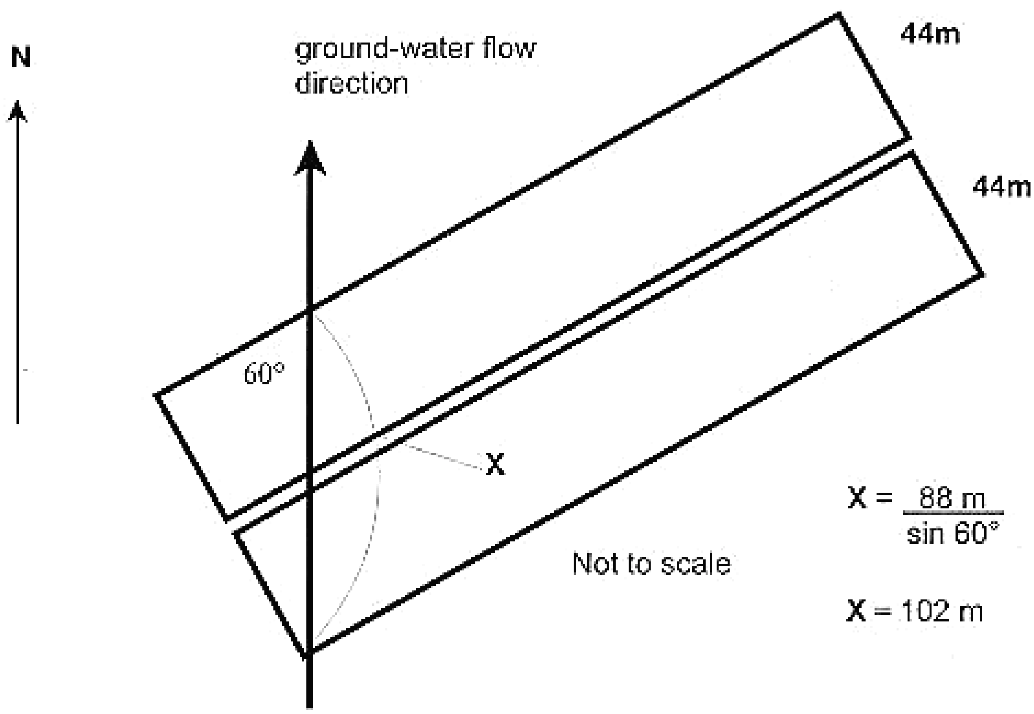
Assumptions for determining scaling factors:

- Three separate disposal areas: LAW Vaults; ILT/ILNT Vaults; ten trenches for the very low activity waste, ten trenches for the MCSW, and ten trenches for the CSEW (Cook et al, 2000, Figure 2.2-1).
- Ground-water flow is south-to-true-north (MMES, 1994, Fig. 3.4-3).
- Active disposal in two LAW Vaults, two ILT/ILNT Vaults, and thirty trenches.
- Use PE tumulus values (Waters and Gruebel, 1996) for LAW and ILT/ILNT vaults; scale based on assumed length of vault facility parallel to ground-water flow used in PE vault analysis (250 m) (Waters and Gruebel, 1996, p. A-SRS-6), and use PE trench values for slit trenches.

Savannah River LAW Vaults

Orientation as shown.

Figure A-6. SRS LAW Vaults Analysis Configuration

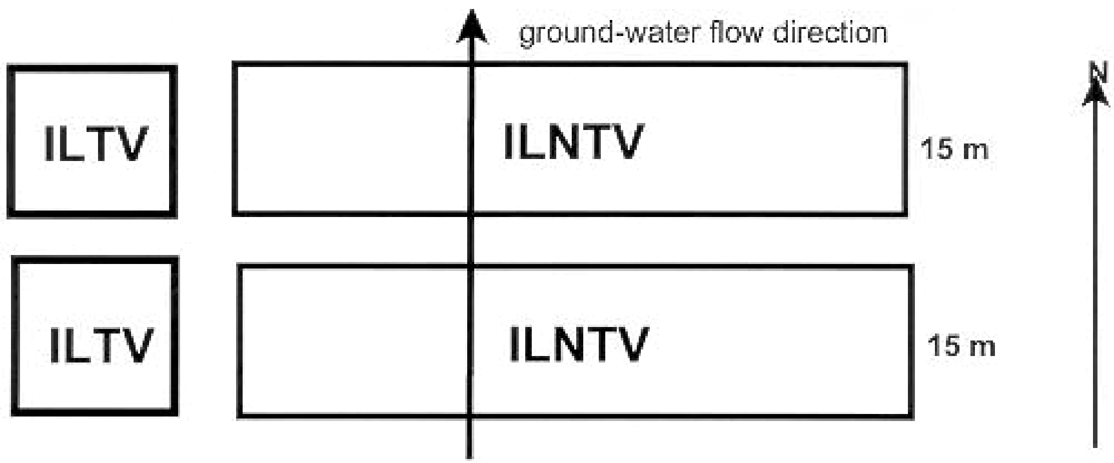


- Effective length parallel to ground-water flow = 102 m
- SF = 250 m/ 102 m = 2.45

Savannah River ILT/ILNT Vaults

Orientation as shown

Figure A-7. SRS ILT/ILNT Vaults Analysis Configuration

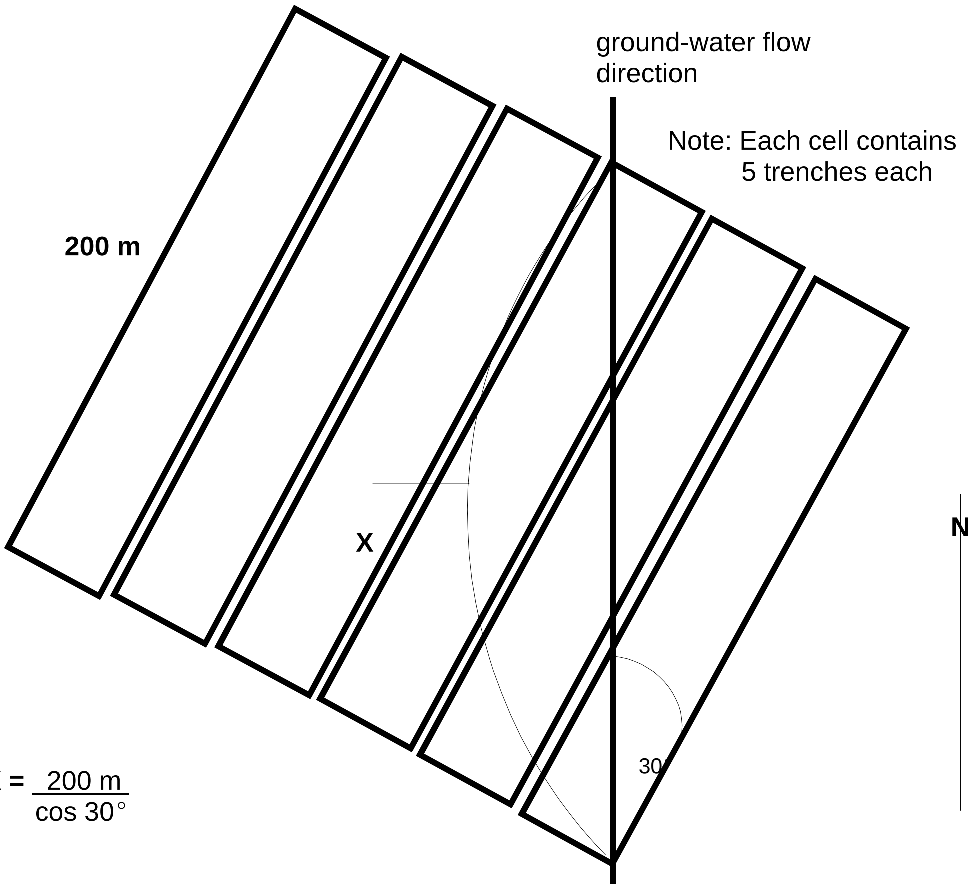


- Effective length parallel to ground-water flow = 30 m
- SF = 250 m/30 m = 8.33

Savannah River E-Area Trenches

Orientation as shown.

Figure A-8. SRS Trench Analysis Configuration



$$X = \frac{200\ m}{\cos 30^{\circ}}$$

X = 231 m

- Effective length parallel to ground-water flow = 231 m
- SF = 50 m/231 m = 0.217

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APPENDIX B: Radiological Projections and Capacity Analysis

Appendix B-1: Sum-of-Fractions Calculations

Base Case: Hanford 200 Area LLW & MLLW

Nuclide	1988-1997	1998-1999			2000-2070			1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Total	Avg. Conc.				
	Volume (trench, m3)	Volume (trench, m3)			Volume (trench, m3)			Volume (trench, m3)					
	1.10E+05	9.39E+02	1.12E+04	1.22E+04	9.15E+03	1.82E+05	1.91E+05	3.14E+05					
	Volume (monolith, m3)							Volume (monolith, m3)					
	1.97E+02							1.97E+02					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Ci/m3	Ci/m3			
H-3	8.79E+04	1.46E+00	2.28E+01	2.43E+01	1.44E+01	2.33E+02	2.48E+02	8.81E+04	2.81E-01	1.E+05	2.84E-06	I	WAC Cat 1
C-14	2.02E+02	1.29E-01	2.02E+00	2.15E+00	1.28E+00	2.08E+01	2.21E+01	2.26E+02	7.19E-04	9.E-02	7.91E-03	I	WAC Cat 1
C-14am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-02	4.94E-02	4.94E-02	1.57E-07	9.E-01	1.73E-07	I	WAC Cat 1
Al-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cl-36	3.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.67E-07	1.17E-12	8.E-07	1.54E-06	W	PE
K-40	3.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.31E-04	1.06E-09	7.E-04	1.51E-06	I	PE
Co-60	9.89E+05	2.19E+01	1.41E+02	1.63E+02	1.72E+02	3.31E+03	3.48E+03	9.92E+05	3.16E+00	3.E+04	1.05E-04	I	PE
Ni-59	4.90E+03	3.16E-01	4.95E+00	5.27E+00	3.12E+00	4.90E+01	5.21E+01	4.95E+03	1.58E-02	3.E+00	5.26E-03	I	PE
Ni-63	8.22E+05	3.90E+01	2.23E+02	2.62E+02	2.99E+02	1.72E+03	2.02E+03	8.25E+05	2.63E+00	6.E+01	4.45E-02	I	WAC Cat 1
Ni-63am	0.00E+00	8.40E-10	8.32E-08	8.40E-08	1.56E-07	1.91E-02	1.91E-02	1.91E-02	6.08E-08	6.E+01	1.03E-09	I	WAC Cat 1
Se-79	7.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.81E-05	2.49E-10	2.E-06	1.46E-04	W	PE
Sr-90	9.90E+05	5.38E+02	3.05E+03	3.59E+03	4.15E+03	2.38E+04	2.80E+04	1.02E+06	3.25E+00	5.E+04	6.03E-05	I	WAC Cat 3
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Nb-93m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Tc-99	7.15E+00	1.68E-03	1.64E-01	1.66E-01	3.07E-01	9.38E+01	9.41E+01	1.01E+02	3.23E-04	2.E-02	1.41E-02	I	WAC Cat 1
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-126	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
I-129	9.81E-02	5.35E-10	5.29E-08	5.35E-08	9.91E-08	4.13E-03	4.13E-03	1.02E-01	3.26E-07	9.E-03	3.83E-05	W	WAC Cat 1
Cs-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cs-137	8.64E+05	4.24E+02	2.40E+03	2.83E+03	3.28E+03	1.89E+04	2.21E+04	8.89E+05	2.83E+00	1.E+04	2.36E-04	I	WAC Cat 3
Ba-133	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-04	5.43E-10	3.E+02	1.81E-12	I	PE
Sm-151	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Eu-152	1.32E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E+03	4.19E-03	2.E+01	2.10E-04	I	PE
Eu-154	1.93E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E+03	6.14E-03	4.E+02	1.53E-05	I	PE
Ra-226	6.37E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.37E-04	2.03E-09	8.E-05	2.54E-05	I	PE
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Th-229	2.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-05	6.73E-11	5.E-04	1.35E-07	I	PE
Th-230	5.26E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-05	1.68E-10	8.E-05	2.10E-06	I	PE
Th-232	1.12E-01	2.67E-10	2.65E-08	2.67E-08	4.96E-08	3.45E-02	3.45E-02	1.46E-01	4.67E-07	6.E-05	7.78E-03	I	PE
Pa-231	4.48E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-07	1.43E-12	6.E-08	2.50E-05	W	PE
U-232	2.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-05	7.69E-11	4.E-06	2.02E-05	W	PE
U-233	3.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E+01	3.81E+01	3.85E+01	1.23E-04	7.E-03	1.66E-02	I	WAC Cat 1
U-234-trench	5.56E+01	1.56E-02	1.55E+00	1.56E+00	2.89E+00	5.23E+02	5.25E+02	5.83E+02	1.86E-03	1.E+99	1.86E-102	I	WAC-NL
U-234-monolith	1.99E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E+01	1.01E-01	1.E+99	1.01E-100	I	WAC-NL
U-235-trench	1.01E+00	1.62E-03	1.59E-01	1.60E-01	2.97E-01	5.17E+01	5.20E+01	5.32E+01	1.70E-04	3.E-03	6.06E-02	I	WAC Cat 1
U-235-monolith	6.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.43E-01	3.26E-03	5.E-01	6.53E-03	I	WAC Cat 3
U-236-trench	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-05	1.76E-05	1.76E-05	5.62E-11	1.E-02	5.92E-09	I	WAC Cat 1
U-236-monolith	1.09E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E+00	5.53E-03	2.E+00	2.77E-03	I	WAC Cat 3
U-238-trench	2.84E+01	1.93E-04	4.47E-03	4.66E-03	4.93E-03	3.94E+00	3.94E+00	3.24E+01	1.03E-04	6.E-03	1.81E-02	I	WAC Cat 1
U-238-monolith	3.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E+01	1.75E-01	1.E+00	1.46E-01	I	WAC Cat 3
Np-237	2.70E-02	1.49E-09	1.47E-07	1.49E-07	2.76E-07	1.25E-01	1.25E-01	1.52E-01	4.85E-07	4.E-04	1.21E-03	I	PE
Pu-238	1.40E+02	8.22E-02	4.66E-01	5.48E-01	6.31E-01	4.66E+00	5.29E+00	1.46E+02	4.66E-04	7.E-02	6.65E-03	I	PE
Pu-239	4.27E+01	3.83E-01	2.18E+00	2.56E+00	3.49E+00	9.29E+01	9.64E+01	1.42E+02	4.51E-04	6.E-03	7.52E-02	I	PE
Pu-240	1.37E+01	1.45E-01	8.20E-01	9.64E-01	1.32E+00	1.83E+01	1.97E+01	3.44E+01	1.09E-04	6.E-03	1.82E-02	I	PE
Pu-241	3.28E+02	9.15E+00	5.19E+01	6.10E+01	7.02E+01	4.48E+02	5.18E+02	9.07E+02	2.89E-03	2.E-01	1.45E-02	I	PE
Pu-242	1.02E-03	3.82E-11	3.78E-09	3.82E-09	7.08E-09	7.14E-05	7.14E-05	1.09E-03	3.48E-09	6.E-03	5.81E-07	I	PE
Pu-244	3.76E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-06	1.20E-11	4.E-04	2.99E-08	I	PE
Am-241	3.18E+01	3.28E-01	1.86E+00	2.18E+00	2.51E+00	3.47E+01	3.72E+01	7.12E+01	2.27E-04	7.E-03	3.24E-02	I	PE
Am-243	1.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.57E-01	4.57E-01	4.73E-01	1.51E-06	9.E-04	1.68E-03	I	PE
Cm-243	1.39E-02	3.82E-11	3.78E-09	3.82E-09	7.08E-09	2.68E-06	2.69E-06	1.39E-02	4.42E-08	8.E-01	5.53E-08	I	PE
Cm-244	6.84E-01	1.91E-10	1.89E-08	1.91E-08	3.54E-08	7.12E-06	7.16E-06	6.84E-01	2.18E-06	2.E+00	1.09E-06	I	PE

Notes: The waste volumes and uranium nuclide inventories and limits have been segregated to accommodate the separate 1996 disposal of a uranium-filled culvert monolith. 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 16-7, trench values), WAC = waste acceptance criteria, NL = No Limit (FDH, 1998, Table A-2); 3) No data, assumes 1/10 of C-14 value.

Sum of Fractions:	4.8E-01

Base Case: INEEL RWMC LLW

Nuclide	1984-1999	2000-2070			1984-2070	1984-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	Total	Avg. Conc.				
	Volume (m3)	Volume (m3)			Volume (m3)					
	31,491.0	10,058.0	9,770.0	19,828.0	51,319.0					
	Activity (Ci)	Activity (Ci)			Activity (Ci)	Ci/m3	Ci/m3			
H-3	3.00E+05	4.81E+03	4.67E+03	9.48E+03	3.10E+05	6.04E+00	7.E+01	8.63E-02	I	PE
C-14	3.10E+00	7.09E-01	6.89E-01	1.40E+00	4.50E+00	8.76E-05	7.E-03	1.25E-02	A	PE
C-14am	4.77E+01	1.09E+01	1.06E+01	2.15E+01	6.92E+01	1.35E-03	7.E-02	1.93E-02	A	3
Al-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cl-36	1.98E-02	2.23E-02	2.17E-02	4.40E-02	6.38E-02	1.24E-06	4.E-05	3.05E-02	W	PE
K-40	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Co-60	1.43E+06	3.14E+04	3.05E+04	6.19E+04	1.50E+06	2.92E+01	3.E+04	9.72E-04	I	PE
Ni-59	1.80E+03	4.70E+02	4.57E+02	9.27E+02	2.73E+03	5.32E-02	3.E+00	1.77E-02	I	PE
Ni-63	5.28E+05	5.79E+04	5.63E+04	1.14E+05	6.42E+05	1.25E+01	3.E+03	3.79E-03	I	WAC
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sr-90	6.20E+02	4.78E+01	4.64E+01	9.41E+01	7.14E+02	1.39E-02	1.E+01	1.16E-03	I	WAC
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Nb-93m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Nb-94	7.46E-01	6.12E-01	5.94E-01	1.21E+00	1.95E+00	3.80E-05	2.E-02	1.90E-03	I	4
Tc-99	1.16E+00	7.42E-01	7.21E-01	1.46E+00	2.62E+00	5.10E-05	3.E+00	1.70E-05	I	WAC
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-126	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
I-129	6.80E-03	5.30E-03	5.14E-03	1.04E-02	1.72E-02	3.36E-07	8.E-02	4.20E-06	I	WAC
Cs-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cs-137	3.16E+03	7.46E+01	7.25E+01	1.47E+02	3.30E+03	6.44E-02	8.E+00	8.05E-03	I	WAC
Ba-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sm-151	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Eu-152	2.86E+01	2.76E+01	2.68E+01	5.44E+01	8.31E+01	1.62E-03	2.E+01	8.09E-05	I	PE
Eu-154	7.83E+01	8.45E+01	8.21E+01	1.67E+02	2.45E+02	4.77E-03	4.E+02	1.19E-05	I	PE
Ra-226	1.18E+00	9.10E-02	8.84E-02	1.79E-01	1.36E+00	2.65E-05	8.E-05	3.31E-01	I	PE
Ra-228	1.07E-05	1.21E-05	1.17E-05	2.38E-05	3.45E-05	6.73E-10				5
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Th-230	1.11E-02	1.25E-02	1.21E-02	2.46E-02	3.57E-02	6.96E-07	8.E-05	8.70E-03	I	PE
Th-232	1.16E-02	1.31E-02	1.27E-02	2.59E-02	3.75E-02	7.30E-07	6.E-05	1.22E-02	I	PE
Pa-231	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
U-232	2.21E+00	7.34E-04	7.13E-04	1.45E-03	2.21E+00	4.31E-05	2.E-03	2.16E-02	I	PE
U-233	7.05E-03	7.96E-03	7.73E-03	1.57E-02	2.27E-02	4.43E-07	7.E-04	6.33E-04	I	PE
U-234	3.67E+00	1.59E-01	1.54E-01	3.13E-01	3.98E+00	7.76E-05	1.E-03	7.76E-02	I	PE
U-235	1.71E-01	1.64E-02	1.59E-02	3.23E-02	2.03E-01	3.96E-06	6.E-04	6.61E-03	I	PE
U-236	9.69E-03	8.36E-03	8.12E-03	1.65E-02	2.62E-02	5.10E-07	2.E-02	2.55E-05	I	PE
U-238	4.62E+00	3.51E+00	3.41E+00	6.91E+00	1.15E+01	2.25E-04	5.E-03	4.49E-02	I	PE
Np-237	1.16E-02	8.89E-03	8.63E-03	1.75E-02	2.91E-02	5.67E-07	4.E-04	1.42E-03	I	PE
Pu-238	4.14E-01	6.37E-02	6.19E-02	1.26E-01	5.39E-01	1.05E-05	7.E-02	1.50E-04	I	PE
Pu-239	2.55E+00	1.69E-01	1.65E-01	3.34E-01	2.88E+00	5.62E-05	6.E-03	9.37E-03	I	PE
Pu-240	1.04E-01	5.29E-02	5.14E-02	1.04E-01	2.08E-01	4.06E-06	6.E-03	6.77E-04	I	PE
Pu-241	1.93E+01	2.61E+00	2.53E+00	5.14E+00	2.44E+01	4.76E-04	2.E-01	2.38E-03	I	PE
Pu-242	5.33E-08	4.63E-08	4.49E-08	9.12E-08	1.44E-07	2.82E-12	6.E-03	4.69E-10	I	PE
Pu-244	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Am-241	3.83E+00	1.37E-01	1.33E-01	2.70E-01	4.10E+00	7.99E-05	7.E-03	1.14E-02	I	PE
Am-243	6.75E-06	7.62E-06	7.40E-06	1.50E-05	2.18E-05	4.24E-10	9.E-04	4.71E-07	I	PE
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cm-244	8.69E-02	1.22E-02	1.18E-02	2.40E-02	1.11E-01	2.16E-06	2.E+00	1.08E-06	I	PE
						Sum of Fractions:		**7.1E-01**		

Notes:

C-14 inventories assume 93.9% is present as activated metal. 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 4-7, trench values), WAC = waste acceptance criteria (DOE, 2000, Table 4.5.5-1, pit values); 3) Assumes 10X of C-14 PE value; 4) Assumes 1/10 of Nb-94am WAC value; 5) While no limits have been established for Ra-228, that nuclide is not a major contributor to facility risk.

Base Case: Los Alamos TA-54 LLW

Nuclide	1988-1997	1998-1999			2000-2070			1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Total	Avg. Conc.				
	Volume (m3)	Volume (m3)			Volume (m3)			Volume (m3)					
	4.27E+04	1.43E+03	2.13E+03	3.57E+03	3.39E+04	8.83E+04	1.22E+05	1.68E+05					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Ci/m3	Ci/m3			
H-3	4.33E+05	0.00E+00	8.47E+02	8.47E+02	0.00E+00	3.51E+04	3.51E+04	4.69E+05	2.78E+00	7.E+01	3.98E-02	I	PE
C-14	4.57E-02	0.00E+00	1.28E-03	1.28E-03	0.00E+00	5.30E-02	5.30E-02	1.00E-01	5.94E-07	1.E-03	5.94E-04	A	PE
C-14am	0.00E+00	0.00E+00	4.18E-03	4.18E-03	0.00E+00	1.73E-01	1.73E-01	1.77E-01	1.05E-06	1.E-02	1.05E-04	I	3
Al-26	3.80E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.80E-08	2.26E-13	5.E-05	4.51E-09	I	PE
Cl-36	5.89E-04	0.00E+00	6.07E-05	6.07E-05	0.00E+00	2.51E-03	2.51E-03	3.16E-03	1.88E-08	2.E-04	9.39E-05	I	PE
K-40	5.14E-03	0.00E+00	1.42E-03	1.42E-03	0.00E+00	5.88E-02	5.88E-02	6.54E-02	3.88E-07	7.E-04	5.55E-04	I	PE
Co-60	8.86E+02	0.00E+00	4.00E+00	4.00E+00	0.00E+00	1.65E+02	1.65E+02	1.06E+03	6.27E-03	3.E+04	2.09E-07	I	PE
Ni-59	1.84E-02	0.00E+00	1.50E-03	1.50E-03	0.00E+00	6.23E-02	6.23E-02	8.22E-02	4.88E-07	3.E+00	1.63E-07	I	PE
Ni-63	1.12E-03	0.00E+00	2.59E-04	2.59E-04	0.00E+00	1.07E-02	1.07E-02	1.21E-02	7.18E-08	8.E+00	8.97E-09	I	PE
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	2.52E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-06	1.50E-11	2.E-01	7.49E-11	I	PE
Sr-90	7.29E+00	0.00E+00	6.57E-02	6.57E-02	0.00E+00	2.72E+00	2.72E+00	1.01E+01	5.98E-05	5.E-02	1.20E-03	I	PE
Zr-93	2.83E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-05	1.68E-10	5.E+00	3.35E-11	I	PE
Nb-93m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Nb-94	2.77E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-02	1.64E-07	9.E-05	1.83E-03	I	PE
Tc-99	5.57E-02	0.00E+00	9.88E-03	9.88E-03	0.00E+00	4.09E-01	4.09E-01	4.75E-01	2.82E-06	1.E-04	1.96E-02	W	PE
Cd-113m	5.15E-01	0.00E+00	6.58E-05	6.58E-05	0.00E+00	2.73E-03	2.73E-03	5.17E-01	3.07E-06	1.E+00	3.07E-06	I	PE
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-126	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
I-129	1.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-06	8.99E-12	2.E-03	4.49E-09	I	PE
Cs-135	1.16E-03	0.00E+00	3.07E-04	3.07E-04	0.00E+00	1.27E-02	1.27E-02	1.42E-02	8.42E-08	2.E-01	4.21E-07	I	PE
Cs-137	8.37E+01	0.00E+00	7.07E-02	7.07E-02	0.00E+00	2.93E+00	2.93E+00	8.67E+01	5.15E-04	3.E-01	1.72E-03	I	PE
Ba-133	2.53E+01	0.00E+00	5.74E+00	5.74E+00	0.00E+00	2.38E+02	2.38E+02	2.69E+02	1.60E-03	3.E+02	5.32E-06	I	PE
Sm-151	6.96E-02	0.00E+00	7.09E-04	7.09E-04	0.00E+00	2.94E-02	2.94E-02	9.97E-02	5.92E-07	2.E+02	2.96E-09	I	PE
Eu-152	2.93E-01	0.00E+00	2.86E-05	2.86E-05	0.00E+00	1.18E-03	1.18E-03	2.94E-01	1.74E-06	2.E+01	8.72E-08	I	PE
Eu-154	2.20E-01	0.00E+00	6.09E-07	6.09E-07	0.00E+00	2.52E-05	2.52E-05	2.20E-01	1.31E-06	4.E+02	3.27E-09	I	PE
Ra-226	2.62E-02	0.00E+00	8.67E-04	8.67E-04	0.00E+00	3.59E-02	3.59E-02	6.29E-02	3.74E-07	8.E-05	4.67E-03	I	PE
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Th-229	2.84E-04	0.00E+00	6.74E-05	6.74E-05	0.00E+00	2.79E-03	2.79E-03	3.14E-03	1.87E-08	5.E-04	3.73E-05	I	PE
Th-230	2.77E-06	0.00E+00	6.48E-07	6.48E-07	0.00E+00	2.68E-05	2.68E-05	3.02E-05	1.80E-10	8.E-05	2.24E-06	I	PE
Th-232	2.29E-02	0.00E+00	5.61E-03	5.61E-03	0.00E+00	2.32E-01	2.32E-01	2.61E-01	1.55E-06	6.E-05	2.58E-02	I	PE
Pa-231	9.00E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E-09	5.34E-14	2.E-04	2.67E-10	I	PE
U-232	1.48E-03	0.00E+00	3.47E-04	3.47E-04	0.00E+00	1.44E-02	1.44E-02	1.62E-02	9.60E-08	2.E-03	4.80E-05	I	PE
U-233	8.53E-03	0.00E+00	1.79E-03	1.79E-03	0.00E+00	7.39E-02	7.39E-02	8.43E-02	5.00E-07	7.E-04	7.15E-04	I	PE
U-234	8.19E-01	3.45E-01	5.74E-02	4.02E-01	7.38E+00	2.38E+00	9.76E+00	1.10E+01	6.52E-05	1.E-03	6.52E-02	I	PE
U-235	3.52E-01	1.70E-02	1.18E-02	2.88E-02	3.63E-01	4.89E-01	8.51E-01	1.23E+00	7.32E-06	6.E-04	1.22E-02	I	PE
U-236	2.57E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-03	1.52E-08	2.E-02	7.62E-07	I	PE
U-238	2.76E+00	3.69E-01	2.25E-01	5.94E-01	7.88E+00	9.33E+00	1.72E+01	2.06E+01	1.22E-04	5.E-03	2.44E-02	I	PE
Np-237	6.68E-04	0.00E+00	1.31E-05	1.31E-05	0.00E+00	5.44E-04	5.44E-04	1.23E-03	7.27E-09	4.E-04	1.82E-05	I	PE
Pu-238	5.21E+00	0.00E+00	7.31E-01	7.31E-01	0.00E+00	3.03E+01	3.03E+01	3.62E+01	2.15E-04	7.E-02	3.07E-03	I	PE
Pu-239	9.62E+00	0.00E+00	1.49E+00	1.49E+00	0.00E+00	6.16E+01	6.16E+01	7.27E+01	4.32E-04	6.E-03	7.20E-02	I	PE
Pu-240	2.86E-01	0.00E+00	1.23E-02	1.23E-02	0.00E+00	5.09E-01	5.09E-01	8.07E-01	4.79E-06	6.E-03	7.99E-04	I	PE
Pu-241	4.14E+00	0.00E+00	1.15E-01	1.15E-01	0.00E+00	4.75E+00	4.75E+00	9.00E+00	5.35E-05	2.E-01	2.67E-04	I	PE
Pu-242	3.16E-04	0.00E+00	2.18E-05	2.18E-05	0.00E+00	9.01E-04	9.01E-04	1.24E-03	7.35E-09	6.E-03	1.23E-06	I	PE
Pu-244	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Am-241	2.17E+00	0.00E+00	3.70E-01	3.70E-01	0.00E+00	1.53E+01	1.53E+01	1.79E+01	1.06E-04	7.E-03	1.52E-02	I	PE
Am-243	2.85E-04	0.00E+00	9.89E-06	9.89E-06	0.00E+00	4.10E-04	4.10E-04	7.05E-04	4.18E-09	9.E-04	4.65E-06	I	PE
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cm-244	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				

Notes: 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 8-7, trench values); 3) Assumes 10x of C-14 PE value.

