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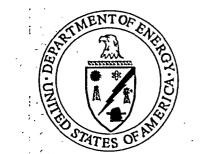
ultari art The Current and Planned Low-Level Waste Disposal Capacity Report Revision 2 •

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U.S. Department of Energy Office of Environmental Management



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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

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

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	Envir,	z: Other.		Projected 1	
Generator Site	Restoration	Activities 33	Total 255	Disposal Facility	Facility Type
Ames Laboratory		120	120		
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		J
Columbus Environmental Management Project -	2 800		0.000		[
West Jefferson	2,800		2,800		
Energy Technology Enginæring Center	1,500		1,500		
Fermi National Accelerator Laboratory		1,800	1,800	Hanford 200 Area	
Hanford Site	340	91,000	92,000	Burial Grounds	[
Knolls Atomic Power Lab-Schenectady		690	690	(130,000 m ³)	ĺ
Laboratory for Energy-Related Health Research		11	11		•
Lawrence Berkeley National Laboratory		270	270		
Massachusetts Institute of Technology*		11	11		· · ·
Paducah Gascous Diffusion Plant		320	320		1
Parks Township *		2,800	2,800		
Portsmouth Gascous Diffusion Plant		290	290		1
Princeton Plasma Physics Laboratory		2,300	2,300		
Stanford Linear Accelerator Center		790	790		1
Idaho National Engineering and Environmental Laboratory	. 10,000	9,800	20,000	INEEL RWMC (20,000 m ³)	Waste Operations
Los Alamos National Laboratory	34,000	88,000	120,000	LANL TA-54 Area G (120,000 m ³)	Disposal Facilities (1,200,000 m ³)
Ashtabula Environmental Management Project	40	380	420		(1,200,000 m)
Energy Technology Enginæring Center	270		270		1
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	NTS Areas 3 & 5 RWMS	
Miamisburg Environmental Management Project	18,000		18,000	(780,000 m³)	
Nevada Test Site	120,000	560	120,000		F
Oak Ridge Reservation	360	400,000	400,000		
Pantex Plant	190	54	250		
Rocky Flats Environmental Technology Site	150,000	11,000	160,000		l
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 ^a	1,600,000		1,600,000	Fernald OSDF (1,600,000 m ³)	Existing/Approved
Hanford Site	5,000,000		5,000,000	Hanford ERDF (5,000,000 m ³)	Environmental Restoration
Oak Ridge Reservation	890,000		890,000	ORR EMWMF (890,000 m ³)	CERCLA Facilities (7,500,000 m ³)
Idaho National Engineering and Environmental Laboratory	76,000		76,000	INEEL ICDF (76,000 m ³)	Planned Environmental Restoration
Idaho National Engineering and Environmental Laboratory	90,000		90,000	INEEL Remediation Unit (90,000 m ³)	CERCLA Facilities (170,000 m ³)

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	Envir.	Other		Projected Disposal
Generator Site	* Restoration	Activities	Total .	Disposal Facility
Brookhaven National Laboratory	8,000	· · · · · · · · · · · · · · · · · · ·	8,000	
General Electric Vallecitos Nuclear Center	20		20	· .
Idaho National Engineering and Environmental	760	69,000	70,000	and the second second second
Laboratory	100 -	09,000	70,000	
Laboratory for Energy-Related Health Research	· . 5		5	
Los Alamos National Laboratory		27	27	To Be Determined
Oak Ridge Reservation	26,000	20	26,000	(280,000 m ³)
Portsmouth Gaseous Diffusion Plant		6,900	6,900	
Princeton Plasma Physics Laboratory		700	· 700	
Savannah River Site	• • • 6,100		6,100 ·	a a ser e se
Separations Process Research Unit	8,200	1	8,200	
West Valley Demonstration Project		150,000	150,000	
Ames Laboratory		. 100	100	
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	Commercial Disposal
Lawrence Livermore National Laboratory - Main Site	• •	160	160	(1,000,000 m ³)
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	110,000	11,000	11,000	a a ser a
Princeton Plasma Physics Laboratory	<u> </u>	51	51	
Rocky Flats Environmental Technology Ste	· ·	· 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 "	0 000 000		10,100,000	
101315	9,000,000	1,100,000	10,100,000	فقدهم فالمعرجات فالتناسي المراجع

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

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* 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 highlevel 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.

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 comingling with other waste streams.

* Because of rounding, some totals may not equal the sum of their components.

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

* Massachusetts Institute of Technology and Parks Township are not DOE sites.

