

5. WASTE HAZARDOUS CHARACTERIZATION

The majority of INEL TSA stored waste is mixed waste. The waste is contaminated with both RCRA listed and characteristic constituents as well as some TSCA regulated constituents. Source information used to identify the presence of contaminants was in accordance with the current database and supporting documentation used for Federal Facilities Compliance Act compliance reporting requirements. Information available from compliance reporting contained estimated listings of contaminants present in the waste; however, definitive information on contaminant concentrations present in the waste was not available. Further document review for presence of contaminants resulted in the additional listing of some constituents in a few of the waste streams.

The concentration information is presented in Appendices A and B. Additional compilations and assumptions were made in order to expand and quantify concentration values and present bounding estimates. Confidence in the accuracy of the estimated concentration values given at a content code level based on past documentation is low; however this information is considered the best available at this time.

Assumed maximum concentrations are also shown in Appendices A and B and are considered to represent bounding values for listed constituents with a margin of conservatism. The intent of this presentation is to provide a consistent basis for use in preparation and evaluation of proposals for treatment services. The information provided in this section is based on data contained in the IMWI database^a and work by Raivo and Pace (1994)^b and Raivo (1995).^c

Ongoing characterization efforts being performed at the INEL will increase the confidence in some concentration values presented in future waste descriptions, and any additional information acquired during retrieval efforts prior to any transport of the waste will be made available. Efforts necessary to obtain high confidence data in all the varied waste streams may not be economically feasible, therefore generation of any facility Waste Acceptance Criteria for input waste streams should allow for a sufficient margin of conservatism.

Historical Transuranic Storage Area (TSA)-stored waste hazardous summary information is shown in Table 5-1 for primary hazardous constituents. Table 5-1 concentrations are based on typical expected concentration from historical documents. Table 5-2 provides current estimates of the major contaminants based on assumed maximum concentrations at the content code level rolled up to the total, which are considered to represent conservative estimates. Table 5-3 provides estimates for all contaminants. Tables 5-2 and 5-3 should be used for all estimates; Table 5-1 is provided for reference only.

a. Idaho Mixed Waste Information (IMWI), Idaho National Engineering Laboratory, September 1995.

b. B. D. Raivo, D. P. Pace, Preliminary EPA Hazardous Constituents Design Basis Concentrations for ALLW Treatment Services, EDF PSPI-015546-04, January 18, 1994.

c. B. D. Raivo, EPA Hazardous Constituent Design Basis Concentrations for INEL Stored Waste (TSA) Treatment Services, EDF PSPI-015546-13, December 15, 1995.

Table 5-1. Historical TSA-stored waste hazardous information.^a

Hazardous constituent	Average mass fraction of total waste	Maximum fraction of any waste container
1,1,1-trichloroethane	0.00581	0.1500
Carbon tetrachloride	0.00627	0.0500
1,1,2-trichloro-1,2,2-trifluoroethane	0.00371	0.0500
Trichloroethene	0.00392	0.1500
Perchloroethylene	0.00062	0.0500
Methylene chloride	0.00040	0.0010
Methyl alcohol	0.000008	0.000025
Butyl alcohol	0.000003	0.00001
Xylene	0.00002	0.00005
Cadmium	0.000003	0.00001
Lead	0.00826	0.6000
Mercury	0.00354	0.2000
Lithium	0.00177	0.2000
Beryllium	0.00021	0.9500
Nitric acid	0.00190	0.5050
Nitrates	0.00037	0.9000
Polychlorinated biphenyls ^{b,c}	0.00854	0.5560
Asbestos ^b	0.00274	0.4500

a. Historical reporting information on chemical contaminants representative of waste at the TSA. (EDF ENV-003, 2/5/90. INEL ER&WM EIS, 1993, RFP No. DE-RP07-94ID 13278 SOW, 12/15/93)

b. To provide more complete waste information, concentration data for some toxic (TSCA) waste constituents not considered hazardous under RCRA are provided.

c. As many as 7,600 drums stored in the TSA are suspect for containing PCBs. The actual number of drums is unknown. These drums are estimated to be within the code 000 (Unknown) or code 003 (Organic setups) waste streams. For purposes of treatment services feasibility studies, PCB concentration within these 7,600 drums is considered to be >500 ppm.