Sum of Fractions: **2.9E-01**

Base Case: NTS Areas 3 and 5 LLW & MLLW

Nuclide	1988-1997	1998-1999			2000-2070			1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Total	Avg. Conc.				
	Volume (m3)	Volume (m3)			Volume (m3)			Volume (m3)					
	1.94E+05	2.08E+04	5.53E+03	2.63E+04	3.49E+05	4.34E+05	7.84E+05	1.00E+06					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Ci/m3	Ci/m3			
H-3	2.89E+06	9.17E+03	4.54E+03	1.37E+04	1.28E+04	9.62E+06	9.64E+06	1.25E+07	1.25E+01	7.E+01	1.51E-05	I	WAC
C-14	6.27E+01	3.87E-01	1.99E+00	2.38E+00	1.22E+00	1.29E+02	1.31E+02	1.96E+02	1.95E-04	2.E-03	9.75E-02	A	PE
C-14am	3.55E-07	2.19E-09	9.97E-09	1.22E-08	6.31E-09	2.88E-08	3.51E-08	4.02E-07	4.00E-13	2.E-02	2.00E-11	A	3
Al-26	8.41E-06	5.19E-08	2.36E-07	2.88E-07	1.50E-07	6.82E-07	8.32E-07	9.53E-06	9.50E-12	5.E-05	1.90E-07	I	PE
Cl-36	4.35E-02	2.68E-04	1.29E-02	1.32E-02	2.47E-01	2.74E+02	2.74E+02	2.74E+02	2.73E-04	3.E-01	9.19E-04	I	WAC
K-40	3.46E-01	2.07E-03	9.45E-03	1.15E-02	2.79E+00	5.08E+00	7.87E+00	8.23E+00	8.20E-06	7.E-04	1.17E-02	I	PE
Co-60	1.46E+05	9.44E+02	4.11E+03	5.05E+03	2.69E+03	9.68E+04	9.95E+04	2.51E+05	2.50E-01	3.E+04	8.33E-06	I	PE
Ni-59	7.23E+02	4.46E+00	2.07E+01	2.52E+01	1.29E+01	6.32E+01	7.61E+01	8.24E+02	8.21E-04	3.E+00	2.74E-04	I	PE
Ni-63	3.26E+04	2.01E+02	9.16E+02	1.12E+03	1.95E+03	1.53E+06	1.53E+06	1.56E+06	1.56E+00	7.E+02	2.29E-03	I	WAC
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	1.38E-03	8.49E-06	3.87E-05	4.72E-05	2.45E-05	1.12E-04	1.36E-04	1.56E-03	1.55E-09	2.E-01	7.77E-09	I	PE
Sr-90	9.26E+05	6.03E+03	2.60E+04	3.20E+04	1.65E+04	8.11E+04	9.77E+04	1.06E+06	1.05E+00	4.E+01	2.60E-02	I	WAC
Zr-93	1.91E-01	1.18E-03	5.38E-03	6.56E-03	3.41E-03	1.55E-02	1.89E-02	2.17E-01	2.16E-07	5.E+00	4.32E-08	I	PE
Nb-93m	4.99E+00	3.08E-02	1.40E-01	1.71E-01	8.88E-02	4.05E-01	4.94E-01	5.66E+00	5.63E-06	4.E+03	1.41E-09	I	PE
Nb-94	2.25E-01	1.38E-03	1.57E-02	1.71E-02	7.11E-03	6.58E-02	7.29E-02	3.15E-01	3.14E-07	9.E-05	3.49E-03	I	PE
Tc-99	7.66E+00	6.95E-02	2.03E-01	2.73E-01	5.14E-01	1.43E+00	1.94E+00	9.87E+00	9.84E-06	2.E-02	4.92E-04	I	PE
Cd-113m	1.72E+00	5.73E-03	2.59E-02	3.16E-02	1.72E-02	7.47E-02	9.19E-02	1.85E+00	1.84E-06	1.E+00	1.84E-06	I	PE
Sn-121m	2.10E+00	9.23E-03	4.21E-02	5.13E-02	2.66E-02	1.21E-01	1.48E-01	2.30E+00	2.29E-06	2.E+01	1.14E-07	I	PE
Sn-126	9.42E-05	5.81E-07	2.65E-06	3.23E-06	1.68E-06	7.64E-06	9.32E-06	1.07E-04	1.06E-10	8.E-05	1.33E-06	I	PE
I-129	6.55E-02	4.04E-04	9.26E-02	9.30E-02	1.19E-03	3.13E-02	3.25E-02	1.91E-01	1.90E-07	2.E-03	9.51E-05	I	PE
Cs-135	1.80E-03	1.11E-05	5.05E-05	6.16E-05	3.20E-05	1.46E-04	1.78E-04	2.04E-03	2.03E-09	2.E-01	1.02E-08	I	PE
Cs-137	8.02E+05	5.57E+03	2.25E+04	2.81E+04	1.49E+04	6.43E+05	6.58E+05	1.49E+06	1.48E+00	9.E+00	1.61E-01	I	WAC
Ba-133	1.26E+01	7.74E-02	3.67E-01	4.45E-01	3.88E-01	1.84E+02	1.84E+02	1.97E+02	1.97E-04	3.E+02	6.55E-07	I	PE
Sm-151	2.01E+01	6.93E-02	3.29E-01	3.99E-01	2.07E-01	1.07E+00	1.28E+00	2.17E+01	2.16E-05	2.E+02	1.08E-07	I	PE
Eu-152	1.62E+02	9.22E-01	4.65E+00	5.58E+00	4.45E+01	4.65E+04	4.65E+04	4.67E+04	4.65E-02	2.E+01	2.32E-03	I	PE
Eu-154	9.71E+02	9.47E-01	4.34E+00	5.29E+00	4.11E+00	1.54E+03	1.55E+03	2.52E+03	2.51E-03	4.E+02	6.28E-06	I	PE
Ra-226	3.28E+01	6.42E+02	9.98E+00	6.52E+02	8.59E+03	6.23E+01	8.65E+03	9.33E+03	9.30E-03	4.E-02	2.65E-01	I	WAC
Ra-228	2.09E-02	6.94E-02	2.98E-03	7.24E-02	9.29E-01	4.09E+00	5.02E+00	5.11E+00	5.09E-06	4.E+03	1.27E-09	I	PE
Th-229	1.81E-04	1.12E-06	2.47E-03	2.47E-03	1.87E-04	2.30E-01	2.30E-01	2.33E-01	2.32E-07	5.E-04	4.63E-04	I	PE
Th-230	1.03E+01	1.30E+02	3.73E-01	1.30E+02	1.73E+03	2.01E+00	1.74E+03	1.88E+03	1.87E-03	8.E-02	2.23E-02	I	WAC
Th-232	2.29E+01	2.05E+00	3.89E-01	2.43E+00	1.88E+01	4.69E+00	2.35E+01	4.88E+01	4.87E-05	2.E-02	2.22E-03	I	WAC
Pa-231	1.62E-01	2.51E+00	6.11E-03	2.51E+00	3.35E+01	1.24E-01	3.37E+01	3.63E+01	3.62E-05	4.E-02	9.58E-04	I	WAC
U-232	2.01E-02	1.24E-04	6.55E-02	6.56E-02	4.18E-04	7.42E-01	7.42E-01	8.28E-01	8.25E-07	2.E-03	4.12E-04	I	PE
U-233	1.53E+00	1.33E-02	1.03E-02	2.36E-02	2.53E-01	4.78E+00	5.03E+00	6.58E+00	6.56E-06	7.E-04	9.37E-03	I	PE
U-234	9.10E+01	7.40E+01	1.09E+01	8.50E+01	1.19E+03	4.88E+02	1.68E+03	1.86E+03	1.85E-03	1.E+00	1.85E-03	I	WAC
U-235	3.56E+02	7.02E-01	3.69E-01	1.07E+00	8.17E+00	1.99E+01	2.81E+01	3.85E+02	3.83E-04	3.E-01	1.18E-03	I	WAC
U-236	6.58E-02	4.04E-04	1.72E-02	1.76E-02	1.20E-03	4.42E-02	4.54E-02	1.29E-01	1.28E-07	2.E-02	6.42E-06	I	PE
U-238	9.15E+03	4.65E+01	8.41E+00	5.50E+01	5.78E+02	2.31E+02	8.09E+02	1.00E+04	9.98E-03	2.E+00	6.28E-03	I	WAC
Np-237	3.85E-02	1.63E-04	1.05E-03	1.22E-03	4.70E-03	4.70E+00	4.70E+00	4.74E+00	4.72E-06	4.E-04	1.18E-02	I	PE
Pu-238	9.44E+01	2.23E+00	2.54E-01	2.48E+00	6.20E+00	7.56E+00	1.38E+01	1.11E+02	1.10E-04	7.E-02	1.57E-03	I	PE
Pu-239	1.15E+02	2.36E-01	1.02E+00	1.26E+00	2.26E+00	1.12E+01	1.35E+01	1.30E+02	1.29E-04	6.E-03	2.15E-02	I	PE
Pu-240	2.62E+01	1.15E-01	6.81E-01	7.96E-01	1.89E+00	3.27E+01	3.46E+01	6.16E+01	6.13E-05	6.E-03	1.02E-02	I	PE
Pu-241	5.42E+02	1.28E-01	1.78E+01	1.79E+01	3.57E-01	1.81E+02	1.81E+02	7.40E+02	7.38E-04	2.E-01	3.69E-03	I	PE
Pu-242	1.66E+02	2.89E-05	1.96E-04	2.24E-04	3.29E-05	8.50E-03	8.53E-03	1.66E+02	1.65E-04	6.E-03	2.76E-02	I	PE
Pu-244	3.64E-06	2.25E-08	8.39E-05	8.39E-05	6.48E-08	8.69E-04	8.69E-04	9.57E-04	9.53E-10	4.E-04	2.38E-06	I	PE
Am-241	2.22E+01	3.63E+00	9.58E-01	4.59E+00	7.34E+01	2.07E+01	9.42E+01	1.21E+02	1.21E-04	7.E-03	1.72E-02	I	PE
Am-243	8.31E-03	5.12E-05	3.74E-04	4.25E-04	1.62E-02	1.79E+01	1.79E+01	1.79E+01	1.78E-05	9.E-04	1.98E-02	I	PE
Cm-243	2.66E-02	1.64E-04	8.49E-04	1.01E-03	4.73E-04	3.22E-03	3.69E-03	3.13E-02	3.11E-08	8.E-01	3.89E-08	I	PE
Cm-244	2.98E-01	1.83E-03	8.71E-03	1.05E-02	6.13E+00	6.79E+03	6.80E+03	6.80E+03	6.78E-03	2.E+00	3.39E-03	I	PE

Notes: 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 7-4), WAC = WAC (DOE, 1999, Table E-1); 3) No data, assumes 10X of C-14 value.

Sum of Fractions: 7.3E-01

Base Case: ORR IWMF LLW

Nuclide	1988-1997	1998-1999			2000-2070			1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Total	Avg. Conc.				
	Volume (m3)	Volume (m3)			Volume (m3)			Volume (m3)					
	2,700.0	-	1,223.0	1,223.0	-	1,800.0	1,800.0	5,723.0					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Ci/m3	Ci/m3			
H-3	6.09E+00	0.00E+00	2.76E+00	2.76E+00	0.00E+00	4.06E+00	4.06E+00	1.29E+01	2.26E-03	3.E+00	6.92E-04	W	PE
C-14	2.67E-02	0.00E+00	1.21E-02	1.21E-02	0.00E+00	1.78E-02	1.78E-02	5.65E-02	9.88E-06	3.E-04	3.03E-02	W	PE
C-14am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Al-26	1.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-03	1.75E-07	5.E-05	3.49E-03	I	PE
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
K-40	1.61E-03	0.00E+00	7.30E-04	7.30E-04	0.00E+00	1.07E-03	1.07E-03	3.41E-03	5.97E-07	4.E-06	1.37E-01	W	PE
Co-60	9.97E+01	0.00E+00	4.51E+01	4.51E+01	0.00E+00	6.64E+01	6.64E+01	2.11E+02	3.69E-02	3.E+04	1.23E-06	I	PE
Ni-59	2.88E-04	0.00E+00	1.30E-04	1.30E-04	0.00E+00	1.92E-04	1.92E-04	6.10E-04	1.07E-07	3.E+00	3.56E-08	I	PE
Ni-63	5.37E+00	0.00E+00	2.43E+00	2.43E+00	0.00E+00	3.58E+00	3.58E+00	1.14E+01	1.99E-03	1.E+01	1.99E-04	I	PE
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sr-90	4.62E+01	0.00E+00	2.09E+01	2.09E+01	0.00E+00	3.08E+01	3.08E+01	9.79E+01	1.71E-02	5.E-02	3.42E-01	I	PE
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Nb-93m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Tc-99	4.20E-03	0.00E+00	1.90E-03	1.90E-03	0.00E+00	2.80E-03	2.80E-03	8.90E-03	1.56E-06	5.E-05	2.86E-02	W	PE
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-126	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
I-129	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cs-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cs-137	5.47E+01	0.00E+00	2.49E+01	2.49E+01	0.00E+00	3.66E+01	3.66E+01	1.16E+02	2.03E-02	8.E-01	2.54E-02	I	PE
Ba-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sm-151	1.10E-03	0.00E+00	4.99E-04	4.99E-04	0.00E+00	7.34E-04	7.34E-04	2.33E-03	4.08E-07	2.E+02	2.04E-09	I	PE
Eu-152	4.90E+00	0.00E+00	2.22E+00	2.22E+00	0.00E+00	3.26E+00	3.26E+00	1.04E+01	1.81E-03	2.E+01	9.07E-05	I	PE
Eu-154	2.06E+00	0.00E+00	9.31E-01	9.31E-01	0.00E+00	1.37E+00	1.37E+00	4.36E+00	7.62E-04	4.E+02	1.90E-06	I	PE
Ra-226	2.10E-03	0.00E+00	9.49E-04	9.49E-04	0.00E+00	1.40E-03	1.40E-03	4.44E-03	7.76E-07	9.E-05	8.62E-03	I	PE
Ra-228	1.71E-04	0.00E+00	7.73E-05	7.73E-05	0.00E+00	1.14E-04	1.14E-04	3.62E-04	6.32E-08	4.E+03	1.58E-11	I	PE
Th-229	4.50E-08	0.00E+00	2.04E-08	2.04E-08	0.00E+00	3.00E-08	3.00E-08	9.54E-08	1.67E-11	5.E-04	3.33E-08	I	PE
Th-230	9.05E-07	0.00E+00	4.11E-07	4.11E-07	0.00E+00	6.04E-07	6.04E-07	1.92E-06	3.35E-10	8.E-05	4.19E-06	I	PE
Th-232	4.31E-03	0.00E+00	1.96E-03	1.96E-03	0.00E+00	2.88E-03	2.88E-03	9.15E-03	1.60E-06	6.E-05	2.67E-02	I	PE
Pa-231	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
U-232	6.00E-02	0.00E+00	2.72E-02	2.72E-02	0.00E+00	4.00E-02	4.00E-02	1.27E-01	2.22E-05	1.E-02	2.22E-03	I	PE
U-233	5.98E-02	0.00E+00	2.71E-02	2.71E-02	0.00E+00	3.98E-02	3.98E-02	1.27E-01	2.21E-05	7.E-04	3.16E-02	I	PE
U-234	3.32E-03	0.00E+00	1.50E-03	1.50E-03	0.00E+00	2.20E-03	2.20E-03	7.01E-03	1.23E-06	1.E-03	1.23E-03	I	PE
U-235	2.46E-04	0.00E+00	1.11E-04	1.11E-04	0.00E+00	1.64E-04	1.64E-04	5.21E-04	9.10E-08	6.E-04	1.52E-04	I	PE
U-236	5.66E-05	0.00E+00	2.57E-05	2.57E-05	0.00E+00	3.78E-05	3.78E-05	1.20E-04	2.10E-08	2.E-02	1.05E-06	I	PE
U-238	5.31E-02	0.00E+00	2.41E-02	2.41E-02	0.00E+00	3.54E-02	3.54E-02	1.13E-01	1.97E-05	5.E-03	3.93E-03	I	PE
Np-237	2.57E-04	0.00E+00	1.16E-04	1.16E-04	0.00E+00	1.71E-04	1.71E-04	5.45E-04	9.52E-08	4.E-04	2.38E-04	I	PE
Pu-238	9.87E-03	0.00E+00	4.46E-03	4.46E-03	0.00E+00	6.56E-03	6.56E-03	2.09E-02	3.65E-06	1.E-01	3.65E-05	I	PE
Pu-239	1.50E-02	0.00E+00	6.78E-03	6.78E-03	0.00E+00	9.98E-03	9.98E-03	3.17E-02	5.55E-06	6.E-03	9.24E-04	I	PE
Pu-240	1.98E-03	0.00E+00	8.96E-04	8.96E-04	0.00E+00	1.32E-03	1.32E-03	4.19E-03	7.33E-07	7.E-03	1.05E-04	I	PE
Pu-241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.E-01	0.00E+00	I	PE
Pu-242	2.63E-06	0.00E+00	1.19E-06	1.19E-06	0.00E+00	1.75E-06	1.75E-06	5.56E-06	9.72E-10	6.E-03	1.62E-07	I	PE
Pu-244	1.00E-06	0.00E+00	4.53E-07	4.53E-07	0.00E+00	6.66E-07	6.66E-07	2.12E-06	3.70E-10	4.E-04	9.26E-07	I	PE
Am-241	3.90E-02	0.00E+00	1.77E-02	1.77E-02	0.00E+00	2.60E-02	2.60E-02	8.27E-02	1.45E-05	9.E-03	1.61E-03	I	PE
Am-243	6.46E-04	0.00E+00	2.92E-04	2.92E-04	0.00E+00	4.30E-04	4.30E-04	1.37E-03	2.39E-07	9.E-04	2.66E-04	I	PE
Cm-243	5.73E-05	0.00E+00	2.60E-05	2.60E-05	0.00E+00	3.82E-05	3.82E-05	1.21E-04	2.12E-08	8.E-01	2.65E-08	I	PE
Cm-244	3.09E-01	0.00E+00	1.40E-01	1.40E-01	0.00E+00	2.06E-01	2.06E-01	6.55E-01	1.14E-04	2.E+00	5.72E-05	I	PE
									Sum of Fractions:		6.5E-01		

Notes: 1) I = intruder, A = agriculture, P = post-drilling; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 14-7, tumulus values), each pad provides for disposal of 900 m3 (ORNL, 1997, p. 3-65).

Base Case: SRS LAW Vaults LLW

Nuclide	1988-1997	1998-1999			2000-2070			1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Total	Avg. Conc.				
	Volume (m3)	Volume (m3)			Volume (m3)			Volume (m3)					
	1.00E+04	0.00E+00	4.71E+02	4.71E+02	0.00E+00	3.80E+04	3.80E+04	4.85E+04					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Ci/m3	Ci/m3			
H-3	5.71E+04	0.00E+00	5.58E+03	5.58E+03	0.00E+00	4.50E+05	4.50E+05	5.13E+05	1.06E+01	5.E+04	2.16E-04	W	PE
C-14	2.47E-02	0.00E+00	4.16E-03	4.16E-03	0.00E+00	3.35E-01	3.35E-01	3.64E-01	7.51E-06	2.E-03	3.83E-03	W	PE
C-14am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Al-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cl-36	0.00E+00	0.00E+00	2.10E-06	2.10E-06	0.00E+00	1.69E-04	1.69E-04	1.72E-04	3.54E-09				
K-40	0.00E+00	0.00E+00	3.13E-06	3.13E-06	0.00E+00	2.52E-04	2.52E-04	2.56E-04	5.27E-09	2.E-05	2.39E-04	W	PE
Co-60	6.79E+00	0.00E+00	1.74E-01	1.74E-01	0.00E+00	1.40E+01	1.40E+01	2.10E+01	4.33E-04	1.E+99	4.33E-103	I	PE
Ni-59	1.99E-02	0.00E+00	1.69E-03	1.69E-03	0.00E+00	1.36E-01	1.36E-01	1.58E-01	3.25E-06	3.E+00	1.08E-06	I	PE
Ni-63	2.53E+00	0.00E+00	1.04E-01	1.04E-01	0.00E+00	8.42E+00	8.42E+00	1.11E+01	2.28E-04	3.E+01	7.60E-06	I	PE
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	5.65E-02	0.00E+00	8.24E-04	8.24E-04	0.00E+00	6.64E-02	6.64E-02	1.24E-01	2.55E-06	5.E-05	5.21E-02	W	PE
Sr-90	1.48E+01	0.00E+00	1.16E+00	1.16E+00	0.00E+00	9.31E+01	9.31E+01	1.09E+02	2.25E-03	1.E+02	2.25E-05	I	PE
Zr-93	9.93E-07	0.00E+00	1.65E-07	1.65E-07	0.00E+00	1.33E-05	1.33E-05	1.44E-05	2.97E-10	2.E-03	1.73E-07	W	PE
Nb-93m	0.00E+00	0.00E+00	2.68E-05	2.68E-05	0.00E+00	2.16E-03	2.16E-03	2.19E-03	4.51E-08	5.E+03	9.21E-12	W	PE
Nb-94	0.00E+00	0.00E+00	9.31E-11	9.31E-11	0.00E+00	7.50E-09	7.50E-09	7.60E-09	1.57E-13	1.E-04	1.57E-09	I	PE
Tc-99	5.96E-02	0.00E+00	9.64E-04	9.64E-04	0.00E+00	7.77E-02	7.77E-02	1.38E-01	2.85E-06	2.E-04	1.16E-02	W	PE
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-126	2.79E-03	0.00E+00	8.51E-06	8.51E-06	0.00E+00	6.86E-04	6.86E-04	3.49E-03	7.20E-08	8.E-05	8.99E-04	I	PE
I-129	1.56E-05	0.00E+00	4.83E-06	4.83E-06	0.00E+00	3.89E-04	3.89E-04	4.10E-04	8.45E-09	1.E-06	5.75E-03	W	PE
Cs-135	7.59E-10	0.00E+00	1.37E-11	1.37E-11	0.00E+00	1.10E-09	1.10E-09	1.88E-09	3.87E-14	2.E-01	1.93E-13	I	PE
Cs-137	2.47E+01	0.00E+00	1.25E+00	1.25E+00	0.00E+00	1.01E+02	1.01E+02	1.27E+02	2.61E-03	3.E+01	8.71E-05	I	PE
Ba-133	0.00E+00	0.00E+00	7.22E-08	7.22E-08	0.00E+00	5.82E-06	5.82E-06	5.89E-06	1.21E-10	1.E+99	1.21E-109	I	PE
Sm-151	7.52E-05	0.00E+00	1.87E-06	1.87E-06	0.00E+00	1.51E-04	1.51E-04	2.28E-04	4.70E-09	8.E+02	5.87E-12	I	PE
Eu-152	5.94E-01	0.00E+00	7.59E-02	7.59E-02	0.00E+00	6.12E+00	6.12E+00	6.79E+00	1.40E-04	2.E+07	7.00E-12	I	PE
Eu-154	4.03E-01	0.00E+00	5.53E-02	5.53E-02	0.00E+00	4.45E+00	4.45E+00	4.91E+00	1.01E-04	1.E+99	1.01E-103	I	PE
Ra-226	4.16E-07	0.00E+00	4.01E-06	4.01E-06	0.00E+00	3.23E-04	3.23E-04	3.28E-04	6.76E-09	9.E-05	7.51E-05	I	PE
Ra-228	4.65E-04	0.00E+00	1.17E-04	1.17E-04	0.00E+00	9.46E-03	9.46E-03	1.00E-02	2.07E-07	1.E+99	2.07E-106	I	PE
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Th-230	4.62E-04	0.00E+00	7.54E-05	7.54E-05	0.00E+00	6.08E-03	6.08E-03	6.62E-03	1.36E-07	8.E-05	1.71E-03	I	PE
Th-232	4.62E-04	0.00E+00	7.83E-05	7.83E-05	0.00E+00	6.31E-03	6.31E-03	6.85E-03	1.41E-07	6.E-05	2.36E-03	I	PE
Pa-231	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
U-232	6.78E-07	0.00E+00	2.12E-04	2.12E-04	0.00E+00	1.71E-02	1.71E-02	1.73E-02	3.57E-07	1.E-02	3.57E-05	I	PE
U-233	2.63E-02	0.00E+00	9.80E-03	9.80E-03	0.00E+00	7.90E-01	7.90E-01	8.26E-01	1.70E-05	7.E-04	2.43E-02	I	PE
U-234	2.73E+00	0.00E+00	9.45E-02	9.45E-02	0.00E+00	7.62E+00	7.62E+00	1.04E+01	2.15E-04	1.E-03	2.15E-01	I	PE
U-235	5.52E-02	0.00E+00	3.27E-03	3.27E-03	0.00E+00	2.63E-01	2.63E-01	3.22E-01	6.64E-06	6.E-04	1.11E-02	I	PE
U-236	4.36E-01	0.00E+00	6.69E-04	6.69E-04	0.00E+00	5.39E-02	5.39E-02	4.91E-01	1.01E-05	2.E-02	5.06E-04	I	PE
U-238	1.21E+00	0.00E+00	1.42E-01	1.42E-01	0.00E+00	1.15E+01	1.15E+01	1.28E+01	2.64E-04	5.E-03	5.28E-02	I	PE
Np-237	6.16E-01	0.00E+00	3.63E-04	3.63E-04	0.00E+00	2.93E-02	2.93E-02	6.46E-01	1.33E-05	4.E-04	3.33E-02	I	PE
Pu-238	1.15E+01	0.00E+00	7.50E-02	7.50E-02	0.00E+00	6.05E+00	6.05E+00	1.77E+01	3.64E-04	4.E-01	9.11E-04	I	PE
Pu-239	1.67E+01	0.00E+00	3.28E-02	3.28E-02	0.00E+00	2.64E+00	2.64E+00	1.93E+01	3.99E-04	6.E-03	6.64E-02	I	PE
Pu-240	2.52E+00	0.00E+00	9.53E-03	9.53E-03	0.00E+00	7.68E-01	7.68E-01	3.29E+00	6.79E-05	7.E-03	9.70E-03	I	PE
Pu-241	3.74E+01	0.00E+00	4.00E-01	4.00E-01	0.00E+00	3.22E+01	3.22E+01	7.00E+01	1.44E-03	3.E-01	4.81E-03	I	PE
Pu-242	4.37E-02	0.00E+00	1.52E-04	1.52E-04	0.00E+00	1.23E-02	1.23E-02	5.62E-02	1.16E-06	6.E-03	1.93E-04	I	PE
Pu-244	4.26E-16	0.00E+00	4.05E-17	4.05E-17	0.00E+00	3.27E-15	3.27E-15	3.73E-15	7.70E-20	4.E-04	1.92E-16	I	PE
Am-241	1.81E+00	0.00E+00	1.15E-02	1.15E-02	0.00E+00	9.23E-01	9.23E-01	2.75E+00	5.66E-05	9.E-03	6.29E-03	I	PE
Am-243	9.71E-06	0.00E+00	1.48E-05	1.48E-05	0.00E+00	1.19E-03	1.19E-03	1.22E-03	2.51E-08	9.E-04	2.79E-05	I	PE
Cm-243	0.00E+00	0.00E+00	2.67E-07	2.67E-07	0.00E+00	2.15E-05	2.15E-05	2.18E-05	4.50E-10	5.E+00	9.00E-11	I	PE
Cm-244	1.34E-02	0.00E+00	1.41E-02	1.41E-02	0.00E+00	1.14E+00	1.14E+00	1.17E+00	2.41E-05	2.E+00	1.20E-05	I	PE
										Sum of Fractions:	5.0E-01		

Notes: 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 13-7, tumulus values; 3) No limit (i. e. 1.E+99) based on short half-life and long time for intrusion (MMES, 1994).

Base Case: SRS ILW Vaults LLW

Nuclide	1988-1997	1998-1999			2000-2070			1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Total	Avg. Conc.				
	Volume (m3)	Volume (m3)			Volume (m3)			Volume (m3)					
	5.47E+02	0.00E+00	1.30E+03	1.30E+03	0.00E+00	5.09E+03	5.09E+03	6.94E+03					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Ci/m3	Ci/m3			
H-3	6.88E+04	0.00E+00	3.83E+05	3.83E+05	0.00E+00	1.50E+06	1.50E+06	1.95E+06	2.82E+02	2.E+05	1.69E-03	W	PE
C-14	2.41E-01	0.00E+00	2.68E-01	2.68E-01	0.00E+00	1.05E+00	1.05E+00	1.56E+00	2.25E-04	7.E-03	3.37E-02	W	PE
C-14am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Al-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
K-40	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Co-60	1.19E+02	0.00E+00	7.70E+01	7.70E+01	0.00E+00	3.02E+02	3.02E+02	4.98E+02	7.18E-02	1.E+99	7.18E-101	I	PE
Ni-59	7.43E-02	0.00E+00	3.66E-02	3.66E-02	0.00E+00	1.44E-01	1.44E-01	2.55E-01	3.67E-05	3.E+00	1.22E-05	I	PE
Ni-63	7.18E+00	0.00E+00	1.13E+01	1.13E+01	0.00E+00	4.43E+01	4.43E+01	6.28E+01	9.05E-03				
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	7.21E-05	0.00E+00	1.08E-04	1.08E-04	0.00E+00	4.23E-04	4.23E-04	6.03E-04	8.70E-08	2.E-04	5.22E-04	W	PE
Sr-90	5.06E-01	0.00E+00	1.28E+01	1.28E+01	0.00E+00	5.01E+01	5.01E+01	6.34E+01	9.13E-03	1.E+02	9.13E-05	I	PE
Zr-93	0.00E+00	0.00E+00	6.55E-06	6.55E-06	0.00E+00	2.57E-05	2.57E-05	3.22E-05	4.65E-09	6.E-03	7.97E-07	W	PE
Nb-93m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Tc-99	1.32E-02	0.00E+00	5.48E-02	5.48E-02	0.00E+00	2.15E-01	2.15E-01	2.83E-01	4.08E-05	8.E-04	4.90E-02	W	PE
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-126	7.68E-06	0.00E+00	5.20E-04	5.20E-04	0.00E+00	2.04E-03	2.04E-03	2.57E-03	3.70E-07	8.E-05	4.62E-03	I	PE
I-129	1.33E-05	0.00E+00	2.16E-03	2.16E-03	0.00E+00	8.48E-03	8.48E-03	1.06E-02	1.53E-06	5.E-06	3.07E-01	W	PE
Cs-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cs-137	1.15E+02	0.00E+00	1.31E+02	1.31E+02	0.00E+00	5.12E+02	5.12E+02	7.58E+02	1.09E-01	3.E+01	3.64E-03	I	PE
Ba-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sm-151	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Eu-152	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Eu-154	0.00E+00	0.00E+00	1.41E-01	1.41E-01	0.00E+00	5.55E-01	5.55E-01	6.96E-01	1.00E-04	1.E+99	1.00E-103	I	PE
Ra-226	2.14E+00	0.00E+00	8.22E-01	8.22E-01	0.00E+00	3.23E+00	3.23E+00	6.19E+00	8.92E-04	1.E+99	8.92E-103	I	3
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Th-230	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Th-232	5.78E-05	0.00E+00	2.29E-05	2.29E-05	0.00E+00	9.00E-05	9.00E-05	1.71E-04	2.46E-08	6.E-05	4.10E-04	I	PE
Pa-231	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
U-232	0.00E+00	0.00E+00	1.36E-06	1.36E-06	0.00E+00	5.36E-06	5.36E-06	6.72E-06	9.69E-10	1.E-02	9.69E-08	I	PE
U-233	2.77E-01	0.00E+00	9.99E-02	9.99E-02	0.00E+00	3.92E-01	3.92E-01	7.69E-01	1.11E-04	7.E-04	1.58E-01	I	PE
U-234	2.96E-01	0.00E+00	1.93E-01	1.93E-01	0.00E+00	7.59E-01	7.59E-01	1.25E+00	1.80E-04	1.E-03	1.80E-01	I	PE
U-235	1.57E-02	0.00E+00	6.88E-03	6.88E-03	0.00E+00	2.70E-02	2.70E-02	4.95E-02	7.14E-06	6.E-04	1.19E-02	I	PE
U-236	4.29E-03	0.00E+00	1.48E-03	1.48E-03	0.00E+00	5.82E-03	5.82E-03	1.16E-02	1.67E-06	2.E-02	8.35E-05	I	PE
U-238	1.48E+00	0.00E+00	5.28E-01	5.28E-01	0.00E+00	2.07E+00	2.07E+00	4.08E+00	5.88E-04	5.E-03	1.18E-01	I	PE
Np-237	2.24E-05	0.00E+00	1.35E-03	1.35E-03	0.00E+00	5.28E-03	5.28E-03	6.65E-03	9.58E-07	4.E-04	2.40E-03	I	PE
Pu-238	6.02E-01	0.00E+00	1.20E+00	1.20E+00	0.00E+00	4.71E+00	4.71E+00	6.52E+00	9.39E-04	4.E-01	2.35E-03	I	PE
Pu-239	1.20E-02	0.00E+00	1.08E-01	1.08E-01	0.00E+00	4.24E-01	4.24E-01	5.44E-01	7.84E-05	6.E-03	1.31E-02	I	PE
Pu-240	4.80E-03	0.00E+00	6.34E-03	6.34E-03	0.00E+00	2.49E-02	2.49E-02	3.60E-02	5.19E-06	7.E-03	7.42E-04	I	PE
Pu-241	2.96E-01	0.00E+00	5.72E-01	5.72E-01	0.00E+00	2.25E+00	2.25E+00	3.12E+00	4.49E-04	3.E-01	1.50E-03	I	PE
Pu-242	6.40E-06	0.00E+00	1.66E-03	1.66E-03	0.00E+00	6.51E-03	6.51E-03	8.17E-03	1.18E-06	6.E-03	1.96E-04	I	PE
Pu-244	0.00E+00	0.00E+00	1.47E-15	1.47E-15	0.00E+00	5.77E-15	5.77E-15	7.24E-15	1.04E-18	4.E-04	2.61E-15	I	PE
Am-241	5.66E-01	0.00E+00	3.12E-01	3.12E-01	0.00E+00	1.23E+00	1.23E+00	2.10E+00	3.03E-04	9.E-03	3.37E-02	I	PE
Am-243	0.00E+00	0.00E+00	4.24E-07	4.24E-07	0.00E+00	1.66E-06	1.66E-06	2.09E-06	3.01E-10	9.E-04	3.34E-07	I	PE
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cm-244	0.00E+00	0.00E+00	6.30E-01	6.30E-01	0.00E+00	2.47E+00	2.47E+00	3.10E+00	4.47E-04	2.E+00	2.24E-04	I	PE
										Sum of Fractions:	**9.2E-01**		

Notes: 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 13-7, tumulus values; 3) No limit (i. e. 1.E+99) based on short half-life and long time for intrusion (MMES, 1994).