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

For the Fernald OSDF, the 2000-2070 projected volume of 1.6 million m³ differs from the 1.9 million m³ volume reported in the CID. 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 prior to disposal.

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

	Envir	Other	a de la compañía de la	Projected	Disposal			
Generator Site	Restoration	Activities	Total	Disposal Facility	Facility Type			
Hanford Site	340	62,000	63,000	Hanford Site Mixed Waste Trenches 31 & 34 (63,000 m ³)	Waste Operations Disposal Facilities			
Nevada Test Site		0.3	0.3	NTS Area 5 Mixed Waste Disposal Unit (0.3 m ³)	(63,000 m ³)			
Fernald Environmental Management Project	_ 90		. 90	Fernald OSDF (90 m ³)	Existing/Approved Environmental Restoration			
Oak Ridge Reservation	200,000	÷	200,000	ORR EMWMF (200,000 m ³)	CERCLA Facilities (200,000 m ³)			
Idaho National Engineering and Environmental Laboratory	37,000		37,000	INEEL ICDF (37,000 m³)	Planned Environmental Restoration CERCLA Facilities (37,000 m ³)			
Columbus Environmental Management Project - West Jefferson	. 3		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	To Be Determined (5,100 m ³)				
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	\ \				

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Table 2-3.	Projected MLLW Disposal Volumes by Generate	or Site
	(2000-2070, cubic meters) *	

(Continued)

Generator SiteEnvir. RestorationOther ActivitiesTotal :Ames Laboratory11Argonne National Laboratory - East180Argonne National Laboratory - West3Argonne National Laboratory - West3Shtabula Environmental Management Project50Columbus Environmental Management Project - West11Energy Technology Engineering Center1,400Control Columbus Environmental Management Project2Idaho National Engineering and Environmental202,4002,400General Atomics1Inhalation Toxicology Resarch Institute71Laboratory For Energy-Related Health Research1Laboratory For Energy-Related Health Research1Laboratory Engineering Laboratory2,400Lostatory for Energy-Related Health Research1Laboratory Faiter National Laboratory2,400Laboratory For Energy-Related Health Research1Laboratory for Energy-Related Health Research1Laboratory For String Laboratory2,400Miamisburg Environmental Management Project<1Columbus Environmental Management Project<1Cok Kidge Reservation940<	and the state of the share of the second		in acay	· · ·	and the second second second
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Columbus Environmental Management Project - West1111Jefferson1,4001,400Energy Technology Engineering Center1,4001,400Fernald Environmental Management Project4,7004,700General Atomics11Grand Junction Office22Idaho National Engineering and Environmental202,400Laboratory7171Inhalation Toxicology Research Institute7171Laboratory of Energy-Related Health Research11Lawrence Berkeley National Laboratory110110Lawrence Livermore National Engineering Laboratory2,4002,500Miamisburg Environmental Management Project<1	Ashtabula Environmental Management Project	50		50	
Jefferson1111Energy Technology Engineering Center1,4001,400Fernald Environmental Management Project4,7004,700General Atomics11Grand Junction Office22Idaho National Engineering and Environmental Laboratory202,4002,400Inhalation Toxicology Research Institute7171Laboratory for Energy-Related Health Research11Lawrence Berkeley National Laboratory110110Lawrence Livermore National Laboratory2,4002,500Miamisburg Environmental Management Project<1	Brookhaven National Laboratory	120	. : 340	• 460	and the second second second
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Grand Junction Office22Idaho National Engineering and Environmental Laboratory202,4002,400Inhalation Toxicology Research Institute7171Laboratory for Energy-Related Health Research11Lawrence Berkeley National Laboratory110110Lawrence Livermore National Laboratory2,4002,500Miamisburg Environmental Management Project<1	Fernald Environmental Management Project	4,700	· ·	4,700	
Idaho National Engineering and Environmental Laboratory202,4002,400Commercial Disposal (150,000 m³)Inhalation Toxicology Research Institute717171Laboratory for Energy-Related Health Research111Lawrence Berkeley National Laboratory110110140Lawrence Livermore National Laboratory2,4002,5004,800Miamisburg Environmental Management Project<1	General Atomics	· · · ····	1	· · · 1	
Laboratory202,4002,400(150,000 m³)Inhalation Toxicology Research Institute7171Laboratory for Energy-Related Health Research11Lawrence Berkeley National Laboratory110110Lawrence Livermore National Laboratory2,4002,500Miamisburg Environmental Management Project<1	Grand Junction Office	2		2	
Laboratory for Energy-Related Health Research11Lawrence Berkeley National Laboratory110110Lawrence Livermore National Laboratory - Main Site140140Los Alamos National Engineering Laboratory2,4002,5004,800Miamisburg Environmental Management Project<1		20	2,400	2,400	
Laboratory11Lawrence Berkeley National Laboratory110110Lawrence Livermore National Laboratory - Main Site140140Los Alamos National Engineering Laboratory2,4002,5004,800Miamisburg Environmental Management Project<1	Inhalation Toxicology Research Institute		71	71	
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Oak Ridge Reservation94052,000\$3,000Paducah Gaseous Diffusion Plant23,0005,10028,000Portsmouth Gaseous Diffusion Plant9709,10010,000Rocky Flats Environmental Technology Site35,0003,80039,000Sandia National Laboratory - New Mexico- 3,3009304,200	Los Alamos National Engineering Laboratory	2,400	2,500	4,800	
Paducah Gaseous Diffusion Plant23,0005,10028,000Portsmouth Gaseous Diffusion Plant9709,10010,000Rocky Flats Environmental Technology Site35,0003,80039,000Sandia National Laboratory - New Mexico3,3009304,200	Miamisburg Environmental Management Project		<1	<1	
Portsmouth Gaseous Diffusion Plant9709,10010,000Rocky Flats Environmental Technology Site35,0003,80039,000Sandia National Laboratory - New Mexico- 3,3009304,200	Oak Ridge Reservation	940	52,000	53,000	
Rocky Flats Environmental Technology Site35,0003,80039,000Sandia National Laboratory - New Mexico3,3009304,200	Paducah Gaseous Diffusion Plant	23,000	5,100	28,000]
Sandia National Laboratory - New Mexico 3,300 930 4,200	Portsmouth Gaseous Diffusion Plant	970	9,100	10,000	
	Rocky Flats Environmental Technology Site	35,000	3,800	39,000	
Totals* 310.000 140.000 450.000	Sandia National Laboratory - New Mexico	3,300	930	· 4,200	Let Albert 1 1 - Let a
	Totals *	310,000	140,000	450,000	