Table 5-2. Distribution of hazardous contaminants.^a

Hazardous Contaminant ^b	Percent of Total inventory (%)	Percent of Total RCRA contaminants (%)	Estimated Contaminant Mass (kg)
RCRA			
D008A	4.13	17.15	1,317,638.67
F001C	2.99	12.41	954,019.29
F001A	2.52	10.45	802,756.49
D008C	2.35	9.76	750,316.25
F001B	1.47	6.10	469,144.37
D009A	1.14	4.72	362,866.76
F002F	0.92	3.81	293,121.68
F001F	0.89	3.68	282,832.98
D002E	0.87	3.61	277,672.66
F003I	0.77	3.18	244,193.71
F003F	0.61	2.55	195,661.01
F001E	0.58	2.41	185,045.09
D006A	0.47	1.95	149,673.28
F003H	0.43	1.78	136,943.94
D028A	0.39	1.63	125,088.76
D022A	0.39	1.61	123,747.58
F005H	0.35	1.45	111,798.36
D002F	0.34	1.41	107,980.00
F003D	0.28	1.17	90,242.00
F005C	0.25	1.06	81,289.17
D029A	0.25	1.05	80,698.59
D007A	0.25	1.04	80,099.41
D011A	0.24	1.01	77,855.61
F003A	0.23	0.97	74,368.48
D005A	0.23	0.96	73,440.35
D002A	0.17	0.72	55,423.40
P015	0.17	0.72	55,423.40
D001G	0.14	0.58	44,753.64
Others	0.25	1.05	80,893.99
Total RCRA	24.09	100.00	7,684,988.95
TSCA			
Asbestos	1.90		605,633.20
PCBs	1.83		585,348.50
Total TSCA	3.73		1,190,981.70

a. Percent values are based on estimated maximum concentrations of contaminants within each content code and a total estimated inventory mass of 3.19E+07 kg which corresponds to 65,000-m³. EDF PSPI-015546-13, 12/15/95.

b. Contaminants >0.1% of total inventory, see table 5-3 for code identification.