Base Case: SRS E-Area Trenches LLW

Nuclide	1988-1997 Total	1998-1999 ER	1998-1999 NonER	1998-1999 Total	2000-2070 ER	2000-2070 NonER	2000-2070 Total	1988-2070 Total	1988-2070 Avg. Conc.	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Volume (m3)	Volume (m3)			Volume (m3)			Volume (m3)					
	7.74E+02	0.00E+00	5.82E+02	5.82E+02	0.00E+00	6.25E+04	6.25E+04	6.39E+04					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Ci/m3	Ci/m3			
H-3	6.42E+00	0.00E+00	3.08E-01	3.08E-01	0.00E+00	3.31E+01	3.31E+01	3.98E+01	6.23E-04	2.E-02	4.10E-02	W	PE
C-14	3.32E-04	0.00E+00	3.58E-04	3.58E-04	0.00E+00	3.84E-02	3.84E-02	3.91E-02	6.12E-07	9.E-05	7.05E-03	W	PE
C-14am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Al-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
K-40	0.00E+00	0.00E+00	2.79E-04	2.79E-04	0.00E+00	3.00E-02	3.00E-02	3.03E-02	4.74E-07	1.E-06	4.43E-01	W	PE
Co-60	2.73E-03	0.00E+00	2.56E-03	2.56E-03	0.00E+00	2.75E-01	2.75E-01	2.80E-01	4.38E-06	1.E+99	4.38E-105	I	PE
Ni-59	2.88E-04	0.00E+00	2.03E-04	2.03E-04	0.00E+00	2.18E-02	2.18E-02	2.23E-02	3.49E-07	3.E+00	1.16E-07	I	PE
Ni-63	9.52E-04	0.00E+00	6.16E-04	6.16E-04	0.00E+00	6.62E-02	6.62E-02	6.78E-02	1.06E-06				
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	6.20E-10	0.00E+00	8.27E-06	8.27E-06	0.00E+00	8.89E-04	8.89E-04	8.97E-04	1.40E-08	2.E-06	6.47E-03	W	PE
Sr-90	2.50E-02	0.00E+00	4.62E-03	4.62E-03	0.00E+00	4.96E-01	4.96E-01	5.26E-01	8.23E-06	1.E+00	8.23E-06	I	PE
Zr-93	0.00E+00	0.00E+00	5.86E-10	5.86E-10	0.00E+00	6.14E-08	6.14E-08	6.20E-08	9.70E-13	7.E-05	1.49E-08	W	PE
Nb-93m	0.00E+00	0.00E+00	1.75E-06	1.75E-06	0.00E+00	1.88E-04	1.88E-04	1.90E-04	2.97E-09	2.E-02	1.37E-07	W	PE
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Tc-99	1.39E-04	0.00E+00	8.92E-05	8.92E-05	0.00E+00	9.59E-03	9.59E-03	9.82E-03	1.54E-07	1.E-05	1.18E-02	W	PE
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sn-126	2.00E-05	0.00E+00	1.33E-05	1.33E-05	0.00E+00	1.42E-03	1.42E-03	1.46E-03	2.28E-08	8.E-05	2.85E-04	I	PE
I-129	1.25E-04	0.00E+00	2.64E-08	2.64E-08	0.00E+00	2.84E-06	2.84E-06	1.28E-04	2.01E-09	7.E-08	3.08E-02	W	PE
Cs-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Cs-137	3.58E-02	0.00E+00	1.26E-01	1.26E-01	0.00E+00	1.35E+01	1.35E+01	1.36E+01	2.14E-04	3.E-01	7.12E-04	I	PE
Ba-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Sm-151	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Eu-152	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Eu-154	0.00E+00	0.00E+00	1.38E-05	1.38E-05	0.00E+00	1.48E-03	1.48E-03	1.49E-03	2.34E-08	4.E+06	5.85E-15	I	PE
Ra-226	3.77E-04	0.00E+00	2.30E-04	2.30E-04	0.00E+00	2.47E-02	2.47E-02	2.54E-02	3.97E-07	8.E-05	4.96E-03	I	PE
Ra-228	4.03E-04	0.00E+00	1.75E-05	1.75E-05	0.00E+00	1.88E-03	1.88E-03	2.30E-03	3.60E-08	1.E+99	3.60E-107	I	PE
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Th-230	0.00E+00	0.00E+00	1.75E-05	1.75E-05	0.00E+00	1.88E-03	1.88E-03	1.90E-03	2.97E-08	8.E-05	3.71E-04	I	PE
Th-232	0.00E+00	0.00E+00	1.75E-05	1.75E-05	0.00E+00	1.88E-03	1.88E-03	1.90E-03	2.97E-08	6.E-05	4.94E-04	I	PE
Pa-231	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
U-232	0.00E+00	0.00E+00	8.10E-08	8.10E-08	0.00E+00	8.71E-06	8.71E-06	8.79E-06	1.38E-10	2.E-03	6.88E-08	I	PE
U-233	3.00E-09	0.00E+00	9.34E-07	9.34E-07	0.00E+00	1.00E-04	1.00E-04	1.01E-04	1.58E-09	7.E-04	2.26E-06	I	PE
U-234	1.89E-03	0.00E+00	1.22E-03	1.22E-03	0.00E+00	1.31E-01	1.31E-01	1.34E-01	2.10E-06	1.E-03	2.10E-03	I	PE
U-235	2.64E-04	0.00E+00	3.84E-05	3.84E-05	0.00E+00	4.12E-03	4.12E-03	4.43E-03	6.93E-08	6.E-04	1.15E-04	I	PE
U-236	1.27E-09	0.00E+00	1.09E-04	1.09E-04	0.00E+00	1.17E-02	1.17E-02	1.18E-02	1.84E-07	2.E-02	9.22E-06	I	PE
U-238	2.82E-03	0.00E+00	5.76E-04	5.76E-04	0.00E+00	6.19E-02	6.19E-02	6.53E-02	1.02E-06	5.E-03	2.05E-04	I	PE
Np-237	1.56E-07	0.00E+00	9.60E-06	9.60E-06	0.00E+00	1.03E-03	1.03E-03	1.04E-03	1.63E-08	4.E-04	4.07E-05	I	PE
Pu-238	2.69E-03	0.00E+00	1.07E-03	1.07E-03	0.00E+00	1.15E-01	1.15E-01	1.19E-01	1.86E-06	7.E-02	2.66E-05	I	PE
Pu-239	3.66E-04	0.00E+00	2.34E-04	2.34E-04	0.00E+00	2.51E-02	2.51E-02	2.57E-02	4.02E-07	6.E-03	6.70E-05	I	PE
Pu-240	2.19E-03	0.00E+00	3.06E-05	3.06E-05	0.00E+00	3.29E-03	3.29E-03	5.51E-03	8.62E-08	6.E-03	1.44E-05	I	PE
Pu-241	4.95E-04	0.00E+00	1.33E-03	1.33E-03	0.00E+00	1.42E-01	1.42E-01	1.44E-01	2.26E-06	2.E-01	1.13E-05	I	PE
Pu-242	2.49E-07	0.00E+00	4.61E-07	4.61E-07	0.00E+00	4.95E-05	4.95E-05	5.02E-05	7.86E-10	6.E-03	1.31E-07	I	PE
Pu-244	0.00E+00	0.00E+00	1.32E-19	1.32E-19	0.00E+00	1.42E-17	1.42E-17	1.43E-17	2.24E-22	4.E-04	5.59E-19	I	PE
Am-241	1.10E-03	0.00E+00	7.19E-04	7.19E-04	0.00E+00	7.73E-02	7.73E-02	7.91E-02	1.24E-06	7.E-03	1.77E-04	I	PE
Am-243	0.00E+00	0.00E+00	4.27E-07	4.27E-07	0.00E+00	4.59E-05	4.59E-05	4.64E-05	7.26E-10	9.E-04	8.06E-07	I	PE
Cm-243	5.21E-03	0.00E+00	1.39E-09	1.39E-09	0.00E+00	1.49E-07	1.49E-07	5.21E-03	8.15E-08	1.E+00	8.15E-08	I	PE
Cm-244	5.21E-03	0.00E+00	1.30E-04	1.30E-04	0.00E+00	1.39E-02	1.39E-02	1.93E-02	3.02E-07	2.E+00	1.51E-07	I	PE

Notes:

1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 13-7, trench values).

Sum of Fractions: 5.5E-01

Alternative LLW Case: Hanford 200 Area

Nuclide	1988-1997	1998-1999			2000-2070			2000-2070	1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Alternative	Total	Avg. Conc.				
	Volume (trench, m3)	Volume (trench, m3)			Volume (trench, m3)			Volume (trench, m3)	Volume (trench, m3)					
	1.11E+05	9.39E+02	1.12E+04	1.22E+04	9.15E+03	1.82E+05	1.91E+05	4.45E+05	7.59E+05					
	Volume (monolith, m3)								Volume (monolith, m3)					
	1.97E+02								1.97E+02					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Activity (Ci)	Ci/m3	Ci/m3			
H-3	8.79E+04	1.46E+00	2.28E+01	2.43E+01	1.44E+01	2.33E+02	2.48E+02	1.25E+07	1.26E+07	1.66E+01	1.E+05	1.68E-04	I	WAC Cat 1
C-14	2.02E+02	1.29E-01	2.02E+00	2.15E+00	1.28E+00	2.08E+01	2.21E+01	1.34E+03	1.57E+03	2.06E-03	9.E-02	2.27E-02	I	WAC Cat 1
C-14am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-02	4.94E-02	1.34E+04	1.34E+04	1.77E-02	9.E-01	1.94E-02	I	WAC Cat 1
Al-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E-05	5.04E-05	6.65E-11	5.E-05	1.33E-06	I	PE
Cl-36	3.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E+01	1.21E+01	1.59E-05	1.E-01	1.14E-04	I	WAC Cat 3
K-40	3.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.21E+01	9.21E+01	1.21E-04	7.E-04	1.73E-01	I	PE
Co-60	9.89E+05	2.19E+01	1.41E+02	1.63E+02	1.72E+02	3.31E+03	3.48E+03	3.47E+07	3.57E+07	4.71E+01	3.E+04	1.57E-03	I	PE
Ni-59	4.90E+03	3.16E-01	4.95E+00	5.27E+00	3.12E+00	4.90E+01	5.21E+01	1.86E+05	1.91E+05	2.52E-01	3.E+00	8.40E-02	I	PE
Ni-63	8.22E+05	3.90E+01	2.23E+02	2.62E+02	2.99E+02	1.72E+03	2.02E+03	6.65E+06	7.48E+06	9.85E+00	2.E+04	4.93E-04	I	WAC Cat 3
Ni-63am	0.00E+00	8.40E-10	8.32E-08	8.40E-08	1.56E-07	1.91E-02	1.91E-02	0.00E+00	1.91E-02	2.51E-08	6.E+01	4.26E-10	I	WAC Cat 1
Se-79	7.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.26E-03	8.34E-03	1.10E-08	2.E-06	6.42E-03	W	PE
Sr-90	9.90E+05	5.38E+02	3.05E+03	3.59E+03	4.15E+03	2.38E+04	2.80E+04	5.56E+06	6.58E+06	8.67E+00	5.E+04	1.61E-04	I	WAC Cat 3
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.31E+01	5.31E+01	7.00E-05	5.E+00	1.40E-05	I	PE
Nb-93m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E+03	1.38E+03	1.82E-03	4.E+03	4.56E-07	I	PE
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.16E+01	6.16E+01	8.11E-05	5.E-02	1.69E-03	I	WAC Cat 3
Tc-99	7.15E+00	1.68E-03	1.64E-01	1.66E-01	3.07E-01	9.38E+01	9.41E+01	4.04E+03	4.15E+03	5.46E-03	5.E+00	1.09E-03	I	WAC Cat 3
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.89E+00	5.89E+00	7.76E-06	1.E+00	7.76E-06	I	PE
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E+02	2.44E+02	3.21E-04	2.E+01	1.60E-05	I	PE
Sn-126	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.65E-04	5.65E-04	7.45E-10	8.E-05	9.31E-06	I	PE
I-129	9.81E-02	5.35E-10	5.29E-08	5.35E-08	9.91E-08	4.13E-03	4.13E-03	1.68E+00	1.78E+00	2.35E-06	9.E-03	2.76E-04	I	WAC Cat 1
Cs-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-02	1.08E-02	1.42E-08	2.E-05	8.31E-04	W	PE
Cs-137	8.64E+05	4.24E+02	2.40E+03	2.83E+03	3.28E+03	1.89E+04	2.21E+04	4.90E+06	5.79E+06	7.63E+00	1.E+04	6.36E-04	I	WAC Cat 3
Ba-133	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.55E+01	7.55E+01	9.95E-05	3.E+02	3.32E-07	I	PE
Sm-151	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.18E+02	4.18E+02	5.50E-04	2.E+02	2.75E-06	I	PE
Eu-152	1.32E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+04	3.01E+04	3.96E-02	2.E+01	1.98E-03	I	PE
Eu-154	1.93E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E+03	5.04E+03	6.64E-03	4.E+02	1.66E-05	I	PE
Ra-226	6.37E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E+02	2.82E+02	3.72E-04	4.E-02	8.64E-03	I	WAC Cat 3
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-01	1.35E-01	1.78E-07	4.E+03	4.44E-11	I	PE
Th-229	2.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.21E-03	5.23E-03	6.89E-09	5.E-04	1.38E-05	I	PE
Th-230	5.26E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E+01	5.74E+01	7.57E-05	2.E-03	3.60E-02	I	WAC Cat 1
Th-232	1.12E-01	2.67E-10	2.65E-08	2.67E-08	4.96E-08	3.45E-02	3.45E-02	1.88E+01	1.90E+01	2.50E-05	2.E-02	1.09E-03	I	WAC Cat 3
Pa-231	4.48E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.23E-01	9.23E-01	1.22E-06	1.E-04	8.69E-03	I	WAC Cat 1
U-232	2.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-01	1.72E-01	2.26E-07	4.E-06	5.95E-02	W	PE
U-233	3.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E+01	3.81E+01	1.82E+00	4.03E+01	5.31E-05	7.E-03	7.17E-03	I	WAC Cat 1
U-234-trench	5.56E+01	1.56E-02	1.55E+00	1.56E+00	2.89E+00	5.23E+02	5.25E+02	1.32E+02	7.15E+02	9.42E-04	9.E-03	1.06E-01	I	WAC Cat 1
U-234-monolith	1.99E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E+01	1.01E-01	2.E+00	5.32E-02	I	WAC Cat 3
U-235-trench	1.01E+00	1.62E-03	1.59E-01	1.60E-01	2.97E-01	5.17E+01	5.20E+01	2.47E+01	7.79E+01	1.03E-04	3.E-03	3.67E-02	I	WAC Cat 1
U-235-monolith	6.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.43E-01	3.26E-03	5.E-01	6.53E-03	I	WAC Cat 3
U-236-trench	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-05	1.76E-05	6.57E-01	6.57E-01	8.65E-07	1.E-02	9.11E-05	I	WAC Cat 1
U-236-monolith	1.09E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E+00	5.53E-03	2.E+00	2.77E-03	I	WAC Cat 3
U-238-trench	2.84E+01	1.93E-04	4.47E-03	4.66E-03	4.93E-03	3.94E+00	3.94E+00	1.09E+03	1.12E+03	1.48E-03	1.E+00	1.23E-03	I	WAC Cat 3
U-238-monolith	3.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E+01	1.75E-01	1.E+00	1.46E-01	I	WAC Cat 3
Np-237	2.70E-02	1.49E-09	1.47E-07	1.49E-07	2.76E-07	1.25E-01	1.25E-01	9.34E-01	1.09E+00	1.43E-06	4.E-04	3.58E-03	I	PE
Pu-238	1.40E+02	8.22E-02	4.66E-01	5.48E-01	6.31E-01	4.66E+00	5.29E+00	2.42E+01	1.70E+02	2.24E-04	7.E-02	3.21E-03	I	PE
Pu-239	4.27E+01	3.83E-01	2.18E+00	2.56E+00	3.49E+00	9.29E+01	9.64E+01	5.27E+02	6.69E+02	8.81E-04	4.E-01	2.10E-03	I	WAC Cat 3
Pu-240	1.37E+01	1.45E-01	8.20E-01	9.64E-01	1.32E+00	1.83E+01	1.97E+01	2.79E+01	6.23E+01	8.20E-05	6.E-03	1.37E-02	I	PE
Pu-241	3.28E+02	9.15E+00	5.19E+01	6.10E+01	7.02E+01	4.48E+02	5.18E+02	3.16E+03	4.06E+03	5.35E-03	2.E-01	2.68E-02	I	PE
Pu-242	1.02E-03	3.82E-11	3.78E-09	3.82E-09	7.08E-09	7.14E-05	7.14E-05	8.54E-03	9.63E-03	1.27E-08	6.E-03	2.11E-06	I	PE
Pu-244	3.76E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-05	2.56E-05	3.37E-11	4.E-04	8.43E-08	I	PE
Am-241	3.18E+01	3.28E-01	1.86E+00	2.18E+00	2.51E+00	3.47E+01	3.72E+01	1.45E+02	2.16E+02	2.85E-04	7.E-03	4.07E-02	I	PE
Am-243	1.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.57E-01	4.57E-01	8.06E-02	5.54E-01	7.30E-07	9.E-04	8.11E-04	I	PE
Cm-243	1.39E-02	3.82E-11	3.78E-09	3.82E-09	7.08E-09	2.68E-06	2.69E-06	2.88E-01	3.02E-01	3.98E-07	8.E-01	4.98E-07	I	PE
Cm-244	6.84E-01	1.91E-10	1.89E-08	1.91E-08	3.54E-08	7.12E-06	7.16E-06	3.26E+00	3.94E+00	5.20E-06	2.E+00	2.60E-06	I	PE
										Sum of Fractions:		8.8E-01		

Notes: The waste volumes and uranium nuclide inventories and limits have been segregated to accommodate the separate 1996 disposal of a uranium-filled culvert monolith. 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 16-7, trench values), WAC = waste acceptance criteria, NL = No Limit (FDH, 1998, Table A-2); 3) No data, assumes 1/10 of C-14 value.

Alternative LLW Case: NTS Areas 3 and 5

Nuclide	1988-1997	1998-1999			2000-2070			2000-2070	1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Alternative	Total	Avg. Conc.				
	Volume (m3)	Volume (m3)			Volume (m3)			Volume (m3)	Volume (m3)					
	1.94E+05	2.08E+04	5.53E+03	2.63E+04	3.49E+05	4.34E+05	7.84E+05	4.45E+05	1.45E+06					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Activity (Ci)	Ci/m3	Ci/m3			
H-3	2.89E+06	9.17E+03	4.54E+03	1.37E+04	1.28E+04	9.62E+06	9.64E+06	1.25E+07	2.51E+07	1.73E+01	7.E+01	1.51E-05	I	WAC
C-14	6.27E+01	3.87E-01	1.99E+00	2.38E+00	1.22E+00	1.29E+02	1.31E+02	1.34E+03	1.54E+03	1.06E-03	2.E-03	6.22E-03	A	WAC
C-14am	3.55E-07	2.19E-09	9.97E-09	1.22E-08	6.31E-09	2.88E-08	3.51E-08	1.34E+04	1.34E+04	9.25E-03	2.E-02	6.22E-02	A	3
Al-26	8.41E-06	5.19E-08	2.36E-07	2.88E-07	1.50E-07	6.82E-07	8.32E-07	5.04E-05	6.00E-05	4.14E-11	5.E-05	8.28E-07	I	PE
Cl-36	4.35E-02	2.68E-04	1.29E-02	1.32E-02	2.47E-01	2.74E+02	2.74E+02	1.21E+01	2.86E+02	1.97E-04	3.E-01	6.65E-04	I	WAC
K-40	3.46E-01	2.07E-03	9.45E-03	1.15E-02	2.79E+00	5.08E+00	7.87E+00	9.21E+01	1.00E+02	6.93E-05	7.E-04	9.89E-02	I	PE
Co-60	1.46E+05	9.44E+02	4.11E+03	5.05E+03	2.69E+03	9.68E+04	9.95E+04	3.47E+07	3.50E+07	2.42E+01	3.E+04	8.05E-04	I	PE
Ni-59	7.23E+02	4.46E+00	2.07E+01	2.52E+01	1.29E+01	6.32E+01	7.61E+01	1.86E+05	1.87E+05	1.29E-01	3.E+00	4.30E-02	I	PE
Ni-63	3.26E+04	2.01E+02	9.16E+02	1.12E+03	1.95E+03	1.53E+06	1.53E+06	6.65E+06	8.22E+06	5.67E+00	7.E+02	8.34E-03	I	WAC
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	1.38E-03	8.49E-06	3.87E-05	4.72E-05	2.45E-05	1.12E-04	1.36E-04	8.26E-03	9.82E-03	6.78E-09	2.E-01	3.39E-08	I	PE
Sr-90	9.26E+05	6.03E+03	2.60E+04	3.20E+04	1.65E+04	8.11E+04	9.77E+04	5.56E+06	6.61E+06	4.57E+00	4.E+01	1.13E-01	I	WAC
Zr-93	1.91E-01	1.18E-03	5.38E-03	6.56E-03	3.41E-03	1.55E-02	1.89E-02	5.31E+01	5.33E+01	3.68E-05	5.E+00	7.36E-06	I	PE
Nb-93m	4.99E+00	3.08E-02	1.40E-01	1.71E-01	8.88E-02	4.05E-01	4.94E-01	1.38E+03	1.39E+03	9.59E-04	4.E+03	2.40E-07	I	PE
Nb-94	2.25E-01	1.38E-03	1.57E-02	1.71E-02	7.11E-03	6.58E-02	7.29E-02	6.16E+01	6.19E+01	4.27E-05	9.E-05	4.75E-01	I	PE
Tc-99	7.66E+00	6.95E-02	2.03E-01	2.73E-01	5.14E-01	1.43E+00	1.94E+00	4.04E+03	4.05E+03	2.80E-03	3.E+00	1.11E-01	I	WAC
Cd-113m	1.72E+00	5.73E-03	2.59E-02	3.16E-02	1.72E-02	7.47E-02	9.19E-02	5.89E+00	7.73E+00	5.34E-06	1.E+00	5.34E-06	I	PE
Sn-121m	2.10E+00	9.23E-03	4.21E-02	5.13E-02	2.66E-02	1.21E-01	1.48E-01	2.44E+02	2.46E+02	1.70E-04	2.E+01	8.49E-06	I	PE
Sn-126	9.42E-05	5.81E-07	2.65E-06	3.23E-06	1.68E-06	7.64E-06	9.32E-06	5.65E-04	6.72E-04	4.64E-10	8.E-05	5.80E-06	I	PE
I-129	6.55E-02	4.04E-04	9.26E-02	9.30E-02	1.19E-03	3.13E-02	3.25E-02	1.68E+00	1.87E+00	1.29E-06	2.E-03	6.46E-04	I	PE
Cs-135	1.80E-03	1.11E-05	5.05E-05	6.16E-05	3.20E-05	1.46E-04	1.78E-04	1.08E-02	1.28E-02	8.85E-09	2.E-01	4.43E-08	I	PE
Cs-137	8.02E+05	5.57E+03	2.25E+04	2.81E+04	1.49E+04	6.43E+05	6.58E+05	4.90E+06	6.39E+06	4.41E+00	9.E+00	4.80E-01	I	WAC
Ba-133	1.26E+01	7.74E-02	3.67E-01	4.45E-01	3.88E-01	1.84E+02	1.84E+02	7.55E+01	2.73E+02	1.88E-04	3.E+02	6.28E-07	I	PE
Sm-151	2.01E+01	6.93E-02	3.29E-01	3.99E-01	2.07E-01	1.07E+00	1.28E+00	4.18E+02	4.39E+02	3.03E-04	2.E+02	1.52E-06	I	PE
Eu-152	1.62E+02	9.22E-01	4.65E+00	5.58E+00	4.45E+01	4.65E+04	4.65E+04	2.88E+04	7.54E+04	5.21E-02	2.E+01	2.60E-03	I	PE
Eu-154	9.71E+02	9.47E-01	4.34E+00	5.29E+00	4.11E+00	1.54E+03	1.55E+03	3.12E+03	5.64E+03	3.89E-03	4.E+02	9.73E-06	I	PE
Ra-226	3.28E+01	6.42E+02	9.98E+00	6.52E+02	8.59E+03	6.23E+01	8.65E+03	2.82E+02	9.62E+03	6.64E-03	4.E-02	1.89E-01	I	WAC
Ra-228	2.09E-02	6.94E-02	2.98E-03	7.24E-02	9.29E-01	4.09E+00	5.02E+00	1.35E-01	5.25E+00	3.62E-06	4.E+03	9.06E-10	I	PE
Th-229	1.81E-04	1.12E-06	2.47E-03	2.47E-03	1.87E-04	2.30E-01	2.30E-01	5.21E-03	2.38E-01	1.64E-07	5.E-04	3.28E-04	I	PE
Th-230	1.03E+01	1.30E+02	3.73E-01	1.30E+02	1.73E+03	2.01E+00	1.74E+03	5.74E+01	1.93E+03	1.34E-03	8.E-02	1.59E-02	I	WAC
Th-232	2.29E+01	2.05E+00	3.89E-01	2.43E+00	1.88E+01	4.69E+00	2.35E+01	1.88E+01	6.77E+01	4.67E-05	2.E-02	2.13E-03	I	WAC
Pa-231	1.62E-01	2.51E+00	6.11E-03	2.51E+00	3.35E+01	1.24E-01	3.37E+01	9.23E-01	3.73E+01	2.57E-05	4.E-02	6.80E-04	I	WAC
U-232	2.01E-02	1.24E-04	6.55E-02	6.56E-02	4.18E-04	7.42E-01	7.42E-01	1.72E-01	9.99E-01	6.90E-07	2.E-03	3.45E-04	I	PE
U-233	1.53E+00	1.33E-02	1.03E-02	2.36E-02	2.53E-01	4.78E+00	5.03E+00	1.82E+00	8.40E+00	5.80E-06	7.E-04	8.29E-03	I	PE
U-234	9.10E+01	7.40E+01	1.09E+01	8.50E+01	1.19E+03	4.88E+02	1.68E+03	1.32E+02	1.99E+03	1.37E-03	1.E+00	1.37E-03	I	WAC
U-235	3.56E+02	7.02E-01	3.69E-01	1.07E+00	8.17E+00	1.99E+01	2.81E+01	2.47E+01	4.10E+02	2.83E-04	3.E-01	8.73E-04	I	WAC
U-236	6.58E-02	4.04E-04	1.72E-02	1.76E-02	1.20E-03	4.42E-02	4.54E-02	6.57E-01	7.85E-01	5.42E-07	2.E-02	2.71E-05	I	PE
U-238	9.15E+03	4.65E+01	8.41E+00	5.50E+01	5.78E+02	2.31E+02	8.09E+02	1.09E+03	1.11E+04	7.66E-03	2.E+00	4.82E-03	I	WAC
Np-237	3.85E-02	1.63E-04	1.05E-03	1.22E-03	4.70E-03	4.70E+00	4.70E+00	9.34E-01	5.67E+00	3.92E-06	4.E-04	9.79E-03	I	PE
Pu-238	9.44E+01	2.23E+00	2.54E-01	2.48E+00	6.20E+00	7.56E+00	1.38E+01	2.42E+01	1.35E+02	9.31E-05	7.E-02	1.33E-03	I	PE
Pu-239	1.15E+02	2.36E-01	1.02E+00	1.26E+00	2.26E+00	1.12E+01	1.35E+01	5.27E+02	6.57E+02	4.53E-04	6.E-03	7.55E-02	I	PE
Pu-240	2.62E+01	1.15E-01	6.81E-01	7.96E-01	1.89E+00	3.27E+01	3.46E+01	2.79E+01	8.95E+01	6.18E-05	6.E-03	1.03E-02	I	PE
Pu-241	5.42E+02	1.28E-01	1.78E+01	1.79E+01	3.57E-01	1.81E+02	1.81E+02	3.16E+03	3.90E+03	2.69E-03	2.E-01	1.34E-02	I	PE
Pu-242	1.66E+02	2.89E-05	1.96E-04	2.24E-04	3.29E-05	8.50E-03	8.53E-03	8.54E-03	1.66E+02	1.15E-04	6.E-03	1.91E-02	I	PE
Pu-244	3.64E-06	2.25E-08	8.39E-05	8.39E-05	6.48E-08	8.69E-04	8.69E-04	2.18E-05	9.79E-04	6.75E-10	4.E-04	1.69E-06	I	PE
Am-241	2.22E+01	3.63E+00	9.58E-01	4.59E+00	7.34E+01	2.07E+01	9.42E+01	1.45E+02	2.66E+02	1.84E-04	7.E-03	2.63E-02	I	PE
Am-243	8.31E-03	5.12E-05	3.74E-04	4.25E-04	1.62E-02	1.79E+01	1.79E+01	8.06E-02	1.80E+01	1.24E-05	9.E-04	1.38E-02	I	PE
Cm-243	2.66E-02	1.64E-04	8.49E-04	1.01E-03	4.73E-04	3.22E-03	3.69E-03	2.88E-01	3.20E-01	2.21E-07	8.E-01	2.76E-07	I	PE
Cm-244	2.98E-01	1.83E-03	8.71E-03	1.05E-02	6.13E+00	6.79E+03	6.80E+03	3.26E+00	6.80E+03	4.70E-03	2.E+00	2.35E-03	I	PE
											Sum of Fractions:	**1.8E+00**		

Notes: 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 7-4), WAC = WAC (DOE, 1999, Table E-1); 3) No data, assumes 10X of C-14 value.