* 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.

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.

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

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Environmental Restoration Generation Projections 2.2.2 - -

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 (insitu) 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 m³ of LLW media shown in Table 2-4, 9.0 million m³ of LLW is projected to be generated through ex-situ response strategies. Similarly, of the 2.5 million m³ of MLLW media shown in Table 2-5, 280,000 m³ of MLLW is projected to be generated through ex-situ response strategies.

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	Solid LLW	Volume	of Solid LLW		n Environmental		0-2070)	
Site	Media Volume Managed In-Situ	Treatment or Processing In DOE 7 Facilities	Disposal In DOE CERCLA Cells	Disposal in DOE Waste Operations Facilities	Transfer to Commercial Facilities	Disposition to be Determined	Total Ex- Situ Volume Generated	Totals 4
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
Grand Junction Office	1 0 000 000				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
Los Alamos National Laboratory	290,000			34,000			34,000	330,000
Miamisburg Environmental Management Project	, i			18,000	• 72,000		90,000	90,000
Nevada Test Site	2,100,000	110,000		8,500		10.000	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		·	ļ	ļ1	l		1	1
Portsmouth Gaseous Diffusion Plant	:			•	110		110	110
Sandia National Laboratones - New Mexico				. 330	1,500	• · ·	1,800	1,800
Savannah River Site	1,400,000	l		· · · ·	52,000	1 1	52,000	1,400,000
Separations Process Research Unit	• •		·	· · · · · · · · · · · · · · · · · · ·		7,800	7,800	7,800
Totals *	26,000,000	830,000	7,700,000	88,000	350,000	48,000	9,000,000	35,000,000

Table 2-4. LLW Media from Environmental Restoration Activities (cubic meters)^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.

* Transfer to Commercial Facilities category includes commercial treatment, disposal, and recycle.

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

⁴ Because of rounding, some totals may not equal the sum of their components.

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Table 2-5. MLLW Media from Environmental Restoration Activities

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						a a la a la a la a		
	Solid S		Volume of MILI	.W Generated	from Environm -2070)	ental Responses		
Sile	Media Volume Managed In-Situ	Treatment or Processing in DOE Facilities	Disposal in DOE CERCLA Cells	Disposal in DOE Waste Operation s Facilities	Transfer to Commercia I Facilities *	Disposition to be to be Determined s	Total Ex- Sita Volume Generated	Totals !
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 Laboratorics - 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

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.

* Transfer to Commercial Facilities category includes commercial treatment, disposal, and recycle.

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

* Because of rounding, some totals may not equal the sum of their components.

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

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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.

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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 m³ (31,680 ft³) 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.