Distribution of hazardous contaminants

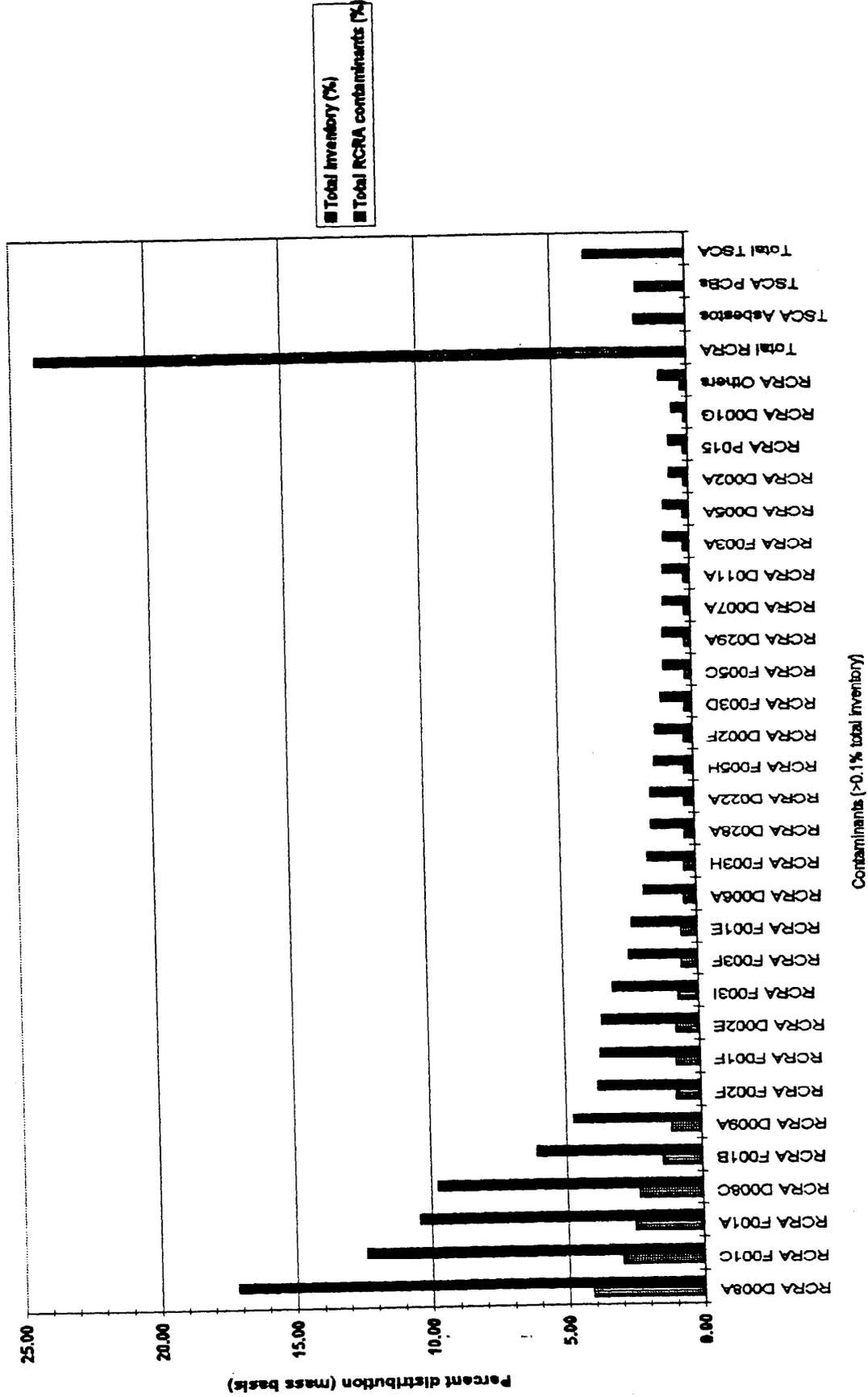


Figure 5-1. Distribution of hazardous contaminants.

Table 5-3. Hazardous contaminants summary for TSA stored waste.^a

Ucode identifier	Epacode	RCRA category	Subcategory	Estimated mass ^b (kg)
D001B	D001	Ignitable	High-TOC ignitable characteristic liquids subcategory based on 261.21(a)(1)-greater than or equal to 10% TOC)	1,040.0
D001G	D001	Ignitable	Ignitable characteristic wastes, that are managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	44,753.6
D001H	D001	Ignitable	Ignitable characteristic wastes that are managed in CWA, CWA equivalent, or Class I SDWA systems	0.0
D002A	D002	Corrosive	Acid	55,423.4
D002E	D002	Corrosive	Corrosive characteristic waste that are managed in non-CWA/non-CWA equivalent/non-Class I SDWA systems	277,672.7
D002F	D002	Corrosive	Corrosive characteristic wastes that are managed in CWA, CWA equivalent, or Class I SDWA system	107,980.0
D003F	D003	Reactive	Water reactives based on 261.23(a)(2),(3), and (4)	1,225.9
D004A	D004	Arsenic	.	8,543.5
D005A	D005	Barium	.	73,440.4
D006A	D006	Cadmium	.	149,673.3
D007A	D007	Chromium	Chromium (Total)	80,099.4
D008A	D008	Lead	.	1,317,638.7
D008C	D008	Lead	Radioactive lead solids	750,316.3
D009A	D009	Mercury	Elemental mercury contaminated with radioactive materials	362,866.8
D009D	D009	Mercury	Low mercury <260 mg/kg total mercury	19,299.6
D009G	D009	Mercury	High-mercury inorganic subcategory (>=260 mg/kg total) inorganic, including incinerator and RMERC residues.	33.3
D010A	D010	Selenium	.	16,929.6
D011A	D011	Silver	.	77,855.6
D018A	D018	Benzene	Benzene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D019A	D019	Carbon tetrachloride	Carbon Tetrachloride managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D021A	D021	Chlorobenzene	Chlorobenzene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D022A	D022	Chloroform	Chloroform managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	123,747.6
D026A	D026	Cresol	Cresols (Total) managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D027A	D027	p-Dichlorobenzene (1,4-Dichlorobenzene)	p-Dichlorobenzene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	71.2
D028A	D028	1,2-Dichloroethane	1,2-Dichloroethane managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	125,088.8
D029A	D029	1,1-Dichloroethylene	1,1-Dichloroethylene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	80,698.6
D031A	D031	Heptachlor	Heptachlor managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	0.0
D032A	D032	Hexachlorobenzene	Hexachlorobenzene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D034A	D034	Hexachloroethane	Hexachloroethane managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D035A	D035	Methyl ethyl ketone	Methyl ethyl ketone managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D036A	D036	Nitrobenzene	Nitrobenzene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D038A	D038	Pyridine	Pyridine managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	77.1
D039A	D039	Tetrachloroethylene	Tetrachloroethylene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	148.3
D040A	D040	Trichloroethylene	Trichloroethylene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.	148.3
F001A	F001	Spent halogenated solvents used in degreasing	1,1,1-Trichloroethane	802,756.5
F001B	F001	Spent halogenated solvents used in degreasing	1,1,2-Trichloro-1,2,2-trifluoroethane	469,144.4
F001C	F001	Spent halogenated solvents used in degreasing	Carbon tetrachloride	954,019.3