Alternative MLLW Case: Hanford 200 Area

Nuclide	1988-1997	1998-1999			2000-2070			2000-2070	1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Alternative	Total	Avg. Conc.				
	Volume (trench, m3)	Volume (trench, m3)			Volume (trench, m3)			Volume (trench, m3)	Volume (trench, m3)					
	1.11E+05	9.39E+02	1.12E+04	1.22E+04	9.15E+03	1.82E+05	1.91E+05	4.87E+05	8.01E+05					
	Volume (monolith, m3)								Volume (monolith, m3)					
	1.97E+02								1.97E+02					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Activity (Ci)	Ci/m3	Ci/m3			
H-3	8.79E+04	1.46E+00	2.28E+01	2.43E+01	1.44E+01	2.33E+02	2.48E+02	1.26E+07	1.27E+07	1.59E+01	1.E+05	1.60E-04	I	WAC Cat 1
C-14	2.02E+02	1.29E-01	2.02E+00	2.15E+00	1.28E+00	2.08E+01	2.21E+01	1.34E+03	1.57E+03	1.95E-03	9.E-02	2.15E-02	I	WAC Cat 1
C-14am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-02	4.94E-02	1.34E+04	1.34E+04	1.67E-02	9.E-01	1.84E-02	I	WAC Cat 1
Al-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E-05	5.14E-05	6.42E-11	5.E-05	1.28E-06	I	PE
Cl-36	3.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E+01	1.21E+01	1.51E-05	1.E-01	1.08E-04	I	WAC Cat 3
K-40	3.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.21E+01	9.21E+01	1.15E-04	7.E-04	1.64E-01	I	PE
Co-60	9.89E+05	2.19E+01	1.41E+02	1.63E+02	1.72E+02	3.31E+03	3.48E+03	3.47E+07	3.57E+07	4.46E+01	3.E+04	1.49E-03	I	PE
Ni-59	4.90E+03	3.16E-01	4.95E+00	5.27E+00	3.12E+00	4.90E+01	5.21E+01	1.86E+05	1.91E+05	2.39E-01	3.E+00	7.95E-02	I	PE
Ni-63	8.22E+05	3.90E+01	2.23E+02	2.62E+02	2.99E+02	1.72E+03	2.02E+03	6.65E+06	7.48E+06	9.33E+00	2.E+04	4.67E-04	I	WAC Cat 3
Ni-63am	0.00E+00	8.40E-10	8.32E-08	8.40E-08	1.56E-07	1.91E-02	1.91E-02	0.00E+00	1.91E-02	2.38E-08	6.E+01	4.03E-10	I	WAC Cat 1
Se-79	7.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-02	1.11E-02	1.39E-08	2.E-06	8.10E-03	W	PE
Sr-90	9.90E+05	5.38E+02	3.05E+03	3.59E+03	4.15E+03	2.38E+04	2.80E+04	5.58E+06	6.61E+06	8.24E+00	5.E+04	1.65E-04	I	WAC Cat 3
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.31E+01	5.31E+01	6.63E-05	5.E+00	1.33E-05	I	PE
Nb-93m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E+03	1.38E+03	1.73E-03	4.E+03	4.32E-07	I	PE
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.16E+01	6.16E+01	7.68E-05	5.E-02	1.60E-03	I	WAC Cat 3
Tc-99	7.15E+00	1.68E-03	1.64E-01	1.66E-01	3.07E-01	9.38E+01	9.41E+01	4.05E+03	4.15E+03	5.17E-03	5.E+00	1.03E-03	I	WAC Cat 3
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.89E+00	5.89E+00	7.35E-06	1.E+00	7.35E-06	I	PE
Sn-121m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E+02	2.44E+02	3.04E-04	2.E+01	1.52E-05	I	PE
Sn-126	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.94E-04	5.94E-04	7.41E-10	8.E-05	9.26E-06	I	PE
I-129	9.81E-02	5.35E-10	5.29E-08	5.35E-08	9.91E-08	4.13E-03	4.13E-03	1.68E+00	1.78E+00	2.23E-06	9.E-03	2.62E-04	I	WAC Cat 1
Cs-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E+03	3.07E+03	3.83E-03	2.E-01	2.40E-02	I	WAC Cat 1
Cs-137	8.64E+05	4.24E+02	2.40E+03	2.83E+03	3.28E+03	1.89E+04	2.21E+04	5.04E+06	5.93E+06	7.40E+00	1.E+04	6.17E-04	I	WAC Cat 3
Ba-133	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.56E+01	7.56E+01	9.43E-05	3.E+02	3.14E-07	I	PE
Sm-151	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.18E+02	4.18E+02	5.21E-04	2.E+02	2.61E-06	I	PE
Eu-152	1.32E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+04	3.01E+04	3.76E-02	2.E+01	1.88E-03	I	PE
Eu-154	1.93E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E+03	5.05E+03	6.30E-03	4.E+02	1.57E-05	I	PE
Ra-226	6.37E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E+02	2.82E+02	3.52E-04	4.E-02	8.19E-03	I	WAC Cat 3
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-01	1.35E-01	1.69E-07	4.E+03	4.23E-11	I	PE
Th-229	2.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.21E-03	5.23E-03	6.53E-09	5.E-04	1.31E-05	I	PE
Th-230	5.26E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E+01	5.74E+01	7.17E-05	2.E-03	3.41E-02	I	WAC Cat 1
Th-232	1.12E-01	2.67E-10	2.65E-08	2.67E-08	4.96E-08	3.45E-02	3.45E-02	3.46E+01	3.48E+01	4.34E-05	2.E-02	1.89E-03	I	WAC Cat 3
Pa-231	4.48E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.24E-01	9.24E-01	1.15E-06	1.E-04	1.15E-02	I	WAC Cat 1
U-232	2.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-01	1.72E-01	2.15E-07	4.E-06	5.66E-02	W	PE
U-233	3.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E+01	3.81E+01	1.86E+00	4.03E+01	5.03E-05	7.E-03	6.80E-03	I	WAC Cat 3
U-234-trench	5.56E+01	1.56E-02	1.55E+00	1.56E+00	2.89E+00	5.23E+02	5.25E+02	1.33E+02	7.16E+02	8.93E-04	2.E+00	4.70E-04	I	WAC Cat 3
U-234-monolith	1.99E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E+01	1.01E-01	2.E+00	5.32E-02	I	WAC Cat 3
U-235-trench	1.01E+00	1.62E-03	1.59E-01	1.60E-01	2.97E-01	5.17E+01	5.20E+01	2.48E+01	7.80E+01	9.73E-05	3.E-03	3.47E-02	I	WAC Cat 1
U-235-monolith	6.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.43E-01	3.26E-03	5.E-01	6.53E-03	I	WAC Cat 3
U-236-trench	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-05	1.76E-05	6.59E-01	6.59E-01	8.22E-07	1.E-02	8.66E-05	I	WAC Cat 1
U-236-monolith	1.09E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E+00	5.53E-03	2.E+00	2.77E-03	I	WAC Cat 3
U-238-trench	2.84E+01	1.93E-04	4.47E-03	4.66E-03	4.93E-03	3.94E+00	3.94E+00	1.10E+03	1.13E+03	1.41E-03	1.E+00	1.17E-03	I	WAC Cat 3
U-238-monolith	3.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E+01	1.75E-01	1.E+00	1.46E-01	I	WAC Cat 3
Np-237	2.70E-02	1.49E-09	1.47E-07	1.49E-07	2.76E-07	1.25E-01	1.25E-01	9.35E-01	1.09E+00	1.36E-06	4.E-04	3.39E-03	I	PE
Pu-238	1.40E+02	8.22E-02	4.66E-01	5.48E-01	6.31E-01	4.66E+00	5.29E+00	2.47E+01	1.71E+02	2.13E-04	7.E-02	3.05E-03	I	PE
Pu-239	4.27E+01	3.83E-01	2.18E+00	2.56E+00	3.49E+00	9.29E+01	9.64E+01	5.28E+02	6.69E+02	8.35E-04	4.E-01	1.99E-03	I	WAC Cat 3
Pu-240	1.37E+01	1.45E-01	8.20E-01	9.64E-01	1.32E+00	1.83E+01	1.97E+01	2.79E+01	6.23E+01	7.77E-05	6.E-03	1.30E-02	I	PE
Pu-241	3.28E+02	9.15E+00	5.19E+01	6.10E+01	7.02E+01	4.48E+02	5.18E+02	3.16E+03	4.06E+03	5.07E-03	2.E-01	2.54E-02	I	PE
Pu-242	1.02E-03	3.82E-11	3.78E-09	3.82E-09	7.08E-09	7.14E-05	7.14E-05	9.09E-03	1.02E-02	1.27E-08	6.E-03	2.12E-06	I	PE
Pu-244	3.76E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-05	2.56E-05	3.20E-11	4.E-04	7.99E-08	I	PE
Am-241	3.18E+01	3.28E-01	1.86E+00	2.18E+00	2.51E+00	3.47E+01	3.72E+01	1.46E+02	2.17E+02	2.71E-04	7.E-03	3.87E-02	I	PE
Am-243	1.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.57E-01	4.57E-01	8.07E-02	5.54E-01	6.91E-07	9.E-04	7.68E-04	I	PE
Cm-243	1.39E-02	3.82E-11	3.78E-09	3.82E-09	7.08E-09	2.68E-06	2.69E-06	2.89E-01	3.02E-01	3.77E-07	8.E-01	4.72E-07	I	PE
Cm-244	6.84E-01	1.91E-10	1.89E-08	1.91E-08	3.54E-08	7.12E-06	7.16E-06	3.31E+00	3.99E+00	4.98E-06	2.E+00	2.49E-06	I	PE
										Sum of Fractions:		7.7E-01		

Notes: The waste volumes and uranium nuclide inventories and limits have been segregated to accommodate the separate 1996 disposal of a uranium-filled culvert monolith. 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 16-7, trench values), WAC = waste acceptance criteria, NL = No Limit (FDH, 1998, Table A-2); 3) No data, assumes 1/10 of C-14 value.

Alternative MLLW Case: NTS Areas 3 and 5

Nuclide	1988-1997	1998-1999			2000-2070			2000-2070	1988-2070	1988-2070	Site- and Nuclide-Specific Conc. Limit	Ratio of Radioactivity to Limit	Pathway (Note 1)	Source (Note 2)
	Total	ER	NonER	Total	ER	NonER	Total	Alternative	Total	Avg. Conc.				
	Volume (m3)	Volume (m3)			Volume (m3)			Volume (m3)	Volume (m3)					
	1.94E+05	2.08E+04	5.53E+03	2.63E+04	3.49E+05	4.34E+05	7.84E+05	4.87E+05	1.49E+06					
	Activity (Ci)	Activity (Ci)			Activity (Ci)			Activity (Ci)	Activity (Ci)	Ci/m3	Ci/m3			
H-3	2.89E+06	9.17E+03	4.54E+03	1.37E+04	1.28E+04	9.62E+06	9.64E+06	1.26E+07	2.52E+07	1.69E+01	7.E+01	1.51E-05	I	WAC
C-14	6.27E+01	3.87E-01	1.99E+00	2.38E+00	1.22E+00	1.29E+02	1.31E+02	1.34E+03	1.54E+03	1.03E-03	6.E-03	1.66E-01	A	WAC
C-14am	3.55E-07	2.19E-09	9.97E-09	1.22E-08	6.31E-09	2.88E-08	3.51E-08	1.34E+04	1.34E+04	8.99E-03	6.E-02	1.44E-01	A	3
Al-26	8.41E-06	5.19E-08	2.36E-07	2.88E-07	1.50E-07	6.82E-07	8.32E-07	5.14E-05	6.10E-05	4.09E-11	5.E-05	8.18E-07	I	PE
Cl-36	4.35E-02	2.68E-04	1.29E-02	1.32E-02	2.47E-01	2.74E+02	2.74E+02	1.21E+01	2.86E+02	1.92E-04	3.E-01	6.46E-04	I	WAC
K-40	3.46E-01	2.07E-03	9.45E-03	1.15E-02	2.79E+00	5.08E+00	7.87E+00	9.21E+01	1.00E+02	6.73E-05	7.E-04	9.61E-02	I	PE
Co-60	1.46E+05	9.44E+02	4.11E+03	5.05E+03	2.69E+03	9.68E+04	9.95E+04	3.47E+07	3.50E+07	2.35E+01	3.E+04	7.82E-04	I	PE
Ni-59	7.23E+02	4.46E+00	2.07E+01	2.52E+01	1.29E+01	6.32E+01	7.61E+01	1.86E+05	1.87E+05	1.25E-01	3.E+00	4.18E-02	I	PE
Ni-63	3.26E+04	2.01E+02	9.16E+02	1.12E+03	1.95E+03	1.53E+06	1.53E+06	6.65E+06	8.22E+06	5.51E+00	7.E+02	8.11E-03	I	WAC
Ni-63am	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Se-79	1.38E-03	8.49E-06	3.87E-05	4.72E-05	2.45E-05	1.12E-04	1.36E-04	1.10E-02	1.26E-02	8.44E-09	2.E-01	4.22E-08	I	PE
Sr-90	9.26E+05	6.03E+03	2.60E+04	3.20E+04	1.65E+04	8.11E+04	9.77E+04	5.58E+06	6.64E+06	4.45E+00	4.E+01	1.10E-01	I	WAC
Zr-93	1.91E-01	1.18E-03	5.38E-03	6.56E-03	3.41E-03	1.55E-02	1.89E-02	5.31E+01	5.33E+01	3.58E-05	5.E+00	7.15E-06	I	PE
Nb-93m	4.99E+00	3.08E-02	1.40E-01	1.71E-01	8.88E-02	4.05E-01	4.94E-01	1.38E+03	1.39E+03	9.32E-04	4.E+03	2.33E-07	I	PE
Nb-94	2.25E-01	1.38E-03	1.57E-02	1.71E-02	7.11E-03	6.58E-02	7.29E-02	6.16E+01	6.19E+01	4.15E-05	9.E-05	4.61E-01	I	PE
Tc-99	7.66E+00	6.95E-02	2.03E-01	2.73E-01	5.14E-01	1.43E+00	1.94E+00	4.05E+03	4.05E+03	2.72E-03	2.E-02	1.11E-01	I	WAC
Cd-113m	1.72E+00	5.73E-03	2.59E-02	3.16E-02	1.72E-02	7.47E-02	9.19E-02	5.89E+00	7.74E+00	5.19E-06	1.E+00	5.19E-06	I	PE
Sn-121m	2.10E+00	9.23E-03	4.21E-02	5.13E-02	2.66E-02	1.21E-01	1.48E-01	2.44E+02	2.46E+02	1.65E-04	2.E+01	8.24E-06	I	PE
Sn-126	9.42E-05	5.81E-07	2.65E-06	3.23E-06	1.68E-06	7.64E-06	9.32E-06	5.94E-04	7.01E-04	4.70E-10	8.E-05	5.87E-06	I	PE
I-129	6.55E-02	4.04E-04	9.26E-02	9.30E-02	1.19E-03	3.13E-02	3.25E-02	1.68E+00	1.87E+00	1.26E-06	2.E-03	6.28E-04	I	PE
Cs-135	1.80E-03	1.11E-05	5.05E-05	6.16E-05	3.20E-05	1.46E-04	1.78E-04	3.07E+03	3.07E+03	2.06E-03	2.E-01	1.03E-02	I	PE
Cs-137	8.02E+05	5.57E+03	2.25E+04	2.81E+04	1.49E+04	6.43E+05	6.58E+05	5.04E+06	6.53E+06	4.38E+00	9.E+00	4.77E-01	I	WAC
Ba-133	1.26E+01	7.74E-02	3.67E-01	4.45E-01	3.88E-01	1.84E+02	1.84E+02	7.56E+01	2.73E+02	1.83E-04	3.E+02	6.10E-07	I	PE
Sm-151	2.01E+01	6.93E-02	3.29E-01	3.99E-01	2.07E-01	1.07E+00	1.28E+00	4.18E+02	4.39E+02	2.95E-04	2.E+02	1.47E-06	I	PE
Eu-152	1.62E+02	9.22E-01	4.65E+00	5.58E+00	4.45E+01	4.65E+04	4.65E+04	2.88E+04	7.54E+04	5.06E-02	2.E+01	2.53E-03	I	PE
Eu-154	9.71E+02	9.47E-01	4.34E+00	5.29E+00	4.11E+00	1.54E+03	1.55E+03	3.12E+03	5.64E+03	3.78E-03	4.E+02	9.46E-06	I	PE
Ra-226	3.28E+01	6.42E+02	9.98E+00	6.52E+02	8.59E+03	6.23E+01	8.65E+03	2.82E+02	9.62E+03	6.45E-03	4.E-02	1.84E-01	I	WAC
Ra-228	2.09E-02	6.94E-02	2.98E-03	7.24E-02	9.29E-01	4.09E+00	5.02E+00	1.35E-01	5.25E+00	3.52E-06	4.E+03	8.80E-10	I	PE
Th-229	1.81E-04	1.12E-06	2.47E-03	2.47E-03	1.87E-04	2.30E-01	2.30E-01	5.21E-03	2.38E-01	1.59E-07	5.E-04	3.19E-04	I	PE
Th-230	1.03E+01	1.30E+02	3.73E-01	1.30E+02	1.73E+03	2.01E+00	1.74E+03	5.74E+01	1.93E+03	1.30E-03	8.E-02	1.55E-02	I	WAC
Th-232	2.29E+01	2.05E+00	3.89E-01	2.43E+00	1.88E+01	4.69E+00	2.35E+01	3.46E+01	8.34E+01	5.60E-05	2.E-02	2.56E-03	I	WAC
Pa-231	1.62E-01	2.51E+00	6.11E-03	2.51E+00	3.35E+01	1.24E-01	3.37E+01	9.24E-01	3.73E+01	2.50E-05	4.E-02	6.61E-04	I	WAC
U-232	2.01E-02	1.24E-04	6.55E-02	6.56E-02	4.18E-04	7.42E-01	7.42E-01	1.72E-01	1.00E+00	6.71E-07	2.E-03	3.35E-04	I	PE
U-233	1.53E+00	1.33E-02	1.03E-02	2.36E-02	2.53E-01	4.78E+00	5.03E+00	1.86E+00	8.44E+00	5.66E-06	7.E-04	8.08E-03	I	PE
U-234	9.10E+01	7.40E+01	1.09E+01	8.50E+01	1.19E+03	4.88E+02	1.68E+03	1.33E+02	1.99E+03	1.34E-03	1.E+00	1.34E-03	I	WAC
U-235	3.56E+02	7.02E-01	3.69E-01	1.07E+00	8.17E+00	1.99E+01	2.81E+01	2.48E+01	4.10E+02	2.75E-04	3.E-01	8.48E-04	I	WAC
U-236	6.58E-02	4.04E-04	1.72E-02	1.76E-02	1.20E-03	4.42E-02	4.54E-02	6.59E-01	7.88E-01	5.28E-07	2.E-02	2.64E-05	I	PE
U-238	9.15E+03	4.65E+01	8.41E+00	5.50E+01	5.78E+02	2.31E+02	8.09E+02	1.10E+03	1.11E+04	7.45E-03	2.E+00	4.69E-03	I	WAC
Np-237	3.85E-02	1.63E-04	1.05E-03	1.22E-03	4.70E-03	4.70E+00	4.70E+00	9.35E-01	5.67E+00	3.81E-06	4.E-04	9.51E-03	I	PE
Pu-238	9.44E+01	2.23E+00	2.54E-01	2.48E+00	6.20E+00	7.56E+00	1.38E+01	2.47E+01	1.35E+02	9.08E-05	7.E-02	1.30E-03	I	PE
Pu-239	1.15E+02	2.36E-01	1.02E+00	1.26E+00	2.26E+00	1.12E+01	1.35E+01	5.28E+02	6.57E+02	4.41E-04	6.E-03	7.35E-02	I	PE
Pu-240	2.62E+01	1.15E-01	6.81E-01	7.96E-01	1.89E+00	3.27E+01	3.46E+01	2.79E+01	8.95E+01	6.00E-05	6.E-03	1.00E-02	I	PE
Pu-241	5.42E+02	1.28E-01	1.78E+01	1.79E+01	3.57E-01	1.81E+02	1.81E+02	3.16E+03	3.90E+03	2.61E-03	2.E-01	1.31E-02	I	PE
Pu-242	1.66E+02	2.89E-05	1.96E-04	2.24E-04	3.29E-05	8.50E-03	8.53E-03	9.09E-03	1.66E+02	1.11E-04	6.E-03	1.86E-02	I	PE
Pu-244	3.64E-06	2.25E-08	8.39E-05	8.39E-05	6.48E-08	8.69E-04	8.69E-04	2.19E-05	9.79E-04	6.56E-10	4.E-04	1.64E-06	I	PE
Am-241	2.22E+01	3.63E+00	9.58E-01	4.59E+00	7.34E+01	2.07E+01	9.42E+01	1.46E+02	2.67E+02	1.79E-04	7.E-03	2.56E-02	I	PE
Am-243	8.31E-03	5.12E-05	3.74E-04	4.25E-04	1.62E-02	1.79E+01	1.79E+01	8.07E-02	1.80E+01	1.21E-05	9.E-04	1.34E-02	I	PE
Cm-243	2.66E-02	1.64E-04	8.49E-04	1.01E-03	4.73E-04	3.22E-03	3.69E-03	2.89E-01	3.20E-01	2.14E-07	8.E-01	2.68E-07	I	PE
Cm-244	2.98E-01	1.83E-03	8.71E-03	1.05E-02	6.13E+00	6.79E+03	6.80E+03	3.31E+00	6.80E+03	4.56E-03	2.E+00	2.28E-03	I	PE
											Sum of Fractions:	**2.0E+00**		

Notes: 1) I = intruder, W= water, A= Air; 2) PE = performance evaluation (Waters and Gruebel, 1996, Table 7-4), WAC = WAC (DOE, 1999, Table E-1); 3) No data, assumes 10X of C-14 value.

Appendix B-2: Guidance for Reporting Radionuclide Concentration in Integrated Planning, Accountability, and Budgeting System (IPABS)

The following is an excerpt of the relevant guidance for reporting radionuclide concentration of waste streams in the SDD portion of the FY 2000 update to the IPABS database.

These data serve to identify and quantify the radioactive and/or chemical constituents contained in the stream. The total activity associated with radioactive streams is also identified. This information is used to support a number of Headquarters reporting needs including the LLW Disposal Capacity Report, responses to congressional inquiries, and the CID (Corporate Information Database) *as discussed in section 5.1.*

Following are general guidelines to consider in reporting these data.

- *Emphasis should be placed on reporting the contaminants considered most important to decisions regarding the stream (e.g., relating to waste type determination, health risks, treatment, disposal, or compliance needs).*
- *As discussed in section 5.1, the collection of this information is not intended as a driver for additional characterization activities. Rather, the intent is to collect the information that is currently known. Deficiencies or limitations in the data should be acknowledged in the Confidence Comments.*
- *Contaminant information should be reported for streams with an existing inventory, or that are currently generated, where characterization data exist. When available, sites are encouraged to provide estimates for future streams, particularly those destined for disposal. These streams are critical to the LLW Disposal Capacity Report analyses. Absent any reported data, estimates/assumptions by Headquarters will be necessary.*

Step 1: ***Total Activity (Ci)*** *is the total radioactivity (curies) associated with the existing inventory, or in-place media volume, and future generation (through 2070) of the stream.*

Report the sum of the activities of the individual long-lived radionuclides (generally with half-lives greater than one year) in the stream. Activities of short-lived decay products that accompany longer-lived radionuclides such as yttrium-90, barium-137, and thorium-234 should not be included in this total. These short-lived daughters will be accounted for when these data are used in various analyses at Headquarters.

The reported total activity should represent current (FY 1999) values associated with any existing inventory (or in-place media volume) and as generated values associated with any future generation. If not, the date to which the total activity corresponds should be provided in the Confidence Comments field. The activity *associated with quantities of the stream already dispositioned (FY 1998 or earlier) should not be included.*

Step 5: ***Profile Density*** *is the density of the waste/media represented by the profile. This field is only required if the concentrations of any radioactive contaminants are reported on a mass basis. Conversion of such data to a volumetric basis will be necessary for the LLW Disposal Capacity Report analysis.*

Step 9: ***Constituents (Radioactive)***

S *This pick list of radioactive contaminants (see TA.12, Radiological Contaminants Valid Values) was developed based on review of information previously reported in various documents and databases. These include the LLW Disposal Capacity Report, Mixed Waste Inventory Report, Environmental Restoration Core Database, and National Spent Nuclear Fuel Database. The list contains about 80 isotopes along with a few generic values (e.g., Gross Alpha, Total Beta-Gamma).*

S *Report the key isotopes contained in the profile (generally no more than five to ten) as discussed in the above General Guidelines. Be as specific as possible, aiming for actual isotope(s) such as plutonium-239 or uranium-238, as opposed to reporting, for example, "Alpha (gross)."*

Step 10: ***Concentration (Average, Upper, Lower)***

S *Data fields are available to report average, lower, and upper concentrations. This is not meant to imply that all are required. Rather, it is meant to accommodate the available level of information. At a minimum, provide an average or upper concentration limit (i.e., lower limit by itself is not useful for analysis).*

S *Leave the concentration fields blank if the concentration is not known or cannot be estimated for a given contaminant. Note that "nulls" will be interpreted as unknowns unless otherwise indicated in the Confidence Comments.*

S *As with the Total Activity field (see above), the reported isotope concentrations are presumed to represent current values. If not, provide the corresponding date in the Confidence Comments.*

S *The individual average or upper limit isotope concentrations are not intended to equate, or directly relate, to the reported total activity -- although the average should not be greater than the total activity when summed over the stream volume (reported inventory plus projected generation).*

- *With respect to reporting individual isotopes, the activities of daughters, where applicable, should not be reflected in the concentration values. For example, if a stream contains 100 pCi/g of Sr-90, the concentration reported for Sr-90 should be 100 pCi/g. It is presumed that 100 pCi/g of Y-90 is also present.*

Appendix B-3: Notes for Sum of Fractions Calculations

The *Performance Evaluation* (Waters and Gruebel, 1996) limiting concentrations have been modified in three ways. First, all the uranium radionuclides are now considered solubility limited in the groundwater pathway based on the information from the Hanford Site. Solubility limits were not considered in the original *Performance Evaluation* water pathway analysis. Thus, limiting concentrations for uranium nuclides disposed of in a high pH environment (e.g., in grout and cement) that were previously based on the groundwater pathway are based on the intruder pathway in this radiological capacity analysis.

Second, based on DOE guidance for composite analyses, peak concentration limits in the groundwater pathway are considered for 1,000 years rather than the 10,000-year period used in the the *Performance Evaluation*. Limiting concentrations in the *Performance Evaluation* that were previously based on the ground water pathway for radionuclides with arrival times between 1,000 and 10,000 years are based on the intruder pathway in this radionuclide capacity analysis.

Third, all nickel, radium, thorium, neptunium, plutonium, americium, and curium radionuclides are assumed to be solubility limited in the water pathway (ORNL, 1997). Therefore, concentration limits for these radionuclides are based on the *Performance Evaluation* intruder pathway in this radionuclide capacity analysis.

When no limit was specified in the *Performance Evaluation* values were set at 1E99.

Appendix C. Key Radionuclides and Generation Processes

This appendix presents the criteria used to select the key radionuclides analyzed in this Report. It contains a more complete discussion of the major key radionuclides with the greatest impact on DOE LLW and MLLW disposal capacity. A discussion of the major processes that generate DOE LLW and MLLW is also provided.

C.1 Criteria for Selection of Radionuclides:

The following criteria were developed to select the list of radionuclides important to evaluation of radiological capacity at DOE LLW disposal facilities:

- Half-life in excess of five years.
- Identified in site documents throughout the DOE complex as a radionuclide critical to evaluation of dose to the public through groundwater, atmospheric, or inadvertent intruder scenarios.
- Daughter products of the identified radionuclides are excluded from the list. Since doses from radiologically significant daughter products are considered in the estimation of parent nuclide dose (equilibrium stage), the activity of the daughters need not be reported. Reporting both parents and daughters can be confusing and may lead to an overestimate of the radionuclide inventory and resultant dose.
- Categories for C-14 and Ni-63 activated metal were added because the analysis of radiological capacity recognizes a lower leach rate for radionuclides within a metal matrix.

These criteria resulted in 49 nuclides being included in the 2000 IPABS SDD update. Table C-1 provides the list of nuclides considered.

Table C-1. Key Radionuclides

Radionuclide	Abbreviated Form	Atomic Number	Half-Life	Radionuclide	Abbreviated Form	Atomic Number	Half-Life
tritium	H-3	1	12.3 y	europium 154	Eu-154	63	16 y
carbon 14	C-14	6	5730 y	radium 226	Ra-226	88	1602 y
carbon 14*	C-14 am	6	5730 y	radium 228	Ra-228	88	6.7 y
aluminum 26	Al-26	13	7.4×10^{5} y	thorium 229	Th-229	90	7340 y
chlorine 36	Cl-36	17	3.1×10^{5} y	thorium 230	Th-230	90	8.0×10^{4} y
potassium 40	K-40	19	1.26×10^{9} y	thorium 232	Th-232	90	1.4×10^{10} y
cobalt 60	Co-60	27	5.26 y	protactinium 231	Pa-231	91	3.25×10^{4} y
nickel 59	Ni-59	28	8×10^{4} y	uranium 232	U-232	92	72 y
nickel 63	Ni-63	28	92 y	uranium 233	U-233	92	1.62×10^{5} y
nickel 63*	Ni-63 am	28	92 y	uranium 234	U-234	92	2.47×10^{5} y
selenium 79	Se-79	34	6.5×10^{4} y	uranium 235	U-235	92	7.1×10^{8} y
strontium 90	Sr-90	38	28.1 y	uranium 236	U-236	92	2.39×10^{7} y
zirconium 93	Zr-93	40	1.5×10^{6} y	uranium 238	U-238	92	4.51×10^{9} y
niobium 93**	Nb-93m	41	13.6 y	neptunium 237	Np-237	93	2.14×10^{6} y
niobium 94	Nb-94	41	2.0×10^{4} y	plutonium 238	Pu-238	94	86.4 y
technetium 99	Tc-99	43	2.12×10^{5} y	plutonium 239	Pu-239	94	24.39 y
cadmium 113**	Cd-113m	48	13.6 y	plutonium 240	Pu-240	94	6580 y
tin 121**	Sn-121m	50	76 y	plutonium 241	Pu-241	94	13.2 y
tin 126	Sn-126	50	10^{5} y	plutonium 242	Pu-242	94	3.79×10^{5} y
iodine 129	I-129	53	1.7×10^{7} y	plutonium 244	Pu-244	94	7.6×10^{5} y
cesium 135	Cs-135	55	3.0×10^{6} y	americium 241	Am-241	95	458 y
cesium 137	Cs-137	55	30.0 y	americium 243	Am-243	95	7.95×10^{3} y
barium 133	Ba-133	56	7.2 y	curium 243	Cm-243	96	32 y
samarium 151	Sm-151	62	87 y	curium 244	Cm-244	96	17.6 y
europium 152	Eu-152	63	12 y				

*Activated metal; **Metastable

The following nuclides were reported to be below 1 curie throughout the DOE complex: Al-26, Ni-63am, Se-79, Sn-126, and Th-229.

C.2 Key Radionuclides

This section provides additional detail on the characteristics and sources of the radionuclides most important for assessing radiological impacts on Department disposal operations.

C.2.1 Tritium

Tritium (^{3}H) is a radioactive isotope of hydrogen. It has a half-life of 12.3 years and decays to helium-3 (^{3}He) with the emission of a beta particle and no gamma ray. Tritium produces a very low-energy beta particle and is usually considered one of the least radiologically hazardous of the radionuclides. However, since it can replace normal hydrogen in chemical compounds essential for life, tritium poses a potential hazard that can be very mobile within the biological environment.

Light water reactors produce a small amount of tritium, primarily from ternary fission. Most tritium created in these reactors remains in the fuel rods. The major source of tritium in the DOE complex was the tritium production reactors. None of these reactors are currently producing, but a stockpile of tritium remains as part of the DOE mission. Presently, tritium is used in testing, component maintenance, and research applications.

The primary chemical waste forms of tritium from DOE activities are tritium gas and tritiated water, either as a liquid or vapor. Additionally, tritium waste forms generated from the thermonuclear weapons program (e.g., tritium production reactors) are lithium metal hydrides.

Tritium substitutes readily for ordinary hydrogen in water, and thus becomes part of the hydrological cycle. Through sandy soils, migration of tritium takes place at the same velocity as groundwater through sandy soils. However, the migration of tritium in groundwater is influenced by the soil type. Tritium migration is not slowed in sandy soils; but in clay soils, a small number of tritium atoms may exchange with ordinary hydrogen atoms in water molecules that are bound within the clay, thus slowing the migration.

The mechanisms of tritium gas uptake in vegetation are not well understood, but plants have the capability to oxidize tritium to form tritiated water. Many of the metabolic reactions that take place in living organisms are involved with the transfer of hydrogen. Any of these reactions can involve tritium instead of ordinary hydrogen. The oxygen and nitrogen atoms in organic molecules make it much easier for tritium to replace hydrogen associated with these groups than with hydrogen attached to carbon atoms.

The biological half-life of tritium in the human body is about 10 to 12 days. The uptake of hydrogen in humans can occur through inhalation, ingestion, or absorption through the skin. The rate of inhalation is about two times the rate of absorption through the skin.

C.2.2 Cesium-137

Cesium-137 (^{137}Cs) is not a naturally occurring radionuclide. Its half-life is 30.2 years, and it emits one to two high-energy beta particles. Approximately 85 percent of all ^{137}Cs decays result in the emission of a 662 keV gamma ray. Due to the gamma ray energy of ^{137}Cs, it has been used to sterilize medical supplies and milk cartons, and irradiate food.

The primary means of producing ^{137}Cs is via nuclear fission. Industrial applications of ^{137}Cs include the production of plastic shrink tubing (irradiated plastic has the tendency to shrink after being heated); radiography to inspect metal castings and welds for flaws and material defects (e.g., cracks in steel pipes); radioactive measurement gauges for liquid or solid thicknesses (e.g., gaging of automobile sheet steel); treatment of sewage sludge to kill bacteria and viruses; and medical radiotherapy to kill cancerous tissue.

Chemically, cesium behaves like other alkali metals (lithium, sodium, potassium, etc.) and has the simplest of elemental chemistries (excepting the inert gases, such as helium). Cesium reacts with most other elements directly and reacts explosively with air and water. Therefore, metallic cesium must be handled in an inert atmosphere. Cesium reacts with most nonmetals to produce one or more binary compounds; it also forms numerous alloys and compounds with other metals, such as lead and tin. Various oxides, sulfides, and similar compounds are readily hydrolyzed by water-forming cesium hydroxides. Cesium salts are generally characterized by high melting points, electrical conductivity of the melts, and high solubility in water.

The largest source of ^{137}Cs, and therefore the largest potential for waste material, is from nuclear reactors and the large inventory of ^{137}Cs stored in irradiated fuel. DOE also maintains a large inventory of ^{137}Cs as Special Case Waste in the form of sealed sources. These sources were designed to generate known amounts of gamma radiation for equipment and food sterilization, as well as other purposes. A small quantity of ^{137}Cs waste is also generated in research facilities. The primary waste forms that may contain ^{137}Cs, in addition to other fission products, include contaminated scrub water, decontamination solutions, demineralizers, contaminated clothing or gloves, contaminated tools and equipment, ion exchange resins, and filters.

The behavior of cesium in the environment is dictated by its chemical properties. Because of its high solubility, cesium generally moves with the ground water but is retained in clay soils. If cesium is not held in the soils, it can relocate through the root system of plants or through the leaves and stems by atmospheric deposition. Cesium-137 deposited on leaves is likely to penetrate into the plant more rapidly than cesium absorbed from the ground.