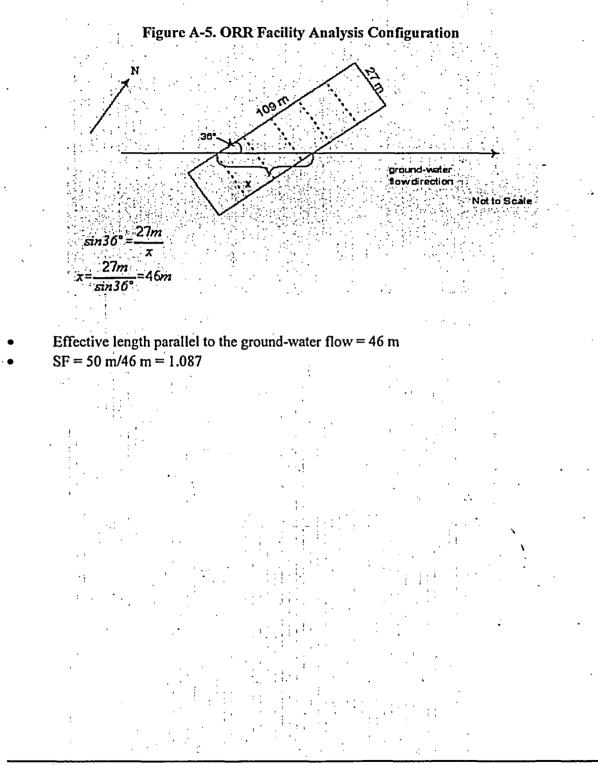
A.5.2.2 Scaling Factor

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.

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

Stram Name:	3540; Treated BFV Burn Sol	3691: LLW from RMI (Aentabule EMP)	3692 LLW from ORR	4136: U2bu Lead Contaminated Sol	4283: Treated Bulk Load	4284: Treated EMAD	4285; Treated TTF Solvents	4269; Trested A-12 Liquid	4287: Trested Sealed Sources
Gen Ste:	Walte Control Spec	Aerestate	Oak Ridge	Nevada Test 64.0	Waste Control Spec	Waste Control Spec	Waste Control Spec	Wante Control Spec	Waste Control Spec
FY98-70 M3		621	403.076	20		12	- la-		la
Profile Source;	Reported after 6/26/00	No Avalable Data	NTS Generator Data	Reported after 6/26/00	Rev. 1 p. DI-NV-3 MLLW-		Reported after 6/26/00	Reported after 6/25/00	Reported after 6/26/00
<u>.</u>		1	2.39€+01	· · · · · · · · · · · · · · · · · · ·		3.416-08			· · · · · · · · · · · · · · · · · · ·
43 C-14		+	2.875-04						4.01E-05
C-14am		1							
4+28 2+36 K-40									
24-36		1	0,796-04		-1				
K-40			1,25E-05		1	1.47E-00			
Co-60			2115-01	3.51E-06		7.51E-05			
N-59			9,29E-07			·			<u> </u>
NH63			3,795+00						<u> </u>
NI-63am		·							ł
5-79 5r-90		·	1.51E-02	6,355-07				-}	<u> </u>
21-93			L31E=02			7.00E-06	4.17E-00		
ND-93m									·
ND-94									
68-01			1.68E-06						· · · · · · · · · · · · · · · · · · ·
26-113m									+
5n-121m						1		1	<u></u>
Sn-128		1							
F129			6,45E-08						I
C=135									
C+137		1	1,44E+00	8.78E-07	5.90E-06	39E-07	4.17E-00		
8+133			4.54E-04				_ <u></u>		7.00E-04
Sm-151		+	4,36E-09	· · · · · · · · · · · · · · · · · · ·		<u> </u>			
Eu-152		<u> </u>	1.15E-01			·	+	_ <u> </u>	
Eu-154			3,605-03	2.26E-06		3.626-07			<u> </u>
Re-226			1.485-04			15/5-9/			······
Re-228			5.076-07			+			<u> </u>
Th-230	_		2,565-06				2.08E-07		
h.212			1.10E-05	2.89E-06					<u>├</u>
n-232 a-231			231E-07						·
J-232			1.06E-07	<u></u>					
1-233			1.17E-05						1
1-233 1-234	1		1.046-03			4,05E-06		1	
1235 1236 1238			4.72E-05		1	1.76E-07	6.63E-00		
1-236		1	8,996-08						1
238			5.11E-04			1.546-07			I
ND-237			1,16E-05				1.64E-08 6.79E-08		
24238 24-239 24-240		· · · · · · · · · · · · · · · · · · ·	1.236-05		_ 	6,355-00	6.79E-00	4,43E-11	}
V-239	2.24E-07		1,106-05	1,30E-00		6.81E-08	3,866-08	8.04E-10	
	2.245-07	<u> </u>	6.596-05		- 	·	·		
<u>v-241</u>		+				<u> </u>		-{	<u> </u>
<u>v-242</u>		+	1.07E-08			<u>}</u>			<u> </u>
30-244 Vm-241	2.245-07	+	3,095-05	1.50E-08				4,005-07	6.41E-07
Vm-243		+	4,446-05						
2m-243		+				<u>}</u>			t
m-244		+	1.895-02						t
2017 6 4 1						<u> </u>			