Table 5-3. (continued).

Ucode identifier	Epacode	RCRA category	Subcategory	Estimated mass ^b (kg)
F001D	F001	Spent halogenated solvents used in degreasing	Methylene chloride	148.3
F001E	F001	Spent halogenated solvents used in degreasing	Tetrachloroethylene	185,045.1
F001F	F001	Spent halogenated solvents used in degreasing	Trichloroethylene	282,833.0
F002A	F002	Spent halogenated solvents	o-Dichlorobenzene	77.1
F002B	F002	Spent halogenated solvents	1,1,1-Trichloroethane	77.1
F002D	F002	Spent halogenated solvents	1,1,2-Trichloroethane	77.1
F002E	F002	Spent halogenated solvents	Chlorobenzene	77.1
F002F	F002	Spent halogenated solvents	Methylene chloride	293,121.7
F002H	F002	Spent halogenated solvents	Tetrachloroethylene	148.3
F002I	F002	Spent halogenated solvents	Trichloroethylene	789.1
F003A	F003	Spent non-halogenated solvents	Acetone	74,368.5
F003D	F003	Spent non-halogenated solvents	Ethyl benzene	90,242.0
F003E	F003	Spent non-halogenated solvents	Ethyl ether	3,214.6
F003F	F003	Spent non-halogenated solvents	Methanol	195,661.0
F003H	F003	Spent non-halogenated solvents	n-Butyl alcohol	136,943.9
F003I	F003	Spent non-halogenated solvents	Xylenes - mixed isomers	244,193.7
F004B	F004	Spent non-halogenated solvents	Nitrobenzene	20,910.9
F005B	F005	Spent non-halogenated solvents	2-Nitropropane	77.1
F005C	F005	Spent non-halogenated solvents	Benzene	81,289.2
F005D	F005	Spent non-halogenated solvents	Carbon disulfide	77.1
F005E	F005	Spent non-halogenated solvents	Isobutyl alcohol	77.1
F005F	F005	Spent non-halogenated solvents	Methyl ethyl ketone	148.3
F005G	F005	Spent non-halogenated solvents	Pyridine	77.1
F005H	F005	Spent non-halogenated solvents	Toluene	111,798.4
P005	P005	Allyl alcohol	.	77.1
P012	P012	Arsenic trioxide	.	77.1
P015	P015	Beryllium powder	.	55,423.4
P022	P022	Carbon disulfide	.	77.1
P024	P024	p-Chloroaniline	.	77.1
P027	P027	3-Chloropropionitrile	.	77.1
P028	P028	Benzyl chloride	.	77.1
P030A	P030	Cyanides (Soluble salts and complexes)	Cyanides (Total)	77.1
P031	P031	Cyanogen	.	77.1
P056	P056	Fluorine	Fluoride (measured in wastewaters only)	77.1
P073	P073	Nickel carbonyl	Nickel	77.1
P075	P075	Nicotine and Salts	.	77.1
P077	P077	p-Nitroaniline	p-Nitroaniline	77.1
P098A	P098	Potassium cyanide	Cyanide (Total)	77.1
P104A	P104	Silver cyanide	Cyanide (Total)	77.1
P105	P105	Sodium azide	.	77.1
P106A	P106	Sodium cyanide	Cyanide (Total)	77.1