Absorption of cesium by humans takes place primarily through the digestive tract. Cesium, like potassium, enters body cells; however, cesium is bound more tightly than potassium. The biological half-life for cesium in humans depends on age, sex, and body mass. For adult humans, the biological half-life varies between 50 and 150 days, with a mean value of 101 days; for infants and children, the biological half-life ranges between 5 and 50 days.

C.2.3 Strontium-90

Strontium-90 (^{90}Sr) is not a naturally occurring radionuclide. It has a half-life of 29 years. Almost no gamma ray particles are released from the ^{90}Sr decay sequence. For example, 99.98 percent of all ^{90}Sr decays result in the emission of a 523 keV maximum-energy beta particle and a 2280 keV maximum-energy beta particle from ^{90}Y decay with no gamma ray. Chemically, strontium behaves like the other alkaline-earth metals (e.g., magnesium, calcium, and barium) and has a relatively simple chemistry. In a nuclear reactor fuel element, strontium preferentially forms a stable oxide. When released into the atmosphere, strontium oxide has a high affinity for water and will readily form a soluble hydroxide.

Strontium-90 exists because of human activities. Due to the high beta particle energies of ^{90}Sr (and its daughter ^{90}Y), it has been used in industrial applications to measure thicknesses of paper, plastic, rubber, and metal foils. It also has some medical applications such as treatment for some eye and skin diseases. Due to the low gamma ray activity of ^{90}Sr, it is not normally used as an irradiation source. The primary means of producing ^{90}Sr is via nuclear fission, and the main source of ^{90}Sr is from fission product recovery.

Most of the ^{90}Sr that exists is trapped inside the spent UO_2 fuel in complex chemical compounds. Strontium-90 can be recovered from high-level radioactive waste streams for eventual separate disposal or use in industrial or medical applications. A large inventory of ^{90}Sr exists at Hanford. Some sealed sources used to generate known amounts of gamma radiation for thickness gauging and other purposes contain ^{90}Sr. Strontium-90 is also used in some radioisotope thermoelectric generators.

The primary low-level waste streams produced at light water reactors include both wet and dry wastes, such as spent-ion exchange resins, filter sludges, filter cartridges, and compactible trash. Most of these wastes will contain small amounts of ^{90}Sr in the presence of other radioactive nuclides. Small amounts of radioactive waste containing ^{90}Sr are also generated in research facilities.

Since strontium typically is in a soluble form and chemically bonds less with surrounding soil and rock than many other radioactive species (for example ^{137}Cs), it tends to migrate further with the ground water. Strontium tends to percolate deeper into the soil due to the effects of leaching by soil moisture. This has the beneficial effect of reducing the probability that strontium will become airborne due to surface erosion, but it also means that strontium can more quickly migrate into an underground water supply. Also because of its solubility, ^{90}Sr can be taken up by plants through the roots, which is the principal means by which strontium gets into the food chain. Absorption through the upper plant structures (leaves, stem) does not happen to an appreciable degree.

Absorption of strontium by humans takes place primarily through the gastrointestinal tract. Once in the body, up to 95 percent of ^{90}Sr is eventually excreted within a few weeks. The remaining fraction is fixed within the skeletal structures, preferentially in the areas of bone growth. Health hazards include the possibility of bone cancer. Strontium enters the body and can replace calcium atoms within the bone. The effective half-life of ^{90}Sr that remains in the skeletal structures is about 18 years (including both decay and biological/chemical processes).

C.2.4 Uranium

Natural uranium chiefly contains three isotopes of uranium; uranium-234 (^{234}U), uranium-235 (^{235}U), and uranium-238 (^{238}U). Uranium-234 is a member of the ^{238}U decay chain and usually found in equilibrium with its ^{238}U parent. The amount of ^{238}U in natural uranium is more than 99 percent, but the ^{235}U, present at 0.72 percent in natural uranium, is most radioactive and important in nuclear weapons and nuclear reactors. Enriching uranium, a process by which the percentage of ^{235}U is increased in relation to the other uranium radionuclides, makes it useful in nuclear weapons and nuclear reactors. Uranium-234 has a half-life of 2.5×10^5 yr and exists as 0.0057 percent of natural uranium. Uranium-230 (^{230}U) is also a member of the ^{238}U decay chain but has a short half-life of only 20.8 days.

Uranium-238 has a half-life of 4.47×10^9 years. This radionuclide decays by alpha particle emission to ^{234}Th. A series of 14 alpha and beta transitions results in the stable ^{206}Pb nuclide. Moderately high-energy alpha particles, low-energy x-rays, and low-energy beta particles are emitted during this series of transitions.

The presence of uranium can be very significant in assessing the long-term performance of a LLW disposal facility due to the quantity, radiotoxicity, and mobility of its daughter products, which include isotopes of radium and radon.

Uranium is very reactive and forms compounds with many other elements, such as the halides, oxygen, and hydrogen. The ability of soil to adsorb uranium out of the ground water depends on a number of factors, including pH and the presence or absence of complexing agents. In the presence of low pH soil conditions, uranium is very soluble and tends to remain in the ground water rather than being adsorbed by the soil.

The principal radiological hazard associated with uranium is due to the relatively high-energy alpha particles its radionuclides and daughters emit. Since these alpha particles do not penetrate materials easily, external exposure to uranium does not pose a high risk. The principal risk is due to either inhalation or ingestion. Inhalation occurs either from release of volatile uranium compound or from suspension of volatile uranium-laden aerosols. Ingestion can occur when the uranium is introduced into water for consumption or the food chain by plant uptake. When uranium is either ingested or inhaled, it is removed from the body with a biological half-life varying between 6 and 5,000 days, depending on which organ has become contaminated. Uranium tends to concentrate in the kidneys and the bones. Additionally, if inhaled, the lungs can receive a dose.

C.2.5 Plutonium

Plutonium is an element produced in nuclear reactors by neutron irradiation of uranium. Neutron capture converts uranium-238 (^{238}U) into neptunium-239 (^{239}Np) which transforms, in a matter of days, into plutonium 239 (^{239}Pu). Absorption of more neutrons and other nuclear reactions generate the other isotopes of plutonium, such as plutonium-238 (^{238}PU), plutonium-240 (^{240}Pu), plutonium-241 (^{241}Pu), and plutonium-242 (^{242}Pu). All isotopes of plutonium are radioactive.

Plutonium-239 is fissile (i.e., fissionable by neutrons), and thus able to sustain a nuclear chain reaction. This property made ^{239}Pu a suitable material for nuclear warheads. Plutonium was produced in special reactors at Hanford and SRS. No plutonium for weapons has been produced since 1988.

Plutonium-240 is more radioactive and generates more heat than ^{239}Pu. In addition to ^{239}Pu, weapons grade plutonium contains up to 6 percent ^{240}Pu; fuel-grade plutonium used in breeder reactors contains up to 18 percent ^{240}Pu; and reactor grade plutonium from power-producing reactors contains up to 24 percent ^{240}Pu. Plutonium-238 is intensely radioactive and generates significant quantities of heat. It is used to make general purpose heat sources and radioisotope thermoelectric generators to produce electricity in spacecraft.

All plutonium isotopes except ^{241}Pu emit alpha particles as the principal form of radiation. Plutonium isotopes also emit small amounts of gamma and neutron radiation. Plutonium-241 decays into americium-241 (^{241}Am), which is a much stronger source of gamma radiation.

Plutonium is usually stored as metal or as powdered oxide. Plutonium metal, the form used in nuclear weapons, will corrode to the oxide form if exposed to air or moisture. Other processes involving plutonium include purification in strong acids, ion exchange, and physical state conversion. Because of these processes, the forms of plutonium found in the DOE complex include metal, oxide, solutions, and scrap/residues.

Most data on plant uptake of plutonium have shown that the majority of plutonium found in native plants and agricultural crops comes from surface deposition rather than soil-plant absorption via the roots. Plutonium concentrations are dependant on plant species, plant age, vegetation type, soil pH, positive ion exchange capability, mineral and organic composition, the plutonium chemical form, and duration of the contamination. Root absorption of plutonium, when present in soil, does occur; however, translocation to the aboveground portions of the plant is limited to less than 0.01percent of the total plutonium concentration in the soil.

Inhalation of plutonium delivers significant internal radiation doses to the body. Absorption of plutonium via ingestion delivers a much lower internal dose than inhalation. When plutonium enters the body, its biological behavior is determined by its physical and chemical characteristics. Very small plutonium particles are complexed in the blood and deposited in the liver and on bone surfaces. These deposits are metabolized very slowly, with biological elimination half-lives of about 50 to 100 years.

C.2.6 Carbon-14

Carbon-14 (^{14}C) is a long-lived radionuclide with a half-life of 5,730 years. When ^{14}C undergoes radioactive decay, the nucleus emits a single beta particle with an energy of 0.156 MeV. There are no radionuclides that decay to form ^{14}C; therefore, it has no parent. The ^{14}C radionuclide is naturally produced in the upper atmosphere by the reaction of neutrons of cosmic ray origin with nitrogen, oxygen, and carbon.

Carbon-14 is also produced in nuclear reactors as a result of absorption of neutrons by nitrogen, carbon, or oxygen present as components of air, coolant, moderator, structural materials, fuel, or impurities. Additionally, ^{14}C is produced for preparation of labeled materials used in medical or biological tracer research.

Because of neutron activation of nitrogen-14, an impurity found in non-fuel reactor components, the activated metals waste stream from nuclear reactors contains a substantial amount of ^{14}C. Additional ^{14}C produced in the coolant may add to the contamination of other waste streams including ion exchange resins, concentrated liquids, filter sludge, cartridge filters, and trash.

The chemistry of carbon is quite complex and involves both oxidation-reduction and nonoxidation-reduction reactions. The predominant forms of ^{14}C available for transport at a LLW disposal site are carbon dioxide ($^{14}CO_2$), methane ($^{14}CH_4$), carbonate ion ($^{14}CO_3^{-2}$), bicarbonate ion ($H^{14}CO_3^-$), and elemental carbon in activated metals.

The main forms of ^{14}C of concern for ground water transport are bicarbonate and carbonate. Bicarbonate is produced during the dissolution of calcium carbonate into water with a pH of 6.5 to 9, or in the dissolving of carbon dioxide. These two categories encompass essentially all of the ^{14}C activity in the waste disposal site available for groun-water transport. Ground-water sources should not be contaminated by activated metals with ^{14}C. The ^{14}C found in these metals is expected to remain in the disposal site because ^{14}C atoms are dispersed throughout the metal matrix; most of the metals are corrosion resistant (stainless steel); the corrosion products are, in general, insoluble in either freshwater or seawater; and the carbon is in its elemental form and thus unavailable for microbial activity.

Carbon distributes itself quickly among the major environmental components—the atmosphere, the biosphere, and surface waters. Transfer among these components takes place over a period of a few years. Carbon-14 is easily transferred during biological processes and soil-plant interactions that involve carbon compounds.

The metabolism and kinetics of ^{14}C in the human body follow those of ordinary carbon. A fraction of carbon introduced into the body is retained as protein, fat, carbohydrates, and other materials. The remainder of ingested carbon is excreted unchanged or is metabolized to CO_2, urea, or other metabolites. Inhaled $^{14}CO_2$ rapidly equilibriates with the air in the lung and enters many organic components of body tissue. The ingestion pathway is the primary route for ^{14}C incorporation. The corresponding biological half-life of ^{14}C is approximately 40 days.

C.2.7 Technetium-99

Technetium-99 (^{99}Tc) is a long-lived radionuclide with a half-life of 213,000 years. When it undergoes radioactive decay, its nucleus emits a single beta particle with a maximum energy of 0.293 MeV. The decay of ^{99}Tc forms stable ruthenium-99 (^{99}Ru). Oxidation-reduction reactions dominate the chemistry of ^{99}Tc. The two most common forms of technetium are the pertechnetate ion (TcO_4^-) and technetium dioxide (TcO_2).

Uranium and plutonium undergoing thermal fission in nuclear reactors produce most of the ^{99}Tc that exists as waste. This waste comes in several forms, including ion exchange resins, filter sludge, cartridge filters, and decommissioning waste. Some ^{99}Tc is present at certain fuel cycle facilities (such as enrichment facilities) because of the recycling of spent reactor fuel that took place within the DOE complex. Several nuclear power plant waste streams that may contain ^{99}Tc are usually mixed with concrete to create a solid waste form. Some ^{99}Tc waste is also generated through medical, industrial, and academic research.

The high solubility of pertechnetate allows it to move quite rapidly in ground-water systems. The migration rate of pertechnetate is expected to be very close to the velocity of ground water unless it is reduced to a less soluble form. The pertechnetate ion is not volatile; its airborne escape from a LLW disposal facility into the atmosphere is not a concern.

The main route of entry of ^{99}Tc into the human body is by ingestion. Once in the body, ^{99}Tc localizes in the thyroid gland and the gastrointestinal tract. Within 10 hours, it redistributes to the stomach and organs with excretory functions, such as the kidneys and salivary glands. The time required for the body to eliminate one-half of an amount of ^{99}Tc by regular processes of excretion is approximately 60 hours. Very little ^{99}Tc is assimilated by the muscle or the brain. Hair, however, retains ^{99}Tc for long periods of time after a dose and can be a good indicator of ^{99}Tc contamination.

C.3 Processes That Generate LLW

This section describes the major DOE missions that have and are creating LLW within the complex.

C.3.1 Nuclear Fuel Cycle

Nuclear fuel cycle wastes contain the isotopes of uranium, ^{235}U and ^{238}U, and small amounts of their daughter products. They are produced in the early steps of the fuel cycle, at the conversion facilities, at the enrichment facilities, and at the fuel fabrication facilities.

The gaseous diffusion uranium enrichment complex produces waste where small amounts of uranium are contained in liquids from equipment cleanup that is routed to settling ponds where it precipitates as sludge.

Fabrication of fuel produces LLW in the form of dry solids of CaF_2 containing low concentrations of enriched uranium and other low-activity waste. Other uranium-bearing waste are in the forms of liquids and sludges.

C.3.2 Centrifugation

Centrifugation is a treatment process that removes suspended solids from LLW streams. In a centrifuge, the rapid rotation of a perforated basket or bowl containing the waste stream causes the solids to separate from the liquids by centrifugal action. The liquids are forced out through the basket wall, and the solids collect and are removed by mechanical action or sprays. Centrifuges are used to dewater resins and filter sludges and to concentrate dilute sludges.

C.3.3 Decontamination and Decommissioning

Decommissioning nuclear facilities at the end of their useful life will produce large volumes of LLW, much of it as contaminated concrete and metal vessels and piping. Decommissioning waste will generally contain the same isotopes as produced during facility operation. Depending on the type of facility and its previous operations, waste streams from the decommissioning may include activated metal, activated concrete, contaminated metal, contaminated concrete, dry solid waste (trash), spent resins, filter cartridges, and evaporator bottoms.

Decontamination technologies involve the removal of deposited radioactivity from contaminated equipment and other solid waste forms by physical and/or chemical methods. They are used at contaminated sites to clean these surfaces so as to restore structures and equipment to a condition to be reused or, prior to demolition, to reduce the potential for demolition waste to be radioactive. Decontamination activities usually involve the use of four processes—physical decontamination, chemical decontamination, electropolishing, and ultrasonic cleaning.

C.3.4 Remediation

The remediation of radiologically contaminated sites, including buildings, storage piles, equipment, and underlying soils, can be broadly divided into two categories: (1) the decommissioning of nuclear facilities, which may involve the removal of contaminated equipment and structural components and the decontamination of building and equipment surfaces to remove radioactivity; and (2) the cleanup and stabilization of sites that may contain radioactive contamination in buildings, equipment, waste storage piles, and underlying soil. In some instances, the contamination may be detectable as elevated radionuclide levels in ground water, surface water, or airborne pathways.

C.3.5 Waste Water Treatment

Liquid wastes can be treated to remove contaminants and thus permit the treated liquid to be disposed, or to concentrate the liquid (and contaminants) and reduce the volume to be disposed. Liquids in the form of contaminated ground water or leachate can be pumped to the surface for treatment or can be treated *in situ*. Generally, the treatment of liquids or semisolids will produce an effluent that can be discharged and a residual sludge or liquid in which the radioactive constituents are concentrated. The processes that follow are often used at radiologically contaminated sites for treatment of waste liquids:

- Chemical precipitation, or separation can be used to remove soluble metals from contaminated ground water or impounded liquids.

- Ion exchange techniques can be used to remove inorganic salts from a liquid waste stream.

- Evaporation can be used to reduce the volume of radioactive liquids and to remove water from a solution.

- Filtration technology can be used to remove suspended solids from a solution by forcing the liquid phase through a porous membrane and collecting the solid phase on the filter medium.

- Activated carbon adsorption is a physical treatment that can be used to remove complex mixtures of organic contaminants from leachate or ground water.

C.3.6 Stabilization

Stabilization systems are used to immobilize inorganic waste within an inert matrix. Solidification is required for liquid wastes to achieve regulatory limits on water in packages. It is also used for the stabilization of semisolid and solid wastes. There are a number of binder materials commercially available, the selection of which will be dictated by the characteristics of the waste and the relative economics of the competing techniques. Although most waste and soil from a remediated site are shipped offsite or stored in unpackaged bulk form or packaged essentially water free and not stabilized, there are situations in which liquid and/or semisolid wastes will require stabilization and packaging prior to shipment.

Among the available binder materials, cement has the longest record of experience and is applicable to a wide range of waste compositions. The cement is either used as a binder by itself or mixed with a material such as fly ash or cement kiln dust. The waste stream is slurried into this mixture and allowed to set, creating a volume typically twice that of the original waste volume. Thermoplastic binding using asphalt is a competing technique that, although generally more expensive than cementation, provides certain improvements in leaching characteristics and greater volume reduction factors.

C.3.7 Dewatering

Dewatering is a liquid removal technique using concentration technologies that are particularly applicable to treatment of semisolids. In dewatering, either pumping and/or gravitational drainage is used to remove the water from a semisolid. A commonly employed approach for treating ion exchange resins, called “in-container dewatering,” involves the use of multiple filter elements placed in a disposable container and connected to a pump.

C.3.8 Accelerator Targets

Accelerator targets are used to produce radionuclides through direct interaction with charged particle beams or indirectly through the interaction of induced radionuclides and other materials.

C.3.9 Weapons Production

Production reactors use high-enriched uranium (HEU) as a fuel to provide fission neutrons for capture by depleted uranium (DU). Uranium-238 captures the neutron to form ^{239}U, which decays to ^{239}Pu. If the target material is left in the process too long, an increased amount of ^{240,241}Pu will be formed. Production reactors also produce tritium. The ^{235}U fission produces neutrons that are captured by a lithium-6 target, resulting in an alpha emission and tritium (^{3}H). Other major isotopes produced in a production reactor include ^{238}Pu, ^{237}Np, ^{252}Cf, ^{241}Am, ^{60}Co, ^{137}Cs, and ^{85}Kr.

There are various reprocessing methods to recover special nuclear materials from irradiated fuel and targets; the method used depends on the material the fuel is made from. All these methods, however, use some form of the Purex process. Purex is a solvent extraction system that uses tributyl phosphate to separate the materials in the fuel into transuranic elements, uranium, plutonium, and fission products. The fission products fraction contains the waste elements, and they are highly radioactive. These liquid wastes are evaporated and stored in underground tanks until decay heat has been reduced sufficiently for preparation for ultimate disposal.

C.3.10 Ion Exchange

Ion exchange is a process involving the selective removal of contaminants from liquids through the reversible interchange of similarly charged ions between an electrolyte solution and a solid phase. The contaminants are accumulated on to the exchange medium, which is typically a resin. Ion exchangers are either of the cation or anion type. A further categorization is between separate-bed systems (demineralizers) consisting of either cation or anion resins, and the mixed-bed system consisting of a stationary bed containing fixed anion and cation resins. The mixed-bed systems have been the predominant ion exchange choice for treatment of liquid wastes.

C.3.11 Nuclear Reactors

Control of radioactive materials in a power reactor is generally achieved by removing material from process streams, concentrating it in a relatively small volume, and disposing of that volume as LLW. Small amounts of radioactive material are present in the coolant of a power reactor from fuel leakage as well as from system corrosion products and impurities in the coolant that have been activated by neutron bombardment. The radioactive waste treatment systems are designed to remove these materials on an ongoing basis through filtration and ion exchange resins in both the primary system and secondary, or auxiliary, systems that treat liquids with which the primary coolant may have come in contact.

Some of the LLW generated during the operation of a nuclear reactor include:

- ion exchange resins;
- filters that remove particulates from liquids or from air;

- concentrated liquids resulting from evaporative processes;
- dry active waste, which is a term generally applied to a wide variety of waste products such as cleaning materials, glass, filters, concrete, miscellaneous wood, and metals;
- nonfuel reactor components, such as fuel channels, control rods, and in-core instrumentation; and
- decontamination wastes.

C.3.12 Research Facilities

Some DOE facilities use radioactive materials in research and employ a variety of radioisotopes and material forms to achieve their purposes. Several waste streams are generated as a result of research and development activities: liquid scintillation vials, other organic and inorganic liquids, biological wastes, and trash. Accelerator targets and sealed sources are also produced. Certain research and development activities concerned with the fuel cycle processes or weapons production will generate waste streams similar to those processes.

C.3.13 Isotope Production

Processes that result in the generation of LLW include the production and distribution of radioisotopes for medical, academic, or industrial use; manufacture of materials containing radioisotopes; and the use of radioisotopes for research and testing and in gauges and instrumentation. Several distinct waste streams vary in the concentration of activity, isotopes contained, and volumes produced. Isotope production is achieved through irradiation of fuel and targets in a reactor, and the separation and purification of the resulting products. LLW generated from medical isotope production includes solidified aqueous liquids and trash produced in the separation, cleanup, and shipping of the radioisotopes.

APPENDIX D: Waste Stream Supplemental Information

Appendix D-1: Master List of Waste Streams Included in Volumetric Capacity Analysis

Master List of Waste Streams Included in Volumetric Capacity Analysis

Reporting Site	WS_code	Stream Name	Waste Type[*]	Generating Site	Disposal Volumes (m3) FY 1998	FY 1999	FY 2000 - 2070
Hanford 200 Area Burial Grounds and Mixed Waste Trenches 31 and 34							
Hanford	1557	LLW Cat 1 Direct Disp	LLW	Hanford	4,429	4,890	90,787
Hanford	1558	LLW Verif/Cert to Disp	LLW	Hanford	0	269	4,042
Hanford	1559	LLW Treated Liquid to Disp	LLW	Return to Hanford from Commercial Treatment[3]	0	0	360
Hanford	1560	Overpacked LLW Cat 3	LLW	Hanford	1,490	921	18,491
Hanford	1572	LLW Assayed From TRU	LLW	Hanford	0	0	3,813
Hanford	1576	M91 Product to LLW	LLW	Hanford	0	0	6,570
Hanford	3465	Solids redesignated as LLW	LLW	Hanford	0	0	199
Hanford	3467	LDR compliant solids from storage to disposal	MLLW	Hanford	0	182	32,176
Hanford	3468	LDR compliant solids to disposal	MLLW	Hanford	0	0	30,422
Hanford	3492	M91 treated waste to LLW disposal	LLW	Hanford	0	0	2,048
Hanford	3512	LLW from WRAP	LLW	Hanford	0	0	2,397
INEEL RWMC							
Idaho	788	RH DD LLW	LLW	Idaho	0	45	708
Idaho	790	CH DD LLW	LLW	Idaho	0	4,919	16,959
Idaho	800	Incinerated LLW	LLW	Commercial - TBD	0	0	10
Idaho	801	Sized LLW	LLW	Idaho	0	241	158
Idaho	803	Sized LLW	LLW	Commercial - TBD	0	0	99
Idaho	804	Compacted LLW	LLW	Idaho	0	419	1,320
Idaho	806	Compacted LLW	LLW	Commercial - TBD	0	0	574
LANL TA-54 Area G							
Los Alamos	97	LLW Soils/Residues	LLW	Los Alamos	336	717	21,424
Los Alamos	98	LLW Rubble/Debris	LLW	Los Alamos	380	0	12,470
Los Alamos	2015	LLW-PCB	LLW	Los Alamos	0	1	71
Los Alamos	2016	LLW-Asbestos	LLW	Los Alamos	1	56	3,976
Los Alamos	2017	Non-Compactible	LLW	Los Alamos	863	1,100	78,100
Los Alamos	2020	High H-3	LLW	Los Alamos	0	4	270
Los Alamos	2026	From LANL Compactor	LLW	Los Alamos	24	82	5,822
Los Alamos	2418	Commercial Treatment Residues (to LLW)	LLW	Commercial - TBD	0	0	47
Los Alamos	3909	LLW - Storage & Disposal	LLW	TBD - Off-Site	0	0	7
NTS Areas 3 & 5 and Area 5 Mixed Waste Disposal Facility							
Nevada Test Site	1025	LLW Contaminated D & D Rubble & Liq. (Industrial Sites Project)	LLW	Nevada Test Site	0	0	6,396
Nevada Test Site	1041	LLW from Rocky Flats	LLW	Rocky Flats	2,795	4,685	156,712
Nevada Test Site	1042	LLW from LLNL	LLW	Lawrence Livermore	682	702	14,352
Nevada Test Site	1043	LLW from ETEC	LLW	ETEC	869	681	273
Nevada Test Site	1044	LLW from ITRI	LLW	Inhalation Toxicology Laboratory	54	0	2,220
Nevada Test Site	1045	LLW from Fernald	LLW	Fernald	1,781	3,023	64,313
Nevada Test Site	1047	LLW from SNL	LLW	Sandia NM	720	438	3,342
Nevada Test Site	1194	LLW from Pantex	LLW	Pantex	536	237	248
Nevada Test Site	1195	LLW from Allied Signal (DP Site)	LLW	Kansas City	0	0	24
Nevada Test Site	1226	Treated MLLW Soil to NTS Disposal (Industrial Sites Project)	LLW	Nevada Test Site	0	0	15
Nevada Test Site	1228	Treated LLW Soils (Soils Project)	LLW	Nevada Test Site	0	0	111,266
Nevada Test Site	2092	LLW Contaminated Soil (Industrial Sites Project)	LLW	Nevada Test Site	0	136	2,110
Nevada Test Site	2154	LLW from GA	LLW	General Atomics	502	1,736	0

Master List of Waste Streams Included in Volumetric Capacity Analysis

Reporting Site	WS_code	Stream Name	Waste Type*	Generating Site	Disposal Volumes (m3) FY 1998	FY 1999	FY 2000 - 2070
Nevada Test Site	2155	LLW from Mound	LLW	Miamisburg	2,090	4,436	18,167
Nevada Test Site	2877	Treated Area 6 Lead Pigs	MLLW	Waste Control Spec	0	0	0
Nevada Test Site	3151	NTS WEF LLW	LLW	Nevada Test Site	0	0	543
Nevada Test Site	3263	LLW Contaminated Liquid (Industrial Sites Project)	LLW	Nevada Test Site	0	0	26
Nevada Test Site	3539	Treated Pb Contaminated Soils	LLW	Waste Control Spec	0	9	0
Nevada Test Site	3540	Treated BFV Burn Soil	LLW	Waste Control Spec	0	3	0
Nevada Test Site	3691	LLW from RMI (Ashtabula EMP)	LLW	Ashtabula	44	153	424
Nevada Test Site	3692	LLW from ORR	LLW	Oak Ridge	0	0	403,076
Nevada Test Site	4136	U2bu Lead Contaminated Soil	MLLW	Nevada Test Site	0	0	20
Nevada Test Site	4283	Treated Bulk Lead	MLLW	Waste Control Spec	0	0	0
Nevada Test Site	4284	Treated EMAD Filters	MLLW	Waste Control Spec	0	12	0
Nevada Test Site	4285	Treated TTF Solvents	LLW	Waste Control Spec	0	0	0
Nevada Test Site	4286	Treated A-12 Liquid	LLW	Waste Control Spec	0	0	0
Nevada Test Site	4287	Treated Sealed Sources	MLLW	Waste Control Spec	0	0	0
SRS LAW Vault							
Savannah	521	WSF Compacted LLW	LLW	Savannah	0	207	12,333
Savannah	523	WSF Sort/Seg for E Area LAWV	LLW	Savannah	17	248	5,731
Savannah	1919	Treated Non-Incinerable Rad PCBs	LLW*	TBD	0	0	8
Savannah	4126	NR and No Treatment Bulk waste to E-Area LAWV	LLW	Savannah	0	0	19,923
SRS E-Area Trenches							
Savannah	527	Direct dispose Bulk Metal to E Area Trench	LLW	Savannah	0	0	1,570
Savannah	529	CIF Secondary Waste to E Area Trench	LLW	Savannah	0	30	0
Savannah	534	Contaminated Soil/Debris to E Area Trench	LLW	Savannah	0	550	31,337
Savannah	536	Size Red CLE to E Area Trench	LLW	Savannah	0	0	771
Savannah	1912	CIF Stabilized Ash with Characteristic Constituents	LLW	Savannah	0	2	122
Savannah	4127	NR and No Treatment Bulk to E-Area Trench	LLW	Savannah	0	0	18,026
Savannah	4128	Compacted LLW	LLW	Savannah	0	0	10,715
SRS ILW Vault							
Savannah	539	Intermediate Level Waste	LLW	Savannah	859	439	5,093
ORR IWMF							
Oak Ridge	3792	Solid LLW to on-site disposal	LLW	Oak Ridge	1,138	85	1,800
INEEL ICDF							
Idaho	776	WAG 5 LLW ICDF	LLW	Idaho	0	0	35,538
Idaho	2447	WAG 1 MLLW ICDF	MLLW	Idaho	0	0	10,005
Idaho	2456	WAG 1 MLLW TREATED ICDF	MLLW	Idaho	0	0	69
Idaho	2462	WAG 1 MLLW TREATED/ICDF	MLLW	TBD	0	0	42
Idaho	2471	WAG 5 MLLW ICDF	MLLW	Idaho	0	0	3,760
Idaho	2485	WAG 1 LLW ICDF	LLW	Idaho	0	0	3,558
Idaho	2498	WAG 3 LLW ICDF	LLW	Idaho	0	0	28,301
Idaho	3923	WAG 7 LLW ICDF	LLW	Idaho	0	0	88
Idaho	4336	WAG 6 LLW ICDF	LLW	Idaho	0	0	8,600
Idaho	4337	WAG 3 MLLW ICDF	MLLW	Idaho	0	0	23,412
Idaho	4342	WAG 2 LLW TREATED ICDF	LLW	Idaho	0	0	50
Idaho Return to Remediation Unit							
Idaho	2437	WAG 7 LLW TREATED DEBRIS CAP	LLW	Idaho	0	0	27,669

Master List of Waste Streams Included in Volumetric Capacity Analysis

Reporting Site	WS_code	Stream Name	Waste Type[a]	Generating Site	Disposal Volumes (m3) FY 1998	FY 1999	FY 2000 - 2070
Idaho	3922	WAG 7 LLW TREATED SOIL CAP	LLW	Idaho	0	0	62,746
Fernald OSDF[b]							
Fernald	4257	LLW Debris	LLW	Fernald	0	0	8,710
Fernald	4290	LLW	LLW	Fernald	0	0	175,140
Fernald	4294	LLW Trash	LLW	Fernald	0	0	110
Fernald	4299	LLW Asbestos On-Site	LLW	Fernald	0	0	1,325
Fernald	4300	Trash On Site	LLW	Fernald	0	0	6,495
Fernald	4332	Treated Organic Soils - On Site	LLW	Fernald	0	0	767
Fernald	29988	LLW Debris	LLW	Fernald	7,650	24,408	84,036
Fernald	29994	LLW Asbestos	LLW	Fernald	0	0	801
Fernald	29996	LLW Trash	LLW	Fernald	0	0	1,637
Fernald	29998	LLW Copper	LLW	Fernald	0	0	31
Fernald	30014	LLW Trash	LLW	Fernald	0	0	97
Fernald	30018	LLW Filtercake	LLW	Fernald	0	0	1,265
Fernald	30027	LLW Soils	LLW	Fernald	0	0	32,260
Fernald	30042	LLW - Soils	LLW	Fernald	3,570	1,522	13,879
Fernald	30051	LLW Soil and Debris	LLW	Fernald	85,600	169,460	1,557,077
Fernald	30062	LLW - Debris	LLW	Fernald	0	0	4,434
Fernald	30088	Organic ETA Soils	MLLW	Fernald	0	0	90
Hanford ERDF							
Hanford	1470	MLLW Debris to ERDF	LLW*	Hanford	7	0	167
Hanford	1471	MLLW Soils	LLW*	Hanford	2	3	92
Hanford	1472	LLW Soils 100/300 Area	LLW	Hanford	288,800	283,354	4,659,651
Hanford	1473	LLW Debris	LLW	Hanford	0	0	350,700
Hanford	2122	GW Treatment Residue to ERDF	LLW*	Hanford	8	8	24
Hanford	2124	200 ETF Sludge	LLW*	Hanford	5	7	88
ORR EMWMF							
Oak Ridge	5019	LLW/Construction Debris	LLW	Oak Ridge	0	0	43,445
Oak Ridge	5023	LLW/Debris/Other Solids	LLW	Oak Ridge	0	0	187,624
Oak Ridge	5034	LLW/Soil/Sludge/Sediment	LLW	Oak Ridge	0	0	471,840
Oak Ridge	5040	MLLW/Construction Debris	MLLW	Oak Ridge	0	0	17,322
Oak Ridge	5043	MLLW/Debris/Other Solids	MLLW	Oak Ridge	0	0	2,255
Oak Ridge	5049	MLLW/Soil/Sludge/Sediment	MLLW	Oak Ridge	0	0	66,158
Oak Ridge	7001	MLLW/Soil/Sludge/Sediment-TR	MLLW	Oak Ridge	0	0	4,237
Oak Ridge	7009	LLW/Construction Debris-TR	LLW	Oak Ridge	0	0	2,568
Oak Ridge	7011	LLW/Debris/Other Solids-TR	LLW	Oak Ridge	0	0	142,726
Oak Ridge	7013	LLW/Soil/Sludge/Sediment-TR	LLW	Oak Ridge	0	0	46,665
Oak Ridge	7015	MLLW/Construction Debris-TR	MLLW	Oak Ridge	0	0	900
Oak Ridge	7017	MLLW/Debris/Other Solids-TR	MLLW	Oak Ridge	0	0	12,555
Oak Ridge	7019	MLLW/Soil/Sludge/Sediment-TR	MLLW	Oak Ridge	0	0	94,277
To Be Determined							
Battelle WJ	10	MLLW PCB Contaminated Rubble/Debris	MLLW	Battelle WJ	0	0	3
Brookhaven	37	BGRR D & D	LLW	Brookhaven	0	0	7,983
ETEC	1683	Corrosive Cleaning Liquids Neutralized Acid Cleaner, Acidic Aqueous Liquid	MLLW	ETEC	0	0	0
ETEC	2125	Wastewater Evaporation Residues	MLLW	ETEC	0	6	1