LLW Alternative

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Ban Eda Mama	I on Alamon	li na Alamoa	ILEHR	Oak Ridge	Oek Ridge	IOak Ridge	Oak Ridge	Qsk Ridge	Oek Ridge
Rep 5de Name: Stream Name;	3895; LLW - Accepted for	3907: LLW + Accepted for	2659: Cobalt 60 source-	4340; RH LLW-4	4402: DRS - K1420 Screp		4404: DR8 - K1420	4407: BNFL - K29/31/33	5022 LLW/Debne/Other
Steam Name:	Storage, from Licensed	Storage (Greater than	ready for disposal	(Berystum Reflectors)	- Metal (L-020)	Construction Debris	Asbestos	Classified	Solds
			invest for disposat	(Berystom Resectore)	Militar (124020)	Conservation Debris			30000
	Activities (Greater than	Class C)				.	1	• • • • • •	
Source Site:	TBO - Off-Site	TBD + Off-Ste	LEHR	Oak Ridge	Oak Ridge	Oak Ridge	Oek Ridge	Oak Ridge	Oek Ridge
FY00+ Disg	114	13	15	120	44	29	12	22.897	118
Profile Source:	No Avelable 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
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H-3		1		1 2,40E+01					
C-14				2,03E-04					
C-14am		1		-					
AL-26									
CI-36				6,81E-04					
K-40				1,266-05		I			1
Co-60			1.12E+02	2.126-01					1
Co-60 NL59		1		9.32E-07					
NH63				3,80€+00					- I
N+63am						1	- I		
Se-79				1		I			
84-90		In the second second second		1.51E-02	1,74E-05	3,74E-05	4,805-04	3,74E-05	3746-05
Zr-03						I			
Nb-93m				<u> </u>		Į			
ND-94			l	1					
To-99				1.69E-06					-l
Cd-113m				1		1			
Sn-121m									
Sn-126		lut and i and		<u> </u>		<u> </u>			
129				6,47E-08					
Ce-135									
C+137				1,43E+00	3.74E-05	1746-05	4,806-04	3.74E-05	3,746-05
B-133			<u></u>	4,55E-04					· · · · ·
Sm-151				4.37E-09		<u> </u>			
Eu-152				1,16E-01		<u> </u>			
Eu-154		<u> </u>		3,81E-03			· · · ·		
R= 226		<u> </u>		1.498-04		-			
Ra-228				1.01E-05		+			
Th-229 Th-230		Į		283E-11 257E-06					
[h-230				1,11E-05					
Th-232		·	<u> </u>	2.32E-07		+			
P+231 U-232 U-233 U-234		+	+	1,666-07		1			
0-232				1,176-05		1		-1	
0-233			<u> </u>	1,056-03	4,986-05	4,96E-05		4,965-05	4,96E-05
0-234			I—	4,74E-05	2,225-06	2,225-06		2,225-00	2.226-06
U-235 U-236 U-236		 	+	9.02E-08					
0.230			·····	5,12E-04	4.82E-05	4.826-05		4.82E-05	4,825-05
0-230			1	1.178-05	<u>````````````````````````````````</u>				
Np-237 Pu-238 Pu-239 Pu-240 Pu-241		+	1	1,01E-05		<u> </u>			
PU-418		+	<u> </u>	1,10E-05		1			
PU-239	·		<u>+</u> ·	6,612-05		<u> </u>			
PU-240		·····	<u> </u>	6,32E-09	-1	1			1
0.241			+	1,66E-08		i .			
Pu-242		+			-1	1			
Pu-244		+	<u> </u>	3,105-05		1			1
Am-241			1	4,456-05					
Am-243		·			-1	1		- <u> </u>	
Cm-243	<u> </u>			1.696-02		1	-1	· · · · · · · · · · · · · · · · · · ·	
Çm-244			L	1.000.004					