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Table 5-3. (continued).

Ucode identifier	Epacode	RCRA category	Subcategory	Estimated mass ^b (kg)
P113	P113	Thallic oxide	Thallium (measured in wastewaters only)	77.1
P116	P116	Thiosemicarbazide	.	77.1
P119	P119	Ammonium vanadate	Vanadium (measured in wastewaters only)	77.1
P120	P120	Vanadium pentoxide	Vanadium (measured in wastewaters only)	77.1
U003	U003	Acetonitrile	.	77.1
U004	U004	Acetophenone	Acetophenone	77.1
U007	U007	Acrylamide	.	77.1
U009	U009	Acrylonitrile	Acrylonitrile	77.1
U012	U012	Aniline	.	77.1
U014	U014	Auramine	.	77.1
U019	U019	Benzene	.	77.1
U020	U020	Benzenesulfonyl chloride	.	77.1
U032	U032	Calcium chromate	Chromium (total)	77.1
U037	U037	Chlorobenzene	Chlorobenzene	77.1
U044	U044	Chloroform	.	77.1
U048	U048	o-Chlorophenol	2-Chlorophenol	77.1
U052E	U052	Cresols (cresylic acid)	Cresols-mixed isomers (sum of o-, m-, and p-cresol concentrations)	77.1
U069	U069	Dibutyl phthalate	Di-n-butyl phthalate	77.1
U079	U079	1,2-Dichloroethylene	trans-1,2-Dichloroethylene	77.1
U080	U080	Methylene chloride	.	77.1
U081	U081	2,4-Dichlorophenol	2,4-Dichlorophenol	77.1
U083	U083	1,2-Dichloropropane	1,2-Dichloropropane	77.1
U084A	U084	cis-1,3-Dichloropropene	cis-1,3-Dichloropropene	77.1
U084B	U084	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	77.1
U102	U102	Dimethyl phthalate	Dimethyl phthalate	77.1
U103	U103	Dimethyl sulfate	.	77.1
U108	U108	1,4-Dioxane	.	77.1
U116	U116	Ethylene thiourea	.	77.1
U118	U118	Ethyl methacrylate	Ethyl methacrylate	77.1
U120	U120	Fluoranthene	Fluoranthene	77.1
U122	U122	Formaldehyde	.	77.1
U123	U123	Formic acid	.	77.1
U127	U127	Hexachlorobenzene	Hexachlorobenzene	77.1
U128	U128	Hexachlorobutadiene	Hexachlorobutadiene	77.1
U131	U131	Hexachloroethane	Hexachloroethane	77.1
U133	U133	Hydrazine	.	77.1
U134	U134	Hydrogen fluoride	Fluoride (measured in wastewaters only)	77.1
U135	U135	Hydrogen sulfide	.	77.1
U138	U138	Iodomethane	.	77.1
U140	U140	Isobutyl alcohol	.	77.1
U144	U144	Lead acetate	Lead	77.1

Table 5-3. (continued).

Ucode identifier	Epacode	RCRA category	Subcategory	Estimated mass ^b (kg)
U145	U145	Lead phosphate	Lead	77.1
U147	U147	Maleic anhydride	.	77.1
U151D	U151	Mercury nonwastewaters- low mercury (<260 mg/kg total mercury) and that are not residues from RMERC.	.	77.1
U159	U159	Methyl ethyl ketone	.	77.1
U162	U162	Methyl methacrylate	Methyl methacrylate	77.1
U165	U165	Naphthalene	Naphthalene	