Master List of Waste Streams Included in Volumetric Capacity Analysis

Reporting Site	WS_code	Stream Name	Waste Type*	Generating Site	Disposal Volumes (m3) FY 1998	FY 1999	FY 2000 - 2070
ETEC	2856	mercury sediment from ER	MLLW	ETEC	0	0	0
Fernald	4118	Organic Liquids	MLLW	Fernald	0	0	20
GE Vallecitos	1727	LLW-Contaminated Rubble/Debris	LLW	GE Vallecitos	0	0	20
Grand Junction	2730	Commingled RRM/Soil	MLLW	Grand Junction	0	0	0
Hanford	3493	Greater than Class C waste	MLLW	Hanford	0	0	1
Idaho	787	RH DD LLW	LLW	Idaho	0	0	1,925
Idaho	789	CH DD LLW	LLW	Idaho	0	0	63,366
Idaho	798	Incinerated LLW	LLW	Commercial - TBD	0	0	86
Idaho	802	Sized LLW	LLW	Commercial - TBD	0	0	835
Idaho	805	Compacted LLW	LLW	Commercial - TBD	0	0	3,605
Idaho	807	WNPD LLW	LLW	TBD	0	0	69
Idaho	808	WNPD LLW	LLW	TBD	0	0	4
Idaho	2488	WAG 1 LLW TBD Treat/Disp	LLW	Idaho	0	0	10
Idaho	3629	ER TSCA Labpacks in Storage at WROC	MLLW	Idaho	0	1	3
Lawrence Berkeley	1762	[Treated] Tritiated Water on Gel	MLLW	Lawrence Berkeley	0	0	0
LEHR	2859	Cobalt 60 source--ready for disposal	LLW	LEHR	0	0	5
LEHR	4117	Southwest Trench poly buck disposal	MLLW	LEHR	0	0	0
Los Alamos	3895	LLW - Accepted for Storage, from Licensed Activities (Greater than Class C)	LLW	TBD - Off-Site	0	0	14
Los Alamos	3907	LLW - Accepted for Storage (Greater than Class C)	LLW	TBD - Off-Site	0	0	13
Los Alamos	3910	MLLW - Disposal	MLLW	TBD - Off-Site	0	0	8
Nevada Test Site	2868	Picatinny	MLLW	Nevada Test Site	0	0	0
Oak Ridge	4340	RH LLW-4 (Beryllium Reflectors)	LLW	Oak Ridge	0	0	20
Oak Ridge	4400	DRS - K1420 Liquids (WW-02)	MLLW	Oak Ridge	0	0	2
Oak Ridge	4401	DRS - K1420 Debris (MW-008)	MLLW	Oak Ridge	0	0	93
Oak Ridge	4402	DRS - K1420 Scrap Metal (L-020)	LLW	Oak Ridge	0	0	44
Oak Ridge	4403	DRS - K1420 Construction Debris	LLW	Oak Ridge	0	0	29
Oak Ridge	4404	DRS - K1420 Asbestos	LLW	Oak Ridge	0	0	2
Oak Ridge	4407	BNFL - K29/31/33 Classified	LLW	Oak Ridge	0	0	22,897
Oak Ridge	5022	LLW/Debris/Other Solids	LLW	Oak Ridge	0	0	18
Oak Ridge	5024	LLW/Debris/Other Solids	LLW	Oak Ridge	0	0	123
Oak Ridge	5033	LLW/Soil/Sludge/Sediment	LLW	Oak Ridge	0	0	1,500
Oak Ridge	5035	LLW/Soil/Sludge/Sediment	LLW	Oak Ridge	0	0	1,548
Pantex	3597	Organic Liquids	LLW	Pantex	0	0	0
Pantex	3599	Solidified Water	LLW	Pantex	0	0	0
Pantex	3605	Inorganic Liquid	LLW	Pantex	0	0	0
Portsmouth	478	TSCA Soft Solids	MLLW	Portsmouth	0	0	309
Portsmouth	1979	Incinerable Solids (to TBD)	MLLW	Portsmouth	0	0	818
Portsmouth	1983	Incinerable Solids (to TBD)	MLLW	Portsmouth	0	0	83
Portsmouth	4074	LLW Incinerable Soft Solids	LLW	Portsmouth	0	0	6,869
Princeton	3927	Non-Compactable LLW	LLW	Princeton	0	0	500
Princeton	3928	Compacted Waste	LLW	Princeton	0	0	200
Rocky Flats	3993	Disposal Sort to Class C Disposal	MLLW	Rocky Flats	0	0	0
Rocky Flats	4260	Disposal Sort to DOE LLM Disposal	MLLW	Rocky Flats	0	0	0
Sandia NM	2267	Macroencapsulated Inorganic Debris	MLLW	Sandia NM	0	0	19
Sandia NM	2268	Treated Sodium Uranium	MLLW	Sandia NM	0	0	0
Savannah	1908	Meets treatment standard	MLLW	Savannah	0	0	65

Master List of Waste Streams Included in Volumetric Capacity Analysis

Reporting Site	WS_code	Stream Name	Waste Type[1]	Generating Site	Disposal Volumes (m3) FY 1998	FY 1999	FY 2000 - 2070
Savannah	1913	CIF Stabilized Ash/Blowdown with Listed Constituents	MLLW	Savannah	0	0	2,101
Savannah	1916	Macroencapsulated Waste	MLLW	Commercial - TBD	0	0	613
Savannah	1920	Treated Soils/Sludges-M Area	MLLW	Savannah	0	0	819
Savannah	1922	Treated Soils/Sludges	MLLW	TBD	0	0	66
Savannah	2202	LLW Sludge (2nd waste from AI)	LLW	Savannah	52	110	6,107
Savannah	3790	Amalgamated mercury	MLLW	Commercial - TBD	0	0	7
Savannah	3919	Incinerable rad PCBs	MLLW	Savannah	0	55	11
SPRU	1840	LLW-Contaminated Soils from Storage & Collection Bldg (K5/6)	LLW	SPRU	0	0	2,200
SPRU	1842	LLW-Contaminated Rubble from Storage & Collection Bldg (K5/6)	LLW	SPRU	0	0	20
SPRU	1844	LLW- Contaminated Soils from Waste Baler (L7)	LLW	SPRU	0	0	10
SPRU	1846	LLW-Contaminated Rubble from Waste Baler (L7)	LLW	SPRU	0	0	10
SPRU	1848	LLW-Contaminated Soils from Lower Parking	LLW	SPRU	0	0	150
SPRU	1850	LLW-Contaminated Soils from Drum Storage	LLW	SPRU	0	0	1,000
SPRU	1852	MLLW-Soils from Storage & Collection Bldg. (K5/6)	MLLW	SPRU	0	0	10
SPRU	1861	[Rinsed] MLLW-Pipes, Tanks & Equipment	MLLW	SPRU	0	0	20
SPRU	1863	[Rinsed] LLW-Pipes, Tanks & Equipment	LLW	SPRU	0	0	400
SPRU	1865	MLLW-Pipes, Tanks & Equipment (not rinsed)	MLLW	SPRU	0	0	30
SPRU	1867	LLW-Pipes, Tanks & Equipment (not rinsed)	LLW	SPRU	0	0	400
SPRU	1868	MLLW-Contaminated Soil	MLLW	SPRU	0	0	10
SPRU	1869	LLW- Contaminated Soils	LLW	SPRU	0	0	130
SPRU	1870	LLW-Contaminated Bldg Rubble	LLW	SPRU	0	0	3,900
West Valley	644	WVDP Site Closure	LLW	West Valley	0	0	140,000
West Valley	645	Stabilized LLW-Drum Cell Waste	LLW	West Valley	0	0	5,173
West Valley	3193	Resins/Sludges	LLW	West Valley	0	0	799
West Valley	3211	Soils	LLW	West Valley	0	0	4,550
West Valley	3626	Disposal-Pending EIS ROD's	LLW	West Valley	0	0	1,885

[1]Streams marked with an "*" are coded as MLLW in the CID.
[2]For the Fernald OSDF, the 2000 - 2070 projected volume of 1.6 million m3 used in this study differs from the waste volumes reported in the CID, which total to approximately 1.9 million m3. The 1.6 million m3 volume reflects the projected compacted waste volume in the OSDF, while the 1.9 million m3 volume reflects the uncompacted volume.
[3]This stream is waste from Hanford sent to a commercial facility for treatment and returned to Hanford for disposal

Appendix D-2: Radiological Profiles of Waste Streams Used in Radiological Capacity Analysis

Hanford 200 Area Burial Grounds and Mixed Waste Trenches 31 and 34

Stream Name:	1557: LLW Cat 1 Direct Disp	1558: LLW Verif/Cert to Disp	1559: LLW Treated Liquid to Disp	1560: Overpacked LLW Cat 3	1572: LLW Assayed From TRU	1576: M91 Product to LLW	3465: Solids redesignated as LLW	3467: LDR compliant solids from storage to disposal	3468: LDR compliant solids to disposal	3492: M91 treated waste to LLW disposal	3512: LLW from WRAP
Gen Site:	Hanford	Hanford	Return to Hanford from Commercial Treatment	Hanford	Hanford	Hanford	Hanford	Hanford	Hanford	Hanford	Hanford
FY98-70 M3	100,107	4,311	360	20,902	3,813	6,570	199	32,358	30,422	2,048	2,398
Profile Source:	Derived from Predecessor SDD Streams	Derived from Predecessor SDD Streams	Reported after 6/26/00 SDD	Derived from Predecessor SDD Streams	Reported in 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported in 6/26/00 SDD	Reported after 6/26/00 SDD	Reported in 6/26/00 SDD	Reported after 6/26/00 SDD
H-3	2.53E-03	2.46E-03	3.31E-03		8.86E-04		8.39E-11	8.39E-11	7.20E-11	1.58E-03	
C-14	2.25E-04	2.18E-04			2.08E-04						
C-14am										2.41E-05	
Al-26											
Cl-36											
K-40											
Co-60	2.96E-03	2.87E-03		5.58E-02			3.81E-07	3.81E-07	3.27E-07	1.06E+00	
Ni-59	5.50E-04	5.35E-04								1.46E-09	
Ni-63	4.41E-04	4.29E-04		1.07E-01							
Ni-63am							4.61E-10	4.61E-10	3.96E-10	9.30E-06	
Se-79											
Sr-90	1.72E-04	1.67E-04	1.54E-03	1.49E+00			3.46E-03	3.46E-03	2.97E-03	8.57E-04	1.00E-01
Zr-93											
Nb-93m											
Nb-94											
Tc-99	4.16E-08	4.05E-08	2.36E-07				9.09E-04	9.09E-04	7.80E-04	2.00E-02	
Cd-113m											
Sn-121m											
Sn-126											
I-129							2.94E-10	2.94E-10	2.52E-10	2.01E-06	
Cs-135											
Cs-137	1.39E-04	1.35E-04	5.13E-01	1.17E+00	2.21E-06		6.22E-04	6.22E-04	5.34E-04	1.46E-03	1.05E-01
Ba-133											
Sm-151											
Eu-152											
Eu-154											
Ra-226											
Ra-228											
Th-229											
Th-230											
Th-232					8.78E-06		1.47E-10	1.47E-10	1.26E-10	4.63E-07	
Pa-231											
U-232											
U-233					1.00E-02					4.45E-08	
U-234					6.19E-03		8.58E-03	8.58E-03	7.36E-03	1.87E-04	
U-235	3.78E-08	3.68E-08	2.66E-05		5.07E-05		8.79E-04	8.79E-04	7.54E-04	2.09E-04	
U-236										8.61E-09	
U-238	3.07E-07	2.98E-07	8.25E-04		8.00E-04		9.46E-06	9.46E-06	8.11E-06	6.48E-06	
Np-237			7.14E-11		3.24E-05		8.18E-10	8.18E-10	7.02E-10	7.74E-07	
Pu-238	4.16E-09	4.05E-09		2.27E-04			1.31E-06	1.31E-06	1.12E-06	4.93E-04	
Pu-239	2.42E-08	2.36E-08	1.85E-04	1.06E-03		1.60E-03	1.58E-05	1.58E-05	1.35E-05	3.00E-02	1.60E-03
Pu-240	1.21E-08	1.18E-08	4.17E-05	4.00E-04		6.00E-04	3.53E-06	3.53E-06	3.03E-06	3.25E-03	6.00E-04
Pu-241	3.56E-07	3.46E-07		2.53E-02			1.53E-04	1.53E-04	1.32E-04	2.00E-02	
Pu-242							2.10E-11	2.10E-11	1.80E-11	3.43E-08	
Pu-244											
Am-241	1.25E-08	1.21E-08		9.06E-04			1.34E-07	1.34E-07	1.15E-07	1.00E-02	
Am-243					1.20E-04					1.09E-07	
Cm-243							2.10E-11	2.10E-11	1.80E-11	7.16E-10	
Cm-244							1.05E-10	1.05E-10	9.00E-11	5.01E-10	

Stream Name:	788: RH DD LLW	790: CH DD LLW	800: Incinerated LLW	801: Sized LLW	803: Sized LLW	804: Compacted LLW	806: Compacted LLW
Gen Site:	Idaho	Idaho	Commercial - TBD	Idaho	Commercial - TBD	Idaho	Commercial - TBD
FY98-70 M3	753	21,879	10	399	99	1,739	574
Profile Source:	RWMC SOF Spreadsheet	RWMC SOF Spreadsheet	RWMC SOF Spreadsheet	RWMC SOF Spreadsheet	RWMC SOF Spreadsheet	RWMC SOF Spreadsheet	RWMC SOF Spreadsheet
H-3	4.781E-01	4.781E-01	4.781E-01	4.781E-01	4.781E-01	4.781E-01	4.781E-01
C-14	7.054E-05	7.054E-05	7.054E-05	7.054E-05	7.054E-05	7.054E-05	7.054E-05
C-14am	1.086E-03	1.086E-03	1.086E-03	1.086E-03	1.086E-03	1.086E-03	1.086E-03
Al-26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cl-36	2.220E-06	2.220E-06	2.220E-06	2.220E-06	2.220E-06	2.220E-06	2.220E-06
K-40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Co-60	3.123E+00	3.123E+00	3.123E+00	3.123E+00	3.123E+00	3.123E+00	3.123E+00
Ni-59	4.675E-02	4.675E-02	4.675E-02	4.675E-02	4.675E-02	4.675E-02	4.675E-02
Ni-63	5.760E+00	5.760E+00	5.760E+00	5.760E+00	5.760E+00	5.760E+00	5.760E+00
Ni-63am	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Se-79	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Sr-90	4.748E-03	4.748E-03	4.748E-03	4.748E-03	4.748E-03	4.748E-03	4.748E-03
Zr-93	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Nb-93m	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Nb-94	6.080E-05	6.080E-05	6.080E-05	6.080E-05	6.080E-05	6.080E-05	6.080E-05
Tc-99	7.378E-05	7.378E-05	7.378E-05	7.378E-05	7.378E-05	7.378E-05	7.378E-05
Cd-113m	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Sn-121m	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Sn-126	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I-129	5.266E-07	5.266E-07	5.266E-07	5.266E-07	5.266E-07	5.266E-07	5.266E-07
Cs-135	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cs-137	7.418E-03	7.418E-03	7.418E-03	7.418E-03	7.418E-03	7.418E-03	7.418E-03
Ba-133	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Sm-151	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Eu-152	2.746E-03	2.746E-03	2.746E-03	2.746E-03	2.746E-03	2.746E-03	2.746E-03
Eu-154	8.404E-03	8.404E-03	8.404E-03	8.404E-03	8.404E-03	8.404E-03	8.404E-03
Ra-226	9.044E-06	9.044E-06	9.044E-06	9.044E-06	9.044E-06	9.044E-06	9.044E-06
Ra-228	1.201E-09	1.201E-09	1.201E-09	1.201E-09	1.201E-09	1.201E-09	1.201E-09
Th-229	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	1.242E-06	1.242E-06	1.242E-06	1.242E-06	1.242E-06	1.242E-06	1.242E-06
Th-232	1.304E-06	1.304E-06	1.304E-06	1.304E-06	1.304E-06	1.304E-06	1.304E-06
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-232	7.299E-08	7.299E-08	7.299E-08	7.299E-08	7.299E-08	7.299E-08	7.299E-08
U-233	7.909E-07	7.909E-07	7.909E-07	7.909E-07	7.909E-07	7.909E-07	7.909E-07
U-234	1.578E-05	1.578E-05	1.578E-05	1.578E-05	1.578E-05	1.578E-05	1.578E-05
U-235	1.630E-06	1.630E-06	1.630E-06	1.630E-06	1.630E-06	1.630E-06	1.630E-06
U-236	8.311E-07	8.311E-07	8.311E-07	8.311E-07	8.311E-07	8.311E-07	8.311E-07
U-238	3.486E-04	3.486E-04	3.486E-04	3.486E-04	3.486E-04	3.486E-04	3.486E-04
Np-237	8.836E-07	8.836E-07	8.836E-07	8.836E-07	8.836E-07	8.836E-07	8.836E-07
Pu-238	6.337E-06	6.337E-06	6.337E-06	6.337E-06	6.337E-06	6.337E-06	6.337E-06
Pu-239	1.684E-05	1.684E-05	1.684E-05	1.684E-05	1.684E-05	1.684E-05	1.684E-05
Pu-240	5.256E-06	5.256E-06	5.256E-06	5.256E-06	5.256E-06	5.256E-06	5.256E-06
Pu-241	2.591E-04	2.591E-04	2.591E-04	2.591E-04	2.591E-04	2.591E-04	2.591E-04
Pu-242	4.600E-12	4.600E-12	4.600E-12	4.600E-12	4.600E-12	4.600E-12	4.600E-12
Pu-244	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	1.362E-05	1.362E-05	1.362E-05	1.362E-05	1.362E-05	1.362E-05	1.362E-05
Am-243	7.573E-10	7.573E-10	7.573E-10	7.573E-10	7.573E-10	7.573E-10	7.573E-10
Cm-243	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cm-244	1.211E-06	1.211E-06	1.211E-06	1.211E-06	1.211E-06	1.211E-06	1.211E-06

Stream Name:	2015: LLW-PCB	2016: LLW-Asbestos	2017: Non-Compactible	2020: High H-3	2026: From LANL Compactor	2418: Commercial Treatment Residues (to LLW)	3909: LLW - Storage & Disposal	97: LLW Soils/Residues	98: LLW Rubble/Debris
Gen Site:	Los Alamos	Los Alamos	Los Alamos	Los Alamos	Los Alamos	Commercial - TBD	TBD - Off-Site	Los Alamos	Los Alamos
FY98-70 M3	72	4,033	80,063	274	5,928	47	7	22,477	12,850
Profile Source:	Rev.1 p. D1-AL-8	Rev.1 p. D1-AL-8	Rev.1 p. D1-AL-8	Rev.1 p. D1-AL-8	Rev.1 p. D1-AL-8	Rev.1 p. D1-AL-8	Rev.1 p. D1-AL-8	Rev.1 p. D2-AL-5	Rev.1 p. D2-AL-4
H-3	3.97E-01	3.97E-01	3.97E-01	3.97E-01	3.97E-01	3.97E-01	3.97E-01		
C-14	6.01E-07	6.01E-07	6.01E-07	6.01E-07	6.01E-07	6.01E-07	6.01E-07		
C-14am	1.96E-06	1.96E-06	1.96E-06	1.96E-06	1.96E-06	1.96E-06	1.96E-06		
Al-26									
Cl-36	2.85E-08	2.85E-08	2.85E-08	2.85E-08	2.85E-08	2.85E-08	2.85E-08		
K-40	6.66E-07	6.66E-07	6.66E-07	6.66E-07	6.66E-07	6.66E-07	6.66E-07		
Co-60	1.87E-03	1.87E-03	1.87E-03	1.87E-03	1.87E-03	1.87E-03	1.87E-03		
Ni-59	7.06E-07	7.06E-07	7.06E-07	7.06E-07	7.06E-07	7.06E-07	7.06E-07		
Ni-63	1.21E-07	1.21E-07	1.21E-07	1.21E-07	1.21E-07	1.21E-07	1.21E-07		
Ni-63am									
Se-79									
Sr-90	3.08E-05	3.08E-05	3.08E-05	3.08E-05	3.08E-05	3.08E-05	3.08E-05		
Zr-93									
Nb-93m									
Nb-94									
Tc-99	4.64E-06	4.64E-06	4.64E-06	4.64E-06	4.64E-06	4.64E-06	4.64E-06		
Cd-113m	3.09E-08	3.09E-08	3.09E-08	3.09E-08	3.09E-08	3.09E-08	3.09E-08		
Sn-121m									
Sn-126									
I-129									
Cs-135	1.44E-07	1.44E-07	1.44E-07	1.44E-07	1.44E-07	1.44E-07	1.44E-07		
Cs-137	3.32E-05	3.32E-05	3.32E-05	3.32E-05	3.32E-05	3.32E-05	3.32E-05		
Ba-133	2.69E-03	2.69E-03	2.69E-03	2.69E-03	2.69E-03	2.69E-03	2.69E-03		
Sm-151	3.32E-07	3.32E-07	3.32E-07	3.32E-07	3.32E-07	3.32E-07	3.32E-07		
Eu-152	1.34E-08	1.34E-08	1.34E-08	1.34E-08	1.34E-08	1.34E-08	1.34E-08		
Eu-154	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10		
Ra-226	4.07E-07	4.07E-07	4.07E-07	4.07E-07	4.07E-07	4.07E-07	4.07E-07		
Ra-228									
Th-229	3.16E-08	3.16E-08	3.16E-08	3.16E-08	3.16E-08	3.16E-08	3.16E-08		
Th-230	3.04E-10	3.04E-10	3.04E-10	3.04E-10	3.04E-10	3.04E-10	3.04E-10		
Th-232	2.63E-06	2.63E-06	2.63E-06	2.63E-06	2.63E-06	2.63E-06	2.63E-06		
Pa-231									
U-232	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07		
U-233	8.37E-07	8.37E-07	8.37E-07	8.37E-07	8.37E-07	8.37E-07	8.37E-07		
U-234	2.69E-05	2.69E-05	2.69E-05	2.69E-05	2.69E-05	2.69E-05	2.69E-05	3.00E-04	7.56E-05
U-235	5.53E-06	5.53E-06	5.53E-06	5.53E-06	5.53E-06	5.53E-06	5.53E-06	1.48E-05	3.72E-06
U-236									
U-238	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	3.21E-04	8.07E-05
Np-237	6.16E-09	6.16E-09	6.16E-09	6.16E-09	6.16E-09	6.16E-09	6.16E-09		
Pu-238	3.43E-04	3.43E-04	3.43E-04	3.43E-04	3.43E-04	3.43E-04	3.43E-04		
Pu-239	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04		
Pu-240	5.76E-06	5.76E-06	5.76E-06	5.76E-06	5.76E-06	5.76E-06	5.76E-06		
Pu-241	5.38E-05	5.38E-05	5.38E-05	5.38E-05	5.38E-05	5.38E-05	5.38E-05		
Pu-242	1.02E-08	1.02E-08	1.02E-08	1.02E-08	1.02E-08	1.02E-08	1.02E-08		
Pu-244									
Am-241	1.74E-04	1.74E-04	1.74E-04	1.74E-04	1.74E-04	1.74E-04	1.74E-04		
Am-243	4.64E-09	4.64E-09	4.64E-09	4.64E-09	4.64E-09	4.64E-09	4.64E-09		
Cm-243									
Cm-244									

Stream Name:	1025: LLW Contaminated D & D Rubble & Liq. (Industrial Sites Project)	1041: LLW from Rocky Flats	1042: LLW from LLNL	1043: LLW from ETEC	1044: LLW from ITRI	1045: LLW from Fernald	1047: LLW from SNL	1194: LLW from Pantex	1195: LLW from Allied Signal (DP Site)
Gen Site:	Nevada Test Site	Rocky Flats	Lawrence Livermore	ETEC	Inhalation Toxicology Laboratory	Fernald	Sandia NM	Pantex	Kansas City
FY98-70 M3	6,396	164,192	15,736	1,822	2,274	69,117	4,499	1,021	24
Profile Source:	Reported after 6/26/00 SDD	NTS Generator Data	NTS Generator Data	NTS Generator Data	NTS Generator Data	NTS Generator Data	NTS Generator Data	NTS Generator Data	NTS Generator Data
H-3		1.31E-04	2.98E-03		1.00E-02		2.19E+00	1.45E+01	5.00E-03
C-14			9.09E-06		4.00E-03		1.85E-03		
C-14am							1.05E-11		
Al-26							2.49E-10		
Cl-36			8.45E-06				1.29E-06		
K-40	4.95E-07						9.93E-06		
Co-60	1.41E-06		4.29E-06	2.70E-02			4.33E+00		
Ni-59			2.94E-04				2.14E-02		
Ni-63			3.41E-05				9.64E-01		2.50E-01
Ni-63am									
Se-79							4.07E-08		
Sr-90	7.00E-06	2.51E-10	1.47E-06	2.05E-01			2.74E+01		
Zr-93							5.66E-06		
Nb-93m							1.48E-04		
Nb-94	4.89E-07		3.32E-06				6.62E-06		
Tc-99			1.58E-05			6.20E-06	1.91E-04		
Cd-113m							2.73E-05		
Sn-121m							4.43E-05		
Sn-126							2.79E-09		
I-129							1.94E-06		
Cs-135							5.32E-08		
Cs-137	2.89E-05	9.01E-08	6.88E-06	4.05E-01			2.37E+01		
Ba-133			1.01E-05				3.71E-04		
Sm-151			1.15E-05				3.30E-04		
Eu-152			4.79E-06	1.35E-06			4.41E-03		
Eu-154			3.09E-06	1.35E-07			4.54E-03		
Ra-226	3.62E-07	3.26E-09	6.78E-07			1.34E-01	9.58E-04		
Ra-228			9.29E-07			1.44E-05	1.78E-06		
Th-229			1.78E-06				5.37E-09		
Th-230			1.25E-05			2.70E-02	2.92E-04		
Th-232			4.16E-06	1.35E-07		2.86E-04	4.87E-05	1.09E-03	
Pa-231			1.29E-06			5.21E-04	4.55E-06		
U-232			4.69E-05				5.95E-07		
U-233		1.67E-06	1.30E-06				7.98E-06		
U-234	4.05E-06	4.26E-03	3.05E-05	2.70E-04		8.84E-03	7.43E-03	2.11E-07	
U-235	1.76E-07	5.02E-10	3.20E-06	2.70E-05		1.24E-04	3.20E-04	3.63E-08	
U-236			1.84E-07				1.94E-06		
U-238		1.42E-06	6.00E-05	1.35E-03	8.00E-04	8.89E-03	8.28E-03	9.20E-06	1.00E-03
Np-237			2.24E-07				7.83E-07		
Pu-238	2.57E-09		8.06E-05	1.35E-07	5.00E-04		1.21E-04	1.37E-17	
Pu-239	4.89E-08	1.23E-05	3.20E-04	1.35E-05	2.00E-04		5.92E-04	1.47E-18	
Pu-240		1.23E-05	3.97E-04	1.35E-06			1.32E-04	3.45E-19	
Pu-241			1.25E-02	2.70E-06			5.93E-04		
Pu-242			1.15E-07	1.35E-08			3.85E-08		
Pu-244			6.05E-08				1.08E-10		
Am-241		5.02E-04	4.52E-05	4.05E-06	1.00E-04		6.56E-04		
Am-243			1.02E-07				2.46E-07		
Cm-243			7.41E-08				7.86E-07		
Cm-244			2.77E-07				8.77E-06		

NTS Areas 3 and 5 RWMS and Area 5 Mixed Waste Disposal Unit

Stream Name:	1226: Treated MLLW Soil to NTS Disposal (Industrial Sites Project)	1228: Treated LLW Soils (Soils Project)	2092: LLW Contaminated Soil (Industrial Sites Project)	2154: LLW from GA	2155: LLW from Mound	2877: Treated Area 6 Lead Pigs	3151: NTS WEF LLW	3263: LLW Contaminated Liquid (Industrial Sites Project)	3539: Treated Pb Contaminated Soils
Gen Site:	Nevada Test Site	Nevada Test Site	Nevada Test Site	General Atomics	Miamisburg	Waste Control Spec	Nevada Test Site	Nevada Test Site	Waste Control Spec
FY98-70 M3	15	111,266	2,246	2,238	24,693	0	543	26	9
Profile Source:	Rev.1 p. D2-NV-3	Reported after 6/26/00 SDD	Rev.1 p. D2-NV-3	NTS Generator Data	NTS Generator Data	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Rev.1 p. D2-NV-2	Reported after 6/26/00 SDD
H-3				2.97E-04					
C-14									
C-14am									
Al-26									
Cl-36									
K-40		2.50E-05							
Co-60				1.84E-05	3.49E-08				8.96E-07
Ni-59									
Ni-63				1.73E-05					
Ni-63am									
Se-79									
Sr-90	1.27E-04		1.27E-04	2.00E-04	4.20E-07	1.66E-06		1.50E-04	2.14E-06
Zr-93									
Nb-93m									
Nb-94				2.16E-06					
Tc-99	5.42E-08		5.42E-08	5.41E-08				6.40E-08	
Cd-113m	3.53E-07		3.53E-07					4.16E-07	
Sn-121m									
Sn-126									
I-129				4.05E-05					
Cs-135									
Cs-137	1.33E-04	1.15E-06	1.33E-04	1.41E-04		1.66E-06		1.57E-04	2.25E-06
Ba-133				3.24E-07					
Sm-151	3.80E-06		3.80E-06					4.48E-06	
Eu-152	5.42E-06		5.42E-06	2.05E-04				6.40E-06	
Eu-154	9.76E-07		9.76E-07	1.08E-05				1.15E-06	
Ra-226				4.05E-03					3.32E-05
Ra-228									
Th-229									
Th-230				3.51E-05	4.89E-08				
Th-232		1.47E-06		6.76E-05	8.38E-07				7.38E-06
Pa-231									
U-232									
U-233									
U-234				7.03E-04	1.01E-07				
U-235				2.70E-05	9.98E-09				
U-236				6.76E-06					
U-238				1.86E-04	1.10E-07				
Np-237									
Pu-238				2.97E-08	3.37E-04		5.97E-08		
Pu-239	4.88E-05	7.52E-08	4.88E-05	2.70E-08			9.41E-07		3.33E-06
Pu-240							2.16E-07		
Pu-241				1.30E-07			3.14E-06		
Pu-242									
Pu-244									
Am-241				2.70E-08	5.09E-08		2.62E-07		3.84E-06
Am-243									
Cm-243									
Cm-244									