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LLW Alternative

Rep Ste Name:	Oat Ridge	Oak Ridge	Oak Ridge	Partex	Pantex	Partex	Portamouth	Princeton	Princeton
Stream Name:	5024; LLW/Debre/Other Solids	5033:	5035: LLW/Sol/Sludge/Sediment	3597: Organic Liquids	3599: Soldfied Water	3605; Inorganic Liquid	4074: LLW Incinerable Soft Solids	3927: Non-Compectable	3928: Compacted Waste
	· ·			•	1			-	
Source Site:	Oak Ridge	Oak Ridge	Oak Ridge	Pentex	Pantex	Pantex	Portamouth	Princeton	Princeton 200
Profile Source:	123 Rev.1 p. 02-08-3	1 500 Rev. 1 p. D2-OR-3	1.548 Rev.1 p. D2-OR-3	Reported in \$/26/00 SDD	0	0	0.009	500	200
rtulie goorce,		AND DECIMANNESS .		Kepoites in a zono auto	Reported in \$/26/00 800	Reported in 6/26/00 800	Rev.1 p. D2-OR-7	Reported in 6/26/00 600	Reported in \$/25/00 SDD
41		T	·	9.015-04	8.73E-18	9.01E-04		8.506+02	1\$.47E-Q1
+3		1					1		
C-14am		1			1			1	
AL 20 CL-36									
CI-36									
C40 Co-80	····		}	}	· · · · · · · · · · · · · · · · · · ·	<u></u>		5,006-03	5,006-03
NH-59								5,00E-03	5,006-03
NH63					······				{
Ni-63em									
NI-63am Se-79							· · · · · · · · · · · · · · · · · · ·		
Sr-90	1.746-05	1.74E-05	1746-05						
Zr-93		· · · · · · · · · · · · · · · · · · ·			<u> </u>		<u> </u>		· · · · · · · · · · · · · · · · · · ·
ND-93m					<u> </u>	<u> </u>	+		·
10-99			· · · · · · · · · · · · · · · · · · ·		·	<u>+</u>	4.985-05		
Cd-113m						1			·
Sn-121m							1		1
Sn-126									
-129		· · · · · · · · · · · · · · · · · · ·			<u> </u>		┼─────		
Ce-135	3.74E-05	174E-05	3.74E-05			<u> </u>	╎╧╍╍╍╍╍╍		}
8+133		1	A/46-VJ						· · · · · · · · · · · · · · · · · · ·
Sm-151				·	<u> </u>				
Eu-152					1	1	1		
Eu-154					1	1			
Re-226 Re-228							I		
Ra-228				·	1				
h-229 h-230				[<u> </u>			<u> </u>
Th-232					1				<u>├</u>
Pe-231		1			<u> </u>	 	<u></u> _		· · · · · · · · · · · · · · · · · · ·
J-232		1			1		1		
1233							1		
J-234	4,96E-05	4,95E-05 2,22E-06	4,96E-05 2,22E-06	·					
J-235 J-236	2.22E-06	2.226-06	Z 22E-06		<u> </u>		1.61E-07		
1-236 1-230	4.82E-05	4.82E-05	4.82E-05	2.25E-04		2.256-04	8.815-04		· · · · · · · · · · · · · · · · · · ·
Np-237		1.945-144			t				·
Pu 238		1					· · · · · · · · · · · · · · · · · · ·		·
Pu-239							1		
PU-240									I
Py-241									
Pu-242					<u> </u>	<u> </u>			
244					ł				
Vm-241			h			<u> </u>	<u> </u>		<u> </u>
Cm-243						·	1		<u> </u>
Cm-244			·		· · · · · · · · · · · · · · · · · · ·	<u> </u>	1		

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Appendix D-2, Page 18

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Annendiy D-2 Page 18			•

lep Site Name:	Idaho	idaho	Ideho	Ideho	Lawrence Berkeley	Los Alemos	ILEHR	Neveda Test Site	Oek Ridge
ream Name;	2462 WAG 1 MLLW	2471: WAG & MLLW ICDF	3629: ER TSCA Laboacka	4337: WAG 3 MLL WICOF	1762 [Treated] Tritiated	3910: MLLW - Deposal	4117; Southwest Trench	2868; Picetinny	4400 DRS - K1420
	TREATEDACOF		in Storage at WROC		Weter on Get		poly buck disposal		: Liquids (WW-02)
	TREATED/ICDF	· ·					hour many methoder		- Indone (uumos)
					1 · · ·	· • . • •			
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					Le como como como como como como como com				
ource Ster		idaho	ktehg	lideho	Lawrence Berkeley	IBD - Off-Site	LEHR	Neveda Test Ste	Oak Ridge
			3	23.412	19.1	8	0.36	0.04	2
rofile Source;	Composite of SOD profiles	Reported in 6/26/00 SDD	Rev. 1 p. D1-10-8	Reported in 6/26/00 SDD	Rev.1 p. D1-OK-2	Rev.1 B. D1-AL-14	Rev. 1 p. D2-OK-10	Reported after 6/26/00	Rev.1 p. D2-OR-3
	for streams destined to			1				1500	
	ICDF		· · · · ·	1 -		1 · · · ·	1.		
					· ·	1 · · ·	1 .		
					A	1,			
			8.716-06	T	8,51E+01	1.07E+04	1.956-08	· · · · · · · · · · · · · · · · · · ·	
-14			9.() E-Y9		0.016001		1.425-00	· · · · · · · · · · · · · · · · · · ·	
				<u> </u>	1.68E-04	1.495-04			
14am			3,496-04			5,99E-04			
-28						1.21E-07	· · · · · · · · · · · · · · · · · · ·		
-36									
40			3,535-04			4,72E-06			
0-60			8,76E-03			1.15E-03			
-59					1	3,495-04	1		1
-63			6,666-06	<u></u>	1	1	1	· · · · · · · · · · · · · · · · · · ·	
H63am			XXXX		1	1	+ · · · · · · · · · · · · · · · · · · ·	1	
HOJAM									
-79	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	· · · · · · · · · · · · · · · · · · ·			ł	1			
-90	1.98E-04		2,435-04	8,85E-04		3,75E-04	3,925-04	<u> </u>	3746-05
-93			l		t	192E-07			
b-93m								·	
p-94						5,63E-07			
-99			1.665-06		1	1.64E-02 3.77E-06			
d-113m			1.22E-05		1	377E-06		<u>† </u>	
n-121m							1		
					+				
n-128						1.955-08			
129						1.925-08			
►135								<u> </u>	
► <u>137</u>	5.06E-03	1.02E-05	1,035-01	1.736-02	3.346-03	1,136-03	2.70E-07	<u> </u>	3,746-05
-133						7.56E-08			
m-151			1,325-04			4,08E-05			
4-152	2.84E-04		3,89E-06			9,31E-03 1,55E-03	1 .	1	
0-154	2.21E-04		5.50E-05	7.66E-05	1	1.556-03	1	1	
a-226	2,37E-00	6,60E-07	7,21E-08		5,89E-10	1.68E-07	5,565-08	1	
+228						1.68E-07			
					3.09E-10	1.100.00		<u> </u>	
n-229			0.100.04		3,02210	A 105 44			
n-230			3,486-08			2.49E-06 1.92E+00			
~232			3,495-08		3,10E-05	1.92E+00	4.256-00	·	
-231			ł	I	4.63E-11		1		1
232		· · · ·	7,055-11	1	I	5,29E-08			
.233			1.656-07		2,02E-06	3,736-10	1		
234 235 236			2.665-04	· · · · · · · · · · · · · · · · · · ·	4.57E-10	3.46E-04	1	6.63E-04	4,96E-05
225	· · · · · · · · · · · · · · · · · · ·		5,795-08		1,73E-09	1,13E-03	1	+	2,226-08
514				i	1		t	1	
x 30			1.675-04		1.76E-07	5.67E-01	1	7,186-03	4.82E-05
238							ł	(.)0E-03	4.042-00
-231			2.546-06		6.30E-07	6.726-06			
-238			L775-07		1.52E-05	2.585-02	I		
-238 -239 -240	3,365-07		/ 7.036-07		1,196-05	2,58E-02 6,04E-02 6,34E-05	1		
-240				l	1	6,346-05		1	
-241						9,41E-04	2.256-04		
242					1	3.07E-00		1.	
+242 +244					<u> </u>	here and her	I	t	+
	2.66E-08		5,135-08	1.19E-05	2436-05	4.166-02	<u></u>	t	
m-241	T005-00			1.196403	1,46E-08	1,956-06	+	ł	
n-243					1.465-08	1.905-06	!	I	
m-243	L					I		1	1
m-244			2,435-08						1