NTS Areas 3 and 5 RWMS and Area 5 Mixed Waste Disposal Unit

Stream Name:	3540: Treated BFV Burn Soil	3691: LLW from RMI (Ashtabula EMP)	3692: LLW from ORR	4136: U2bu Lead Contaminated Soil	4283: Treated Bulk Lead	4284: Treated EMAD Filters	4285: Treated TTF Solvents	4286: Treated A-12 Liquid	4287: Treated Sealed Sources
Gen Site:	Waste Control Spec	Ashtabula	Oak Ridge	Nevada Test Site	Waste Control Spec	Waste Control Spec	Waste Control Spec	Waste Control Spec	Waste Control Spec
FY98-70 M3	3	621	403,076	20	0	12	0	0	0
Profile Source:	Reported after 6/26/00 SDD	No Available Data	NTS Generator Data	Reported after 6/26/00 SDD	Rev.1 p. D1-NV-3 MLLW-12	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD
H-3			2.39E+01			3.41E-08			
C-14			2.87E-04						4.81E-05
C-14am									
Al-26									
Cl-36			6.79E-04						
K-40			1.25E-05			1.47E-06			
Co-60			2.11E-01	3.51E-06		7.51E-05			
Ni-59			9.29E-07						
Ni-63			3.79E+00						
Ni-63am									
Se-79									
Sr-90			1.51E-02	8.35E-07		7.00E-06	4.17E-08		
Zr-93									
Nb-93m									
Nb-94									
Tc-99			1.68E-06						
Cd-113m									
Sn-121m									
Sn-126									
I-129			6.45E-08						
Cs-135									
Cs-137			1.44E+00	8.78E-07	5.90E-06	3.89E-07	4.17E-08		
Ba-133			4.54E-04						7.00E-04
Sm-151			4.36E-09						
Eu-152			1.15E-01						
Eu-154			3.80E-03						
Ra-226			1.48E-04	2.26E-06		3.62E-07			
Ra-228			1.01E-05						
Th-229			5.07E-07						
Th-230			2.56E-06				2.08E-07		
Th-232			1.10E-05	2.89E-06					
Pa-231			2.31E-07						
U-232			1.66E-07						
U-233			1.17E-05						
U-234			1.04E-03			4.05E-06			
U-235			4.72E-05			1.76E-07	6.63E-08		
U-236			8.99E-08						
U-238			5.11E-04			1.54E-07			
Np-237			1.16E-05				1.64E-08		
Pu-238			1.23E-05			6.35E-08	6.79E-08	4.43E-11	
Pu-239	2.24E-07		1.10E-05	1.30E-06		6.81E-08	3.88E-08	6.04E-10	
Pu-240	2.24E-07		6.59E-05						
Pu-241	2.24E-07		6.30E-09						
Pu-242			1.67E-08						
Pu-244									
Am-241	2.24E-07		3.09E-05	1.50E-06				4.08E-07	6.41E-07
Am-243			4.44E-05						
Cm-243									
Cm-244			1.69E-02						

Stream Name:	3792: Solid LLW to on-site disposal
Gen Site:	Oak Ridge
FY98-70 M3	3023
Profile Source:	Reported after 6/26/00 SDD

H-3	2.03E+00
C-14	8.89E-03
C-14am	
Al-26	
Cl-36	
K-40	5.37E-04
Co-60	3.32E+01
Ni-59	9.60E-05
Ni-63	1.79E+00
Ni-63am	
Se-79	
Sr-90	1.54E+01
Zr-93	
Nb-93m	
Nb-94	
Tc-99	1.40E-03
Cd-113m	
Sn-121m	
Sn-126	
I-129	
Cs-135	
Cs-137	1.83E+01
Ba-133	
Sm-151	3.67E-04
Eu-152	1.63E+00
Eu-154	6.85E-01
Ra-226	6.98E-04
Ra-228	5.69E-05
Th-229	1.50E-08
Th-230	3.02E-07
Th-232	1.44E-03
Pa-231	
U-232	2.00E-02
U-233	1.99E-02
U-234	1.10E-03
U-235	8.20E-05
U-236	1.89E-05
U-238	1.77E-02
Np-237	8.57E-05
Pu-238	3.28E-03
Pu-239	4.99E-03
Pu-240	6.59E-04
Pu-241	
Pu-242	8.75E-07
Pu-244	3.33E-07
Am-241	1.30E-02
Am-243	2.15E-04
Cm-243	1.91E-05
Cm-244	1.03E-01

Stream Name:	1919: Treated Non-Incinerable Rad PCBs	4126: NR and No Treatment Bulk waste to E-Area LAWV	521: WSF Compacted LLW	523: WSF Sort/Seg for E Area LAWV
Gen Site:	TBD	Savannah	Savannah	Savannah
FY98-70 M3	8	19,923	12,540	5,996
Profile Source:	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD
H-3	1.18E+01	1.18E+01	1.18E+01	1.18E+01
C-14	8.82E-06	8.82E-06	8.82E-06	8.82E-06
C-14am				
Al-26				
Cl-36	4.46E-09	4.46E-09	4.46E-09	4.46E-09
K-40	6.64E-09	6.64E-09	6.64E-09	6.64E-09
Co-60	3.69E-04	3.69E-04	3.69E-04	3.69E-04
Ni-59	3.58E-06	3.58E-06	3.58E-06	3.58E-06
Ni-63	2.22E-04	2.22E-04	2.22E-04	2.22E-04
Ni-63am				
Se-79	1.75E-06	1.75E-06	1.75E-06	1.75E-06
Sr-90	2.45E-03	2.45E-03	2.45E-03	2.45E-03
Zr-93	3.49E-10	3.49E-10	3.49E-10	3.49E-10
Nb-93m	5.69E-08	5.69E-08	5.69E-08	5.69E-08
Nb-94	1.97E-13	1.97E-13	1.97E-13	1.97E-13
Tc-99	2.05E-06	2.05E-06	2.05E-06	2.05E-06
Cd-113m				
Sn-121m				
Sn-126	1.81E-08	1.81E-08	1.81E-08	1.81E-08
I-129	1.02E-08	1.02E-08	1.02E-08	1.02E-08
Cs-135	2.91E-14	2.91E-14	2.91E-14	2.91E-14
Cs-137	2.65E-03	2.65E-03	2.65E-03	2.65E-03
Ba-133	1.53E-10	1.53E-10	1.53E-10	1.53E-10
Sm-151	3.97E-09	3.97E-09	3.97E-09	3.97E-09
Eu-152	1.61E-04	1.61E-04	1.61E-04	1.61E-04
Eu-154	1.17E-04	1.17E-04	1.17E-04	1.17E-04
Ra-226	8.50E-09	8.50E-09	8.50E-09	8.50E-09
Ra-228	2.49E-07	2.49E-07	2.49E-07	2.49E-07
Th-229				
Th-230	1.60E-07	1.60E-07	1.60E-07	1.60E-07
Th-232	1.66E-07	1.66E-07	1.66E-07	1.66E-07
Pa-231				
U-232	4.50E-07	4.50E-07	4.50E-07	4.50E-07
U-233	2.08E-05	2.08E-05	2.08E-05	2.08E-05
U-234	2.00E-04	2.00E-04	2.00E-04	2.00E-04
U-235	6.93E-06	6.93E-06	6.93E-06	6.93E-06
U-236	1.42E-06	1.42E-06	1.42E-06	1.42E-06
U-238	3.02E-04	3.02E-04	3.02E-04	3.02E-04
Np-237	7.71E-07	7.71E-07	7.71E-07	7.71E-07
Pu-238	1.59E-04	1.59E-04	1.59E-04	1.59E-04
Pu-239	6.95E-05	6.95E-05	6.95E-05	6.95E-05
Pu-240	2.02E-05	2.02E-05	2.02E-05	2.02E-05
Pu-241	8.49E-04	8.49E-04	8.49E-04	8.49E-04
Pu-242	3.23E-07	3.23E-07	3.23E-07	3.23E-07
Pu-244	8.59E-20	8.59E-20	8.59E-20	8.59E-20
Am-241	2.43E-05	2.43E-05	2.43E-05	2.43E-05
Am-243	3.14E-08	3.14E-08	3.14E-08	3.14E-08
Cm-243	5.67E-10	5.67E-10	5.67E-10	5.67E-10
Cm-244	3.00E-05	3.00E-05	3.00E-05	3.00E-05

Stream Name:	539: Intermediate Level Waste
Gen Site:	Savannah
FY98-70 M3	6,391
Profile Source:	Reported after 6/26/00 SDD

H-3	2.95E+02
C-14	2.06E-04
C-14am	
Al-26	
Cl-36	
K-40	
Co-60	5.94E-02
Ni-59	2.82E-05
Ni-63	8.70E-03
Ni-63am	
Se-79	8.31E-08
Sr-90	9.83E-03
Zr-93	5.04E-09
Nb-93m	
Nb-94	
Tc-99	4.22E-05
Cd-113m	
Sn-121m	
Sn-126	4.00E-07
I-129	1.66E-06
Cs-135	
Cs-137	1.01E-01
Ba-133	
Sm-151	
Eu-152	
Eu-154	1.09E-04
Ra-226	6.33E-04
Ra-228	
Th-229	
Th-230	
Th-232	1.77E-08
Pa-231	
U-232	1.05E-09
U-233	7.70E-05
U-234	1.49E-04
U-235	5.30E-06
U-236	1.14E-06
U-238	4.07E-04
Np-237	1.04E-06
Pu-238	9.26E-04
Pu-239	8.32E-05
Pu-240	4.89E-06
Pu-241	4.41E-04
Pu-242	1.28E-06
Pu-244	1.13E-18
Am-241	2.41E-04
Am-243	3.26E-10
Cm-243	
Cm-244	4.85E-04

SRS E-Area Trenches

Stream Name:	1912: CIF Stabilized Ash with Characteristic Constituents	4127: NR and No Treatment Bulk to E-Area Trench	4128: Compacted LLW	527: Direct dispose Bulk Metal to E Area Trench	529: CIF Secondary Waste to E Area Trench	534: Contaminated Soil/Debris to E Area Trench	536: Size Red CLE to E Area Trench
Gen Site:	Savannah	Savannah	Savannah	Savannah	Savannah	Savannah	Savannah
FY98-70 M3	124	18,026	10,715	1,570	30	31,887	771
Profile Source:	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD
H-3	5.29E-04	5.29E-04	5.29E-04	5.29E-04	5.29E-04	5.29E-04	5.29E-04
C-14	6.14E-07	6.14E-07	6.14E-07	6.14E-07	6.14E-07	6.14E-07	6.14E-07
C-14am							
Al-26							
Cl-36							
K-40	4.80E-07	4.80E-07	4.80E-07	4.80E-07	4.80E-07	4.80E-07	4.80E-07
Co-60	4.39E-06	4.39E-06	4.39E-06	4.39E-06	4.39E-06	4.39E-06	4.39E-06
Ni-59	3.48E-07	3.48E-07	3.48E-07	3.48E-07	3.48E-07	3.48E-07	3.48E-07
Ni-63	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06
Ni-63am							
Se-79	1.42E-08	1.42E-08	1.42E-08	1.42E-08	1.42E-08	1.42E-08	1.42E-08
Sr-90	7.93E-06	7.93E-06	7.93E-06	7.93E-06	7.93E-06	7.93E-06	7.93E-06
Zr-93	1.01E-12	1.01E-12	1.01E-12		1.01E-12	1.01E-12	1.01E-12
Nb-93m	3.01E-09	3.01E-09	3.01E-09	3.01E-09	3.01E-09	3.01E-09	3.01E-09
Nb-94							
Tc-99	1.53E-07	1.53E-07	1.53E-07	1.53E-07	1.53E-07	1.53E-07	1.53E-07
Cd-113m							
Sn-121m							
Sn-126	2.28E-08	2.28E-08	2.28E-08	2.28E-08	2.28E-08	2.28E-08	2.28E-08
I-129	4.54E-11	4.54E-11	4.54E-11	4.54E-11	4.54E-11	4.54E-11	4.54E-11
Cs-135							
Cs-137	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04
Ba-133							
Sm-151							
Eu-152							
Eu-154	2.37E-08	2.37E-08	2.37E-08	2.37E-08	2.37E-08	2.37E-08	2.37E-08
Ra-226	3.96E-07	3.96E-07	3.96E-07	3.96E-07	3.96E-07	3.96E-07	3.96E-07
Ra-228	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08
Th-229							
Th-230	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08
Th-232	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08	3.00E-08
Pa-231							
U-232	1.39E-10	1.39E-10	1.39E-10	1.39E-10	1.39E-10	1.39E-10	1.39E-10
U-233	1.60E-09	1.60E-09	1.60E-09	1.60E-09	1.60E-09	1.60E-09	1.60E-09
U-234	2.10E-06	2.10E-06	2.10E-06	2.10E-06	2.10E-06	2.10E-06	2.10E-06
U-235	6.60E-08	6.60E-08	6.60E-08	6.60E-08	6.60E-08	6.60E-08	6.60E-08
U-236	1.87E-07	1.87E-07	1.87E-07	1.87E-07	1.87E-07	1.87E-07	1.87E-07
U-238	9.91E-07	9.91E-07	9.91E-07	9.91E-07	9.91E-07	9.91E-07	9.91E-07
Np-237	1.65E-08	1.65E-08	1.65E-08	1.65E-08	1.65E-08	1.65E-08	1.65E-08
Pu-238	1.84E-06	1.84E-06	1.84E-06	1.84E-06	1.84E-06	1.84E-06	1.84E-06
Pu-239	4.01E-07	4.01E-07	4.01E-07	4.01E-07	4.01E-07	4.01E-07	4.01E-07
Pu-240	5.26E-08	5.26E-08	5.26E-08	5.26E-08	5.26E-08	5.26E-08	5.26E-08
Pu-241	2.28E-06	2.28E-06	2.28E-06	2.28E-06	2.28E-06	2.28E-06	2.28E-06
Pu-242	7.92E-10	7.92E-10	7.92E-10	7.92E-10	7.92E-10	7.92E-10	7.92E-10
Pu-244	2.26E-22	2.26E-22	2.26E-22	2.26E-22	2.26E-22	2.26E-22	2.26E-22
Am-241	1.24E-06	1.24E-06	1.24E-06	1.24E-06	1.24E-06	1.24E-06	1.24E-06
Am-243	7.34E-10	7.34E-10	7.34E-10	7.34E-10	7.34E-10	7.34E-10	7.34E-10
Cm-243	2.39E-12	2.39E-12	2.39E-12	2.39E-12	2.39E-12	2.39E-12	2.39E-12
Cm-244	2.23E-07	2.23E-07	2.23E-07	2.23E-07	2.23E-07	2.23E-07	2.23E-07

Rep Site Name:	Brookhaven	GE Vallecitos	Idaho	Idaho	Idaho	Idaho	Idaho	Idaho	Idaho
Stream Name:	37: BGRR D & D	1727: LLW-Contaminated Rubble/Debris	2437: WAG 7 LLW TREATED DEBRIS CAP	2485: WAG 1 LLW ICDF	2488: WAG 1 LLW TBD Treat/Disp	2498: WAG 3 LLW ICDF	3922: WAG 7 LLW TREATED SOIL CAP	3923: WAG 7 LLW ICDF	4336: WAG 6 LLW ICDF
Source Site:	Brookhaven	GE Vallecitos	Idaho	Idaho	Idaho	Idaho	Idaho	Idaho	Idaho
FY00+ Disp:	7,983	20	27,669	3,558	10	28,301	62,746	88	8,600
Profile Source:	Reported after 6/26/00 SDD	Rev.1 Complex-wide Profile	Composite of SDD profiles for streams destined to ICDF	Reported in 6/26/00 SDD	Rev.1 p. D2-ID-2	Reported in 6/26/00 SDD	Composite of SDD profiles for streams destined to ICDF	Composite of SDD profiles for streams destined to ICDF	Composite of SDD profiles for streams destined to ICDF

H-3	2.47E-06	2.85E+00							
C-14	8.41E-05	2.42E-03							
C-14am		1.37E-11							
Al-26		3.24E-10							
Cl-36		1.68E-06							
K-40		1.29E-05							
Co-60	9.74E-03	5.64E+00			1.28E-05				
Ni-59		2.79E-02							
Ni-63	2.97E-06	1.26E+00							
Ni-63am									
Se-79		5.31E-08							
Sr-90	1.88E-03	3.57E+01	1.98E-04		5.72E-04	1.10E-03	1.98E-04	1.98E-04	1.98E-04
Zr-93	1.19E-07	7.38E-06							
Nb-93m	1.01E-07	1.93E-04							
Nb-94		8.63E-06							
Tc-99	8.30E-07	2.49E-04							
Cd-113m	1.79E-07	3.56E-05							
Sn-121m		5.77E-05							
Sn-126		3.63E-09							
I-129		2.53E-06							
Cs-135		6.94E-08							
Cs-137	2.18E-03	3.09E+01	5.06E-03	1.20E-05	2.02E-03	3.81E-03	5.06E-03	5.06E-03	5.06E-03
Ba-133		4.84E-04							
Sm-151	2.47E-05	4.30E-04							
Eu-152	5.22E-07	5.75E-03	2.84E-04			1.05E-03	2.84E-04	2.84E-04	2.84E-04
Eu-154	1.80E-06	5.92E-03	2.21E-04			7.51E-04	2.21E-04	2.21E-04	2.21E-04
Ra-226	1.19E-08	1.25E-03	2.37E-08				2.37E-08	2.37E-08	2.37E-08
Ra-228		8.06E-07							
Th-229		7.00E-09							
Th-230		3.69E-04							
Th-232		5.32E-05							
Pa-231		5.94E-06							
U-232		7.76E-07							
U-233		1.04E-05							
U-234		8.34E-04			1.04E-06				
U-235	2.73E-08	4.24E-05			8.25E-08				
U-236	2.02E-08	2.53E-06							
U-238	7.11E-07	1.94E-03			1.61E-06				
Np-237	3.56E-09	1.02E-06							
Pu-238	1.33E-06	1.29E-04							
Pu-239	9.83E-05	7.38E-04	3.36E-07			1.24E-06	3.36E-07	3.36E-07	3.36E-07
Pu-240	1.86E-05	1.72E-04							
Pu-241	5.17E-05	7.73E-04							
Pu-242		5.02E-08							
Pu-244		1.40E-10							
Am-241	1.01E-05	8.47E-04	2.66E-06				2.66E-06	2.66E-06	2.66E-06
Am-243		3.20E-07							
Cm-243		1.02E-06							
Cm-244		1.14E-05							

Rep Site Name:	Idaho	Idaho	Idaho	Idaho	Idaho	Idaho	Idaho	Idaho	Idaho
Stream Name:	4342: WAG 2 LLW TREATED ICDF	776: WAG 5 LLW ICDF	787: RH DD LLW	789: CH DD LLW	798: Incinerated LLW	802: Sized LLW	805: Compacted LLW	807: WNPD LLW	808: WNPD LLW
Source Site:	Idaho	Idaho	Idaho	Idaho	Commercial - TBD	Commercial - TBD	Commercial - TBD	TBD	TBD
FY00+ Disp:	50	35,538	1,925	63,366	86	835	3,605	69	4
Profile Source:	Composite of SDD profiles for streams destined to ICDF	Reported in 6/26/00 SDD	Rev.1 p. D1-ID-4	Rev.1 p. D1-ID-4	Rev.1 p. D1-ID-4	Rev.1 p. D1-ID-4	Rev.1 p. D1-ID-4	Rev.1 p. D1-ID-6	Rev.1 p. D1-ID-6
H-3			1.67E+02	1.67E+02	1.67E+02	1.67E+02	1.67E+02	8.71E-06	8.71E-06
C-14			1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02		
C-14am			1.92E-01	1.92E-01	1.92E-01	1.92E-01	1.92E-01	3.49E-04	3.49E-04
Al-26									
Cl-36			1.69E-04	1.69E-04	1.69E-04	1.69E-04	1.69E-04		
K-40			1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	3.53E-04	3.53E-04
Co-60			4.85E+02	4.85E+02	4.85E+02	4.85E+02	4.85E+02	8.76E-03	8.76E-03
Ni-59			2.61E+00	2.61E+00	2.61E+00	2.61E+00	2.61E+00		
Ni-63			9.25E+01	9.25E+01	9.25E+01	9.25E+01	9.25E+01	6.68E-06	6.68E-06
Ni-63am									
Se-79									
Sr-90	1.98E-04		6.78E-02	6.78E-02	6.78E-02	6.78E-02	6.78E-02	2.43E-04	2.43E-04
Zr-93			7.44E-04	7.44E-04	7.44E-04	7.44E-04	7.44E-04		
Nb-93m			1.94E-02	1.94E-02	1.94E-02	1.94E-02	1.94E-02		
Nb-94			8.63E-04	8.63E-04	8.63E-04	8.63E-04	8.63E-04		
Tc-99			8.31E-05	8.31E-05	8.31E-05	8.31E-05	8.31E-05	1.88E-06	1.88E-06
Cd-113m			5.14E-06	5.14E-06	5.14E-06	5.14E-06	5.14E-06	1.22E-05	1.22E-05
Sn-121m			3.36E-03	3.36E-03	3.36E-03	3.36E-03	3.36E-03		
Sn-126									
I-129			9.81E-06	9.81E-06	9.81E-06	9.81E-06	9.81E-06		
Cs-135									
Cs-137	5.06E-03	1.71E-04	1.31E+00	1.31E+00	1.31E+00	1.31E+00	1.31E+00	1.03E-01	1.03E-01
Ba-133			3.91E-06	3.91E-06	3.91E-06	3.91E-06	3.91E-06		
Sm-151			5.02E-03	5.02E-03	5.02E-03	5.02E-03	5.02E-03	1.32E-04	1.32E-04
Eu-152	2.84E-04		3.98E-01	3.98E-01	3.98E-01	3.98E-01	3.98E-01	3.89E-06	3.89E-06
Eu-154	2.21E-04		3.08E-02	3.08E-02	3.08E-02	3.08E-02	3.08E-02	5.50E-05	5.50E-05
Ra-226	2.37E-08		1.26E-03	1.26E-03	1.26E-03	1.26E-03	1.26E-03	7.21E-08	7.21E-08
Ra-228									
Th-229			5.91E-08	5.91E-08	5.91E-08	5.91E-08	5.91E-08		
Th-230			6.59E-07	6.59E-07	6.59E-07	6.59E-07	6.59E-07	3.48E-08	3.48E-08
Th-232			1.52E-04	1.52E-04	1.52E-04	1.52E-04	1.52E-04	3.49E-08	3.49E-08
Pa-231									
U-232			7.28E-07	7.28E-07	7.28E-07	7.28E-07	7.28E-07	7.05E-11	7.05E-11
U-233			2.94E-06	2.94E-06	2.94E-06	2.94E-06	2.94E-06	1.85E-07	1.85E-07
U-234			1.83E-05	1.83E-05	1.83E-05	1.83E-05	1.83E-05	2.66E-04	2.66E-04
U-235			2.59E-04	2.59E-04	2.59E-04	2.59E-04	2.59E-04	5.79E-08	5.79E-08
U-236			3.77E-06	3.77E-06	3.77E-06	3.77E-06	3.77E-06		
U-238			1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.57E-04	1.57E-04
Np-237			1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	2.54E-06	2.54E-06
Pu-238			5.87E-05	5.87E-05	5.87E-05	5.87E-05	5.87E-05	8.77E-07	8.77E-07
Pu-239	3.36E-07		1.61E-04	1.61E-04	1.61E-04	1.61E-04	1.61E-04	7.03E-07	7.03E-07
Pu-240			1.33E-05	1.33E-05	1.33E-05	1.33E-05	1.33E-05		
Pu-241			4.96E-04	4.96E-04	4.96E-04	4.96E-04	4.96E-04		
Pu-242			1.06E-08	1.06E-08	1.06E-08	1.06E-08	1.06E-08		
Pu-244									
Am-241	2.66E-06		1.91E-04	1.91E-04	1.91E-04	1.91E-04	1.91E-04	5.13E-06	5.13E-06
Am-243			4.28E-07	4.28E-07	4.28E-07	4.28E-07	4.28E-07		
Cm-243			1.11E-07	1.11E-07	1.11E-07	1.11E-07	1.11E-07		
Cm-244			1.46E-05	1.46E-05	1.46E-05	1.46E-05	1.46E-05	2.43E-08	2.43E-08

LLW Alternative

Rep Site Name:	Los Alamos	Los Alamos	LEHR	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge
Stream Name:	3895: LLW - Accepted for Storage, from Licensed Activities (Greater than Class C)	3907: LLW - Accepted for Storage (Greater than Class C)	2859: Cobalt 60 source--ready for disposal	4340: RH LLW-4 (Beryllium Reflectors)	4402: DRS - K1420 Scrap Metal (L-020)	4403: DRS - K1420 Construction Debris	4404: DRS - K1420 Asbestos	4407: BNFL - K29/31/33 Classified	5022: LLW/Debris/Other Solids
Source Site:	TBD - Off-Site	TBD - Off-Site	LEHR	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge
FY00+ Disp:	14	13	5	20	44	29	2	22,897	18
Profile Source:	No Available Data	No Available Data	Reported in 6/26/00 SDD	Rev.1 p. D1-OR-2	Rev.1 p. D2-OR-3	Rev.1 p. D2-OR-3	Rev.1 p. D2-OR-2	Rev.1 p. D2-OR-2	Rev.1 p. D2-OR-3
H-3				2.40E+01					
C-14				2.83E-04					
C-14am									
Al-26									
Cl-36				6.81E-04					
K-40				1.26E-05					
Co-60			1.12E+02	2.12E-01					
Ni-59				9.32E-07					
Ni-63				3.80E+00					
Ni-63am									
Se-79									
Sr-90				1.51E-02	3.74E-05	3.74E-05	4.80E-04	3.74E-05	3.74E-05
Zr-93									
Nb-93m									
Nb-94									
Tc-99				1.69E-06					
Cd-113m									
Sn-121m									
Sn-126									
I-129				6.47E-08					
Cs-135									
Cs-137				1.43E+00	3.74E-05	3.74E-05	4.80E-04	3.74E-05	3.74E-05
Ba-133				4.55E-04					
Sm-151				4.37E-09					
Eu-152				1.16E-01					
Eu-154				3.81E-03					
Ra-226				1.49E-04					
Ra-228				1.01E-05					
Th-229				2.83E-11					
Th-230				2.57E-06					
Th-232				1.11E-05					
Pa-231				2.32E-07					
U-232				1.66E-07					
U-233				1.17E-05					
U-234				1.05E-03	4.96E-05	4.96E-05		4.96E-05	4.96E-05
U-235				4.74E-05	2.22E-06	2.22E-06		2.22E-06	2.22E-06
U-236				9.02E-08					
U-238				5.12E-04	4.82E-05	4.82E-05		4.82E-05	4.82E-05
Np-237				1.17E-05					
Pu-238				1.01E-05					
Pu-239				1.10E-05					
Pu-240				6.61E-05					
Pu-241				6.32E-09					
Pu-242				1.68E-08					
Pu-244									
Am-241				3.10E-05					
Am-243				4.45E-05					
Cm-243									
Cm-244				1.69E-02					

LLW Alternative

Rep Site Name:	Oak Ridge	Oak Ridge	Oak Ridge	Pantex	Pantex	Pantex	Portsmouth	Princeton	Princeton
Stream Name:	5024: LLW/Debris/Other Solids	5033: LLW/Soil/Sludge/Sediment	5035: LLW/Soil/Sludge/Sediment	3597: Organic Liquids	3599: Solidified Water	3605: Inorganic Liquid	4074: LLW Incinerable Soft Solids	3927: Non-Compactable LLW	3928: Compacted Waste
Source Site:	Oak Ridge	Oak Ridge	Oak Ridge	Pantex	Pantex	Pantex	Portsmouth	Princeton	Princeton
FY00+ Disp:	123	1,500	1,548				6,869	500	200
Profile Source:	Rev.1 p. D2-OR-3	Rev.1 p. D2-OR-3	Rev.1 p. D2-OR-3	Reported in 6/26/00 SDD	Reported in 6/26/00 SDD	Reported in 6/26/00 SDD	Rev.1 p. D2-OR-7	Reported in 6/26/00 SDD	Reported in 6/26/00 SDD
H-3				9.01E-04	9.73E-18	9.01E-04		8.50E+02	5.47E-01
C-14									
C-14am									
Al-26									
Cl-36									
K-40									
Co-60								5.00E-03	5.00E-03
Ni-59									
Ni-63									
Ni-63am									
Se-79									
Sr-90	3.74E-05	3.74E-05	3.74E-05						
Zr-93									
Nb-93m									
Nb-94									
Tc-99							4.98E-05		
Cd-113m									
Sn-121m									
Sn-126									
I-129									
Cs-135									
Cs-137	3.74E-05	3.74E-05	3.74E-05						
Ba-133									
Sm-151									
Eu-152									
Eu-154									
Ra-226									
Ra-228									
Th-229									
Th-230									
Th-232									
Pa-231									
U-232									
U-233									
U-234	4.96E-05	4.96E-05	4.96E-05						
U-235	2.22E-06	2.22E-06	2.22E-06				1.61E-07		
U-236									
U-238	4.82E-05	4.82E-05	4.82E-05	2.25E-04		2.25E-04	6.81E-04		
Np-237									
Pu-238									
Pu-239									
Pu-240									
Pu-241									
Pu-242									
Pu-244									
Am-241									
Am-243									
Cm-243									
Cm-244									

Rep Site Name:	Savannah	SPRU	SPRU	SPRU	SPRU	SPRU	SPRU	SPRU	SPRU
Stream Name:	2202: LLW Sludge (2nd waste from AI)	1840: LLW-Contaminated Soils from Storage & Collection Bldg (K5/6)	1842: LLW-Contaminated Rubble from Storage & Collection Bldg (K5/6)	1844: LLW- Contaminated Soils from Waste Baler (L7)	1846: LLW-Contaminated Rubble from Waste Baler (L7)	1848: LLW-Contaminated Soils from Lower Parking	1850: LLW-Contaminated Soils from Drum Storage	1863: [Rinsed] LLW-Pipes, Tanks & Equipment	1867: LLW-Pipes, Tanks & Equipment (not rinsed)
Source Site:	Savannah	SPRU	SPRU	SPRU	SPRU	SPRU	SPRU	SPRU	SPRU
FY00+ Disp:	6,107	2,200	20	10	10	150	1,000	400	400
Profile Source:	Rev.1 p. D2-SR-2	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile
H-3	9.64E-02	2.85E+00	2.85E+00	2.85E+00	2.85E+00	2.85E+00	2.85E+00	2.85E+00	2.85E+00
C-14		2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03
C-14am		1.37E-11	1.37E-11	1.37E-11	1.37E-11	1.37E-11	1.37E-11	1.37E-11	1.37E-11
Al-26		3.24E-10	3.24E-10	3.24E-10	3.24E-10	3.24E-10	3.24E-10	3.24E-10	3.24E-10
Cl-36		1.68E-06	1.68E-06	1.68E-06	1.68E-06	1.68E-06	1.68E-06	1.68E-06	1.68E-06
K-40		1.29E-05	1.29E-05	1.29E-05	1.29E-05	1.29E-05	1.29E-05	1.29E-05	1.29E-05
Co-60	5.41E-07	5.64E+00	5.64E+00	5.64E+00	5.64E+00	5.64E+00	5.64E+00	5.64E+00	5.64E+00
Ni-59		2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02
Ni-63	6.43E-07	1.26E+00	1.26E+00	1.26E+00	1.26E+00	1.26E+00	1.26E+00	1.26E+00	1.26E+00
Ni-63am									
Se-79		5.31E-08	5.31E-08	5.31E-08	5.31E-08	5.31E-08	5.31E-08	5.31E-08	5.31E-08
Sr-90	7.63E-05	3.57E+01	3.57E+01	3.57E+01	3.57E+01	3.57E+01	3.57E+01	3.57E+01	3.57E+01
Zr-93		7.38E-06	7.38E-06	7.38E-06	7.38E-06	7.38E-06	7.38E-06	7.38E-06	7.38E-06
Nb-93m		1.93E-04	1.93E-04	1.93E-04	1.93E-04	1.93E-04	1.93E-04	1.93E-04	1.93E-04
Nb-94		8.63E-06	8.63E-06	8.63E-06	8.63E-06	8.63E-06	8.63E-06	8.63E-06	8.63E-06
Tc-99	1.28E-07	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04
Cd-113m		3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05
Sn-121m		5.77E-05	5.77E-05	5.77E-05	5.77E-05	5.77E-05	5.77E-05	5.77E-05	5.77E-05
Sn-126		3.63E-09	3.63E-09	3.63E-09	3.63E-09	3.63E-09	3.63E-09	3.63E-09	3.63E-09
I-129	4.79E-07	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06
Cs-135		6.94E-08	6.94E-08	6.94E-08	6.94E-08	6.94E-08	6.94E-08	6.94E-08	6.94E-08
Cs-137	6.79E-05	3.09E+01	3.09E+01	3.09E+01	3.09E+01	3.09E+01	3.09E+01	3.09E+01	3.09E+01
Ba-133		4.84E-04	4.84E-04	4.84E-04	4.84E-04	4.84E-04	4.84E-04	4.84E-04	4.84E-04
Sm-151		4.30E-04	4.30E-04	4.30E-04	4.30E-04	4.30E-04	4.30E-04	4.30E-04	4.30E-04
Eu-152		5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03
Eu-154		5.92E-03	5.92E-03	5.92E-03	5.92E-03	5.92E-03	5.92E-03	5.92E-03	5.92E-03
Ra-226	1.44E-06	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03
Ra-228	1.54E-06	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07
Th-229		7.00E-09	7.00E-09	7.00E-09	7.00E-09	7.00E-09	7.00E-09	7.00E-09	7.00E-09
Th-230		3.69E-04	3.69E-04	3.69E-04	3.69E-04	3.69E-04	3.69E-04	3.69E-04	3.69E-04
Th-232		5.32E-05	5.32E-05	5.32E-05	5.32E-05	5.32E-05	5.32E-05	5.32E-05	5.32E-05
Pa-231		5.94E-06	5.94E-06	5.94E-06	5.94E-06	5.94E-06	5.94E-06	5.94E-06	5.94E-06
U-232		7.76E-07	7.76E-07	7.76E-07	7.76E-07	7.76E-07	7.76E-07	7.76E-07	7.76E-07
U-233		1.04E-05	1.04E-05	1.04E-05	1.04E-05	1.04E-05	1.04E-05	1.04E-05	1.04E-05
U-234	7.15E-06	8.34E-04	8.34E-04	8.34E-04	8.34E-04	8.34E-04	8.34E-04	8.34E-04	8.34E-04
U-235	1.00E-06	4.24E-05	4.24E-05	4.24E-05	4.24E-05	4.24E-05	4.24E-05	4.24E-05	4.24E-05
U-236		2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06
U-238	1.06E-05	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.94E-03
Np-237		1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06
Pu-238	1.02E-05	1.29E-04	1.29E-04	1.29E-04	1.29E-04	1.29E-04	1.29E-04	1.29E-04	1.29E-04
Pu-239	1.20E-06	7.38E-04	7.38E-04	7.38E-04	7.38E-04	7.38E-04	7.38E-04	7.38E-04	7.38E-04
Pu-240	8.32E-06	1.72E-04	1.72E-04	1.72E-04	1.72E-04	1.72E-04	1.72E-04	1.72E-04	1.72E-04
Pu-241		7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04
Pu-242		5.02E-08	5.02E-08	5.02E-08	5.02E-08	5.02E-08	5.02E-08	5.02E-08	5.02E-08
Pu-244		1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10
Am-241	1.76E-06	8.47E-04	8.47E-04	8.47E-04	8.47E-04	8.47E-04	8.47E-04	8.47E-04	8.47E-04
Am-243		3.20E-07	3.20E-07	3.20E-07	3.20E-07	3.20E-07	3.20E-07	3.20E-07	3.20E-07
Cm-243	1.99E-05	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06
Cm-244	1.99E-05	1.14E-05	1.14E-05	1.14E-05	1.14E-05	1.14E-05	1.14E-05	1.14E-05	1.14E-05