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MLLW Alternative

MLLW Alternative

Rep Ste Name:	Qak Ridge	Portamouth	Portamouth	Portamouth	Rocky Flats	Rocky Flata	Savannah	Savannah	Savannah
Stream Name:	4401; DRS - K1420 Debris	1979: Incineratile Solute	1983: Incineralite Solids	478: TSCA Soft Solida	3993; Deposed Sort to	4260; Desposal Sort to	1908; Meets treatment	1912 CIF Stablized	1918: Macroencepeulated
Gu a mit feditie.		(to TBO)	(to TBO)		Cless C Disposal	DOE LLM Deposal	standard .		Wasta
	(MW-008)	[((1) [1) [1) [1) [1] [1] [1] [1] [(@ 100)	1	Come o Debora	DOE CON Deboen			THERE .
	1	1	1				•• •••	Constituents	
			1		•		1 ·	1	
Source Site	Oak Ridge	Portamouth	Persenesen	Portamouth	Redor Flata	Recky Flata	Savannah	Savannah	Commercial - TBD
FY00+ Disg	93	816	63	309			65	2.101	013
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	Rev.1 & D2-RF-5	Reported after 6/26/00	Reported in \$/25/00 SOO	Reported after 6/26/00
		1	1		max concentrations from		500	4	SDD
		· ·	i .	1	10CFR61.55 onty puct	1 :	[-	-
		L		1	them Plant 1 profiles	L			
H-3 G-14	1		1	1	1	1.71E-03	1.18E+01	1,90E+00	1,18E+01
C-14			1				B.82E-08		8.82E-08
C-14am		1							
			·	<u> </u>					}
AL-26 CL-36			·	· /			4 445 00		4,46E-09
CL-36							4.46E-09		
K-40 Co-60			+				6,64E-09		6,64E-09
Co-60				<u>+</u>			1.595-04		3,696-04
NI-59	1					1	1,58E-08 2,22E-04	······································	3,585-06
NH63				· · · · · · · · · · · · · · · · · · ·		1	2.22E-04		2.22E-04
NL-63am									
8-79				1			1,75E-06		1,75E-06
Sr.90 Zi-93	3,74E-05	1			3.50E+03	2,306-10	1,755-08		2 45E-03
76.93		1	1			1	3,49E-10	1	3.49E-10
Np-93m							5.89E-08		5.69E-08
ND-94		<u>}</u>		1			1.97E-13		1.97E-13
10-99		4.986-05	4.986-05	4.98E-05			2.05E-06		2.05E-08
10.07						+			
Cd-113m				·					
Sn-121m		·				·			
Sn-126		<u> </u>					1.81E-08		1,81E-08
L129				+			1.026-08		1,02E-08
Ca-135 Ca-137		L					2,915-14		2.01E-14
Cs-137	3.746-05	l			230E+03	8.26E-08	265E-03		2,65E-03
Be-133	-r						1.53E-10		1.53E-10
3m-151						1	3,97E-09		3,07E-09
Eu-152							1.61E-04		1.61E-04
Eu-154				1			1.176-04		1.17E-04
Ra 220						2.99E-09	8.50E-09 2.49E-07		0.50E-00
R - 228							2 496-07		2.496-07
Th-229			· /			1			
Th-230							1.605-07		1.606-07
10-230		·	+				1.865-07		1.005-07
Th-232			+						vvc/
P=-231						-{			
0-232							4.50E-07 2,08E-05	-{	4,50E-07
P=-231 U-232 U-233		I				1,53E-00	2,08E-05		2.085-05
U-234 U-235	4,966-05		1			7.70E-05	2.00E-04	-1	2.00E-04
U-235	2.226-06	1.61E-07	1.616-07	1.61E-07	_1	3.71E-00	6.936-08		6_P3E-00
U-236							1,426-00		1.425-00
U-236 U-238	4,825-05	6.81E-Q4	6,816-04	6.01E-04		6.48E-05_	3,025-04		3.02E-04
Np-237		· · · · · · · · · · · · · · · · · · ·	1	1	1	1	7.71E-07		3.02E-04 7.71E-07
0				1		1	1,59E-04	1	1.596-04
Pu-238 Pu-239		t	1	1	5.00E+01	4.405-03	8 95E-05		0,956-05
1-0-638			· /			4.40E-03 1.13E-05	6.95E-05 2.02E-05		2.026-05
Pu-240 Pu-241		{		+	1.75E+03	1,135-03	495.04		
Py-241		f	· ··································			-{	1495-04		8,495-04
Pu-242		·	<u> </u>	· }		+	3,236-07		3.236-07
Pu-244		1	.I				8,59E-20		8.595-20
Am-241						1.05E-03	2436-09		2,436-05
Am-243				1			14E-06	1	3,145-08
Cm-243			1	1			5,67E-10		5,67E-10
Cm-244		1	1	· · · · · · · · · · · · · · · · · · ·			1,00E-08		3,005-05
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