LLW Alternative

Rep Site Name:	SPRU	SPRU	West Valley	West Valley	West Valley	West Valley	West Valley
Stream Name:	1869: LLW- Contaminated Soils	1870: LLW-Contaminated Bldg Rubble	3193: Resins/Sludges	3211: Soils	3626: Disposal-Pending EIS ROD's	644: WVDP Site Closure	645: Stabilized LLW-Drum Cell Waste
Source Site:	SPRU	SPRU	West Valley	West Valley	West Valley	West Valley	West Valley
FY00+ Disp:	130	3,900	799	4,550	1,885	140,000	5,173
Profile Source:	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	WVDP EIS Appx C, Table C-15
H-3	2.85E+00	2.85E+00	2.85E+00	2.85E+00	2.85E+00	2.85E+00	1.16E-03
C-14	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	7.73E-04
C-14am	1.37E-11	1.37E-11	1.37E-11	1.37E-11	1.37E-11	1.37E-11	
Al-26	3.24E-10	3.24E-10	3.24E-10	3.24E-10	3.24E-10	3.24E-10	
Cl-36	1.68E-06	1.68E-06	1.68E-06	1.68E-06	1.68E-06	1.68E-06	
K-40	1.29E-05	1.29E-05	1.29E-05	1.29E-05	1.29E-05	1.29E-05	
Co-60	5.64E+00	5.64E+00	5.64E+00	5.64E+00	5.64E+00	5.64E+00	
Ni-59	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	
Ni-63	1.26E+00	1.26E+00	1.26E+00	1.26E+00	1.26E+00	1.26E+00	
Ni-63am							
Se-79	5.31E-08	5.31E-08	5.31E-08	5.31E-08	5.31E-08	5.31E-08	
Sr-90	3.57E+01	3.57E+01	3.57E+01	3.57E+01	3.57E+01	3.57E+01	1.93E-01
Zr-93	7.38E-06	7.38E-06	7.38E-06	7.38E-06	7.38E-06	7.38E-06	
Nb-93m	1.93E-04	1.93E-04	1.93E-04	1.93E-04	1.93E-04	1.93E-04	
Nb-94	8.63E-06	8.63E-06	8.63E-06	8.63E-06	8.63E-06	8.63E-06	
Tc-99	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	7.73E-01
Cd-113m	3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05	
Sn-121m	5.77E-05	5.77E-05	5.77E-05	5.77E-05	5.77E-05	5.77E-05	
Sn-126	3.63E-09	3.63E-09	3.63E-09	3.63E-09	3.63E-09	3.63E-09	
I-129	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	1.16E-04
Cs-135	6.94E-08	6.94E-08	6.94E-08	6.94E-08	6.94E-08	6.94E-08	
Cs-137	3.09E+01	3.09E+01	3.09E+01	3.09E+01	3.09E+01	3.09E+01	1.93E-01
Ba-133	4.84E-04	4.84E-04	4.84E-04	4.84E-04	4.84E-04	4.84E-04	
Sm-151	4.30E-04	4.30E-04	4.30E-04	4.30E-04	4.30E-04	4.30E-04	
Eu-152	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	5.75E-03	
Eu-154	5.92E-03	5.92E-03	5.92E-03	5.92E-03	5.92E-03	5.92E-03	
Ra-226	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	
Ra-228	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	
Th-229	7.00E-09	7.00E-09	7.00E-09	7.00E-09	7.00E-09	7.00E-09	
Th-230	3.69E-04	3.69E-04	3.69E-04	3.69E-04	3.69E-04	3.69E-04	
Th-232	5.32E-05	5.32E-05	5.32E-05	5.32E-05	5.32E-05	5.32E-05	
Pa-231	5.94E-06	5.94E-06	5.94E-06	5.94E-06	5.94E-06	5.94E-06	
U-232	7.76E-07	7.76E-07	7.76E-07	7.76E-07	7.76E-07	7.76E-07	
U-233	1.04E-05	1.04E-05	1.04E-05	1.04E-05	1.04E-05	1.04E-05	
U-234	8.34E-04	8.34E-04	8.34E-04	8.34E-04	8.34E-04	8.34E-04	
U-235	4.24E-05	4.24E-05	4.24E-05	4.24E-05	4.24E-05	4.24E-05	
U-236	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	2.53E-06	
U-238	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.94E-03	
Np-237	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	
Pu-238	1.29E-04	1.29E-04	1.29E-04	1.29E-04	1.29E-04	1.29E-04	
Pu-239	7.38E-04	7.38E-04	7.38E-04	7.38E-04	7.38E-04	7.38E-04	7.73E-02
Pu-240	1.72E-04	1.72E-04	1.72E-04	1.72E-04	1.72E-04	1.72E-04	
Pu-241	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	5.80E-01
Pu-242	5.02E-08	5.02E-08	5.02E-08	5.02E-08	5.02E-08	5.02E-08	
Pu-244	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	
Am-241	8.47E-04	8.47E-04	8.47E-04	8.47E-04	8.47E-04	8.47E-04	
Am-243	3.20E-07	3.20E-07	3.20E-07	3.20E-07	3.20E-07	3.20E-07	
Cm-243	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	1.02E-06	
Cm-244	1.14E-05	1.14E-05	1.14E-05	1.14E-05	1.14E-05	1.14E-05	

Rep Site Name:	Battelle WJ	ETEC	ETEC	ETEC	Fernald	Grand Junction	Hanford	Idaho	Idaho
Stream Name:	10: MLLW PCB Contaminated Rubble/Debris	1683: Corrosive Cleaning Liquids Neutralized Acid Cleaner, Acidic Aqueous Liquid	2125: Wastewater Evaporation Residues	2856: mercury sediment from ER	4118: Organic Liquids	2730: Commingled RRM/Soil	3493: Greater than Class C waste	2447: WAG 1 MLLW ICDF	2456: WAG 1 MLLW TREATED ICDF
Source Site:	Battelle WJ	ETEC	ETEC	ETEC	Fernald	Grand Junction	Hanford	Idaho	Idaho
FY00+ Disp:	3	0.001	1	0.2	20	0.175	1	10,005	69
Profile Source:	Reported in 6/26/00 SDD	Rev.1 p. D1-OK-4	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Rev.1 p. D2-OH-11	Rev.1 p. D2-AL-2	Reported after 6/26/00 SDD	Reported in 6/26/00 SDD	Composite of SDD profiles for streams destined to ICDF
H-3									
C-14									
C-14am									
Al-26									
Cl-36									
K-40				1.28E-05					
Co-60	1.40E-06	1.82E+00	7.84E-03						
Ni-59									
Ni-63									
Ni-63am									
Se-79									
Sr-90		4.03E-06	5.16E-01	9.60E-07			1.83E+04		1.98E-04
Zr-93									
Nb-93m									
Nb-94									
Tc-99									
Cd-113m									
Sn-121m									
Sn-126									
I-129									
Cs-135									
Cs-137	3.75E-06	2.80E-03	3.97E-01	2.56E-06			1.08E+05	9.31E-04	5.06E-03
Ba-133									
Sm-151									
Eu-152									2.84E-04
Eu-154									2.21E-04
Ra-226				3.20E-07		1.41E-04			2.37E-08
Ra-228									
Th-229									
Th-230		1.40E-04		1.44E-06					
Th-232	7.60E-06		4.32E-05	6.40E-07	1.92E-02	1.41E-04			
Pa-231									
U-232									
U-233									
U-234	6.70E-05		4.71E-04	2.24E-06	2.88E-02				
U-235	3.03E-06		4.50E-05	6.40E-07					
U-236									
U-238	6.75E-05		1.88E-04	1.28E-06	6.72E-02				
Np-237									
Pu-238		1.36E-04	2.68E-04						
Pu-239		9.15E-05	2.17E-02						3.36E-07
Pu-240			1.83E-04						
Pu-241			2.17E-02						
Pu-242			2.40E-05						
Pu-244									
Am-241			2.17E-03						2.66E-06
Am-243									
Cm-243									
Cm-244									

MLLW Alternative

Rep Site Name:	Idaho	Idaho	Idaho	Idaho	Lawrence Berkeley	Los Alamos	LEHR	Nevada Test Site	Oak Ridge
Stream Name:	2462: WAG 1 MLLW TREATED/ICDF	2471: WAG 5 MLLW ICDF	3629: ER TSCA Labpacks in Storage at WROC	4337: WAG 3 MLLW ICDF	1762: [Treated] Tritiated Water on Gel	3910: MLLW - Disposal	4117: Southwest Trench poly buck disposal	2868: Picatinny	4400: DRS - K1420 Liquids (WW-02)
Source Site:	TBD	Idaho	Idaho	Idaho	Lawrence Berkeley	TBD - Off-Site	LEHR	Nevada Test Site	Oak Ridge
FY00+ Disp:	42	3,760	3	23,412	0.1	8	0.36	0.04	2
Profile Source:	Composite of SDD profiles for streams destined to ICDF	Reported in 6/26/00 SDD	Rev.1 p. D1-ID-6	Reported in 6/26/00 SDD	Rev.1 p. D1-OK-2	Rev.1 p. D1-AL-14	Rev.1 p. D2-OK-10	Reported after 6/26/00 SDD	Rev.1 p. D2-OR-3
H-3			8.71E-06		8.51E+01	1.07E+04	3.95E-06		
C-14					1.68E-04	1.49E-04			
C-14am			3.49E-04			5.99E-04			
Al-26						1.21E-07			
Cl-36									
K-40			3.53E-04			4.72E-06			
Co-60			8.76E-03			1.15E-03			
Ni-59						3.49E-04			
Ni-63			6.68E-06						
Ni-63am									
Se-79									
Sr-90	1.98E-04		2.43E-04	8.85E-04		3.75E-04	3.92E-04		3.74E-05
Zr-93						5.92E-07			
Nb-93m									
Nb-94						5.63E-07			
Tc-99			1.88E-06			1.64E-02			
Cd-113m			1.22E-05			3.77E-06			
Sn-121m									
Sn-126									
I-129						1.95E-08			
Cs-135									
Cs-137	5.06E-03	1.02E-05	1.03E-01	1.73E-02	3.34E-03	1.13E-03	2.76E-07		3.74E-05
Ba-133						7.56E-08			
Sm-151			1.32E-04			4.06E-05			
Eu-152	2.84E-04		3.89E-06			9.31E-03			
Eu-154	2.21E-04		5.50E-05	7.86E-05		1.55E-03			
Ra-226	2.37E-08	6.60E-07	7.21E-08		5.89E-10	1.68E-07	5.56E-06		
Ra-228						1.10E-05			
Th-229					3.09E-10				
Th-230			3.48E-08			2.49E-06			
Th-232			3.49E-08		3.10E-05	1.92E+00	4.25E-08		
Pa-231					4.63E-11				
U-232			7.05E-11			5.29E-08			
U-233			1.85E-07		2.02E-06	3.73E-10			
U-234			2.66E-04		4.57E-10	3.46E-04		6.63E-04	4.96E-05
U-235			5.79E-08		1.73E-09	1.13E-03			2.22E-06
U-236									
U-238			1.57E-04		1.76E-07	5.67E-01		7.18E-03	4.82E-05
Np-237			2.54E-06		6.30E-07	6.72E-06			
Pu-238			8.77E-07		1.52E-05	2.58E-02			
Pu-239	3.36E-07		7.03E-07		1.19E-05	6.04E-02			
Pu-240						6.34E-05			
Pu-241						9.41E-04	2.25E-04		
Pu-242						3.07E-08			
Pu-244									
Am-241	2.66E-06		5.13E-06	1.19E-05	2.83E-05	4.16E-02			
Am-243					1.46E-08	1.96E-06			
Cm-243									
Cm-244			2.43E-08						

Rep Site Name:	Oak Ridge	Portsmouth	Portsmouth	Portsmouth	Rocky Flats	Rocky Flats	Savannah	Savannah	Savannah
Stream Name:	4401: DRS - K1420 Debris (MW-008)	1979: Incinerable Solids (to TBD)	1983: Incinerable Solids (to TBD)	478: TSCA Soft Solids	3993: Disposal Sort to Class C Disposal	4260: Disposal Sort to DOE LLM Disposal	1908: Meets treatment standard	1913: CIF Stabilized Ash/Blowdown with Listed Constituents	1916: Macroencapsulated Waste
Source Site:	Oak Ridge	Portsmouth	Portsmouth	Portsmouth	Rocky Flats	Rocky Flats	Savannah	Savannah	Commercial - TBD
FY00+ Disp:	93	818	83	309			65	2,101	613
Profile Source:	Rev.1 p. D2-OR-3	Rev.1 p. D2-OR-7	Rev.1 p. D2-OR-7	Rev.1 p. D2-OR-7	Assume 50 % of Class C max concentrations from 10CFR61.55 only nucl from Rev 1 profiles	Rev.1 p. D2-RF-5	Reported after 6/26/00 SDD	Reported in 6/26/00 SDD	Reported after 6/26/00 SDD
H-3						1.71E-03	1.18E+01	3.90E+00	1.18E+01
C-14							8.82E-06		8.82E-06
C-14am									
Al-26									
Cl-36							4.46E-09		4.46E-09
K-40							6.64E-09		6.64E-09
Co-60							3.69E-04		3.69E-04
Ni-59							3.58E-06		3.58E-06
Ni-63							2.22E-04		2.22E-04
Ni-63am									
Se-79							1.75E-06		1.75E-06
Sr-90	3.74E-05				3.50E+03	2.30E-10	2.45E-03		2.45E-03
Zr-93							3.49E-10		3.49E-10
Nb-93m							5.69E-08		5.69E-08
Nb-94							1.97E-13		1.97E-13
Tc-99		4.98E-05	4.98E-05	4.98E-05			2.05E-06		2.05E-06
Cd-113m									
Sn-121m									
Sn-126							1.81E-08		1.81E-08
I-129							1.02E-08		1.02E-08
Cs-135							2.91E-14		2.91E-14
Cs-137	3.74E-05				2.30E+03	8.26E-08	2.65E-03		2.65E-03
Ba-133							1.53E-10		1.53E-10
Sm-151							3.97E-09		3.97E-09
Eu-152							1.61E-04		1.61E-04
Eu-154							1.17E-04		1.17E-04
Ra-226						2.99E-09	8.50E-09		8.50E-09
Ra-228							2.49E-07		2.49E-07
Th-229									
Th-230							1.60E-07		1.60E-07
Th-232							1.66E-07		1.66E-07
Pa-231									
U-232							4.50E-07		4.50E-07
U-233						1.53E-06	2.08E-05		2.08E-05
U-234	4.96E-05					7.70E-05	2.00E-04		2.00E-04
U-235	2.22E-06	1.61E-07	1.61E-07	1.61E-07		3.71E-06	6.93E-06		6.93E-06
U-236							1.42E-06		1.42E-06
U-238	4.82E-05	6.81E-04	6.81E-04	6.81E-04		6.48E-05	3.02E-04		3.02E-04
Np-237							7.71E-07		7.71E-07
Pu-238							1.59E-04		1.59E-04
Pu-239					5.00E+01	4.40E-03	6.95E-05		6.95E-05
Pu-240						1.13E-05	2.02E-05		2.02E-05
Pu-241					1.75E+03		8.49E-04		8.49E-04
Pu-242							3.23E-07		3.23E-07
Pu-244							8.59E-20		8.59E-20
Am-241						1.05E-03	2.43E-05		2.43E-05
Am-243							3.14E-08		3.14E-08
Cm-243							5.67E-10		5.67E-10
Cm-244							3.00E-05		3.00E-05

Rep Site Name:	Savannah	Savannah	Savannah	Savannah	Sandia NM	Sandia NM	SPRU	SPRU	SPRU
Stream Name:	1920: Treated Soils/Sludges-M Area	1922: Treated Soils/Sludges	3790: Amalgamated mercury	3919: Incinerable rad PCBs	2267: Macroencapsulated Inorganic Debris	2268: Treated Sodium Uranium	1852: MLLW-Soils from Storage & Collection Bldg. (K5/6)	1861: [Rinsed] MLLW-Pipes, Tanks & Equipment	1865: MLLW-Pipes, Tanks & Equipment (not rinsed)
Source Site:	Savannah	TBD	Commercial - TBD	Savannah	Sandia NM	Sandia NM	SPRU	SPRU	SPRU
FY00+ Disp:	819	66	7	11	19	0.1	10	20	30
Profile Source:	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Reported after 6/26/00 SDD	Derived from Predecessor SDD Streams	SNL-CA Profile from NTS PA	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile	Rev.1 Complex-wide Profile
H-3	1.18E+01	1.18E+01	1.18E+01	1.18E+01	8.80E+01	2.25E+02	2.85E+00	2.85E+00	2.85E+00
C-14	8.82E-06	8.82E-06	8.82E-06	8.82E-06			2.42E-03	2.42E-03	2.42E-03
C-14am							1.37E-11	1.37E-11	1.37E-11
Al-26							3.24E-10	3.24E-10	3.24E-10
Cl-36	4.46E-09	4.46E-09	4.46E-09	4.46E-09			1.68E-06	1.68E-06	1.68E-06
K-40	6.64E-09	6.64E-09	6.64E-09	6.64E-09			1.29E-05	1.29E-05	1.29E-05
Co-60	3.69E-04	3.69E-04	3.69E-04	3.69E-04		9.09E-04	5.64E+00	5.64E+00	5.64E+00
Ni-59	3.58E-06	3.58E-06	3.58E-06	3.58E-06			2.79E-02	2.79E-02	2.79E-02
Ni-63	2.22E-04	2.22E-04	2.22E-04	2.22E-04			1.26E+00	1.26E+00	1.26E+00
Ni-63am									
Se-79	1.75E-06	1.75E-06	1.75E-06	1.75E-06			5.31E-08	5.31E-08	5.31E-08
Sr-90	2.45E-03	2.45E-03	2.45E-03	2.45E-03		1.82E-03	3.57E+01	3.57E+01	3.57E+01
Zr-93	3.49E-10	3.49E-10	3.49E-10	3.49E-10			7.38E-06	7.38E-06	7.38E-06
Nb-93m	5.69E-08	5.69E-08	5.69E-08	5.69E-08			1.93E-04	1.93E-04	1.93E-04
Nb-94	1.97E-13	1.97E-13	1.97E-13	1.97E-13			8.63E-06	8.63E-06	8.63E-06
Tc-99	2.05E-06	2.05E-06	2.05E-06	2.05E-06			2.49E-04	2.49E-04	2.49E-04
Cd-113m							3.56E-05	3.56E-05	3.56E-05
Sn-121m							5.77E-05	5.77E-05	5.77E-05
Sn-126	1.81E-08	1.81E-08	1.81E-08	1.81E-08			3.63E-09	3.63E-09	3.63E-09
I-129	1.02E-08	1.02E-08	1.02E-08	1.02E-08			2.53E-06	2.53E-06	2.53E-06
Cs-135	2.91E-14	2.91E-14	2.91E-14	2.91E-14	1.63E+02		6.94E-08	6.94E-08	6.94E-08
Cs-137	2.65E-03	2.65E-03	2.65E-03	2.65E-03			3.09E+01	3.09E+01	3.09E+01
Ba-133	1.53E-10	1.53E-10	1.53E-10	1.53E-10			4.84E-04	4.84E-04	4.84E-04
Sm-151	3.97E-09	3.97E-09	3.97E-09	3.97E-09			4.30E-04	4.30E-04	4.30E-04
Eu-152	1.61E-04	1.61E-04	1.61E-04	1.61E-04			5.75E-03	5.75E-03	5.75E-03
Eu-154	1.17E-04	1.17E-04	1.17E-04	1.17E-04			5.92E-03	5.92E-03	5.92E-03
Ra-226	8.50E-09	8.50E-09	8.50E-09	8.50E-09			1.25E-03	1.25E-03	1.25E-03
Ra-228	2.49E-07	2.49E-07	2.49E-07	2.49E-07			8.06E-07	8.06E-07	8.06E-07
Th-229							7.00E-09	7.00E-09	7.00E-09
Th-230	1.60E-07	1.60E-07	1.60E-07	1.60E-07			3.69E-04	3.69E-04	3.69E-04
Th-232	1.66E-07	1.66E-07	1.66E-07	1.66E-07			5.32E-05	5.32E-05	5.32E-05
Pa-231							5.94E-06	5.94E-06	5.94E-06
U-232	4.50E-07	4.50E-07	4.50E-07	4.50E-07			7.76E-07	7.76E-07	7.76E-07
U-233	2.08E-05	2.08E-05	2.08E-05	2.08E-05			1.04E-05	1.04E-05	1.04E-05
U-234	2.00E-04	2.00E-04	2.00E-04	2.00E-04			8.34E-04	8.34E-04	8.34E-04
U-235	6.93E-06	6.93E-06	6.93E-06	6.93E-06			4.24E-05	4.24E-05	4.24E-05
U-236	1.42E-06	1.42E-06	1.42E-06	1.42E-06			2.53E-06	2.53E-06	2.53E-06
U-238	3.02E-04	3.02E-04	3.02E-04	3.02E-04			1.94E-03	1.94E-03	1.94E-03
Np-237	7.71E-07	7.71E-07	7.71E-07	7.71E-07			1.02E-06	1.02E-06	1.02E-06
Pu-238	1.59E-04	1.59E-04	1.59E-04	1.59E-04			1.29E-04	1.29E-04	1.29E-04
Pu-239	6.95E-05	6.95E-05	6.95E-05	6.95E-05			7.38E-04	7.38E-04	7.38E-04
Pu-240	2.02E-05	2.02E-05	2.02E-05	2.02E-05			1.72E-04	1.72E-04	1.72E-04
Pu-241	8.49E-04	8.49E-04	8.49E-04	8.49E-04			7.73E-04	7.73E-04	7.73E-04
Pu-242	3.23E-07	3.23E-07	3.23E-07	3.23E-07			5.02E-08	5.02E-08	5.02E-08
Pu-244	8.59E-20	8.59E-20	8.59E-20	8.59E-20			1.40E-10	1.40E-10	1.40E-10
Am-241	2.43E-05	2.43E-05	2.43E-05	2.43E-05			8.47E-04	8.47E-04	8.47E-04
Am-243	3.14E-08	3.14E-08	3.14E-08	3.14E-08			3.20E-07	3.20E-07	3.20E-07
Cm-243	5.67E-10	5.67E-10	5.67E-10	5.67E-10			1.02E-06	1.02E-06	1.02E-06
Cm-244	3.00E-05	3.00E-05	3.00E-05	3.00E-05			1.14E-05	1.14E-05	1.14E-05

Rep Site Name:	SPRU
Stream Name:	1868: MLLW-Contaminated Soil
Source Site:	SPRU
FY00+ Disp:	10
Profile Source:	Rev.1 Complex-wide Profile

H-3	2.85E+00
C-14	2.42E-03
C-14am	1.37E-11
Al-26	3.24E-10
Cl-36	1.68E-06
K-40	1.29E-05
Co-60	5.64E+00
Ni-59	2.79E-02
Ni-63	1.26E+00
Ni-63am	
Se-79	5.31E-08
Sr-90	3.57E+01
Zr-93	7.38E-06
Nb-93m	1.93E-04
Nb-94	8.63E-06
Tc-99	2.49E-04
Cd-113m	3.56E-05
Sn-121m	5.77E-05
Sn-126	3.63E-09
I-129	2.53E-06
Cs-135	6.94E-08
Cs-137	3.09E+01
Ba-133	4.84E-04
Sm-151	4.30E-04
Eu-152	5.75E-03
Eu-154	5.92E-03
Ra-226	1.25E-03
Ra-228	8.06E-07
Th-229	7.00E-09
Th-230	3.69E-04
Th-232	5.32E-05
Pa-231	5.94E-06
U-232	7.76E-07
U-233	1.04E-05
U-234	8.34E-04
U-235	4.24E-05
U-236	2.53E-06
U-238	1.94E-03
Np-237	1.02E-06
Pu-238	1.29E-04
Pu-239	7.38E-04
Pu-240	1.72E-04
Pu-241	7.73E-04
Pu-242	5.02E-08
Pu-244	1.40E-10
Am-241	8.47E-04
Am-243	3.20E-07
Cm-243	1.02E-06
Cm-244	1.14E-05

Appendix E. Definitions and References

E.1 Definitions

The following definitions and terms are used in this Report:

Access/Institutional Control and In-situ Treatment and Containment: Environmental restoration activities manage a significant portion of its contaminated media without physically removing or excavating them, thus generating no LLW or MLLW for disposal. If the degree of contamination is relatively low and the volumes relatively large, an appropriate response may be access/institutional control. Public access to the area of contamination is restricted either through land deeds or a barrier such as a fence and posted warnings. The type and degree of contamination may also warrant an in-situ response. These remediation strategies will allow the environmental restoration activities to address these elements in place and thus minimize or eliminate the generation of LLW and MLLW.

Combustion: This technique transforms the waste to a less reactive form and reduces its volume. Incineration is used for combustible dry active waste and LLW containing certain organic liquids and waste oil. Incineration can achieve high-volume reduction factors.

Compaction: This technique reduces the physical volume of the waste by mechanical compression.

Contaminated Media: Environmental restoration activities address millions of cubic meters of soils, sediments, sludges, debris, and water potentially contaminated with radionuclides and hazardous constituents. This Report does not consider contaminated media as LLW or MLLW when the media are addressed through in-situ containment or treatment remediation strategies. LLW or MLLW are generated when remediation strategies generate excavated or removed materials that require disposal in specially engineered disposal facilities.

Deactivation: The deactivation process places a facility in a safe and stable condition that minimizes the long-term cost of a surveillance and maintenance program and is protective of workers, the public, and the environment until decommissioning is complete. Actions include the removal of fuel, draining and/or de-energizing of nonessential systems, removal of stored radioactive and hazardous materials, and related actions. Source: “DOE D&D Resource Manual” (DOE/EM-0246)

Decommissioning: Decommissioning takes place after deactivation and includes surveillance and maintenance, decontamination, and/or dismantlement. These actions are taken at the end of the life of a facility to retire it from service with adequate regard for the health and safety of workers and the public and protection of the environment. The ultimate goal of decommissioning is unrestricted release or restricted use of the site. Source: “DOE D&D Resource Manual” (DOE/EM-0246)

Dewatering: This is a process usually used as a liquid removal technique to treat wet solids. Pumping and gravitational drainage can be used to remove the water from semi-solid LLW. Ion-exchange resins are commonly treated using “in-container dewatering.”

Disposal Facilities: DOE Order 435.1 defines a disposal facility as the land, structures, and equipment used for disposal of waste. A disposal site is the portion of a disposal facility that is used to dispose of waste. For LLW, it consists of a disposal unit and a buffer zone. A disposal unit is the discrete portion (e.g., a pit, trench, tumulus, vault, or bunker) of the disposal site into which waste is placed for disposal (Source: DOE Order 435.1). The Department has stipulated that waste management disposal facilities at only three sites (Hanford Site and Nevada Test Site) accept waste from offsite generators. CERCLA disposal facilities are designed and constructed to manage LLW/MLLW generated by onsite remediation activities only.

Disposal Ready Volume Projections: LLW and MLLW are generated by a number of Department of Energy programs and disposed by waste operations and CERCLA disposal facilities, as well as commercial facilities. LLW and MLLW volume projections vary depending on the point in time at which they were reported. Projection data are available for a number of different volumes, from initial LLW generated from a remediation response to contaminated media to volumes transferred for treatment to volumes transferred for disposal. In general, data on treatment were not available. The projections reported in this Report represent the waste volumes requiring disposal in engineered facilities. Volume projections transferred by any generator to the Environmental Management program for treatment and/or disposal represent the volumes at the time of transfer to the Environmental Management program. As certain types of treatment, such as compaction or incineration, may significantly reduce volumes for final disposal, these volumetric projections may overstate required disposal capacities. Moreover, employing aggressive waste minimization techniques may further reduce the volume projections.

Disposal in CERCLA Facilities: This disposition category consists primarily of disposal in the existing, approved, and planned CERCLA disposal facilities. Appendix A contains a detailed discussion of the existing, approved, and planned CERCLA disposal facilities. Note that these disposal facilities will accept only onsite remediation LLW or MLLW.

Disposition to be Determined: Some sites did not report a final disposition remediation strategy for specific elements. Examples include collection and treatment or collection and storage (the Report did not consider these remediation strategies as final disposition types) where no additional responses were provided by the sites. Other sites did not have sufficient data to provide an initial volume of contaminated media. Finally, some sites dispositioned only fractions of certain elements. In all these instances, the Report segregated these elements into the “disposition to be determined” category.

Evaporation: This is a concentration method that can be used on many different liquid wastes and slurries.

Low-Level Waste: DOE Order 435.1 defines low-level waste as waste that contains radioactivity and is not classified as high-level waste, transuranic waste, spent nuclear fuel, or 11e(2) byproduct material as defined by [DOE Order 435.1]. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of transuranic is less than 100 nanocuries per gram.

Mixed Low-Level Waste: DOE Order 435.1 defines mixed low-level waste as waste containing both radioactive and hazardous components as defined by the Atomic Energy Act and the Resource Conservation and Recovery Act, respectively.

No Further Action: After consulting with stakeholders and regulatory agencies (whether the Environmental Protection Agency, other Federal agencies, or State and local agencies), the Office of Environmental Management may determine that no further action is appropriate. Sites reported a number of elements that have been determined as or are forecasted to require no further action.

Sedimentation and Precipitation: These processes are used to concentrate the radioactivity of liquid LLW into a small volume of wet solids.

Solidification and Stabilization: These processes are used to convert LLW to a stabilized from to prevent degradation and release of radionuclides.

Transfer to Commercial Facility for Disposal: The Environmental Management program plans to transfer some of its LLW and MLLW to commercial facilities for disposal (the Department currently transfers waste to the Envirocare facility in Utah; other commercial disposal facilities will be considered as they become available).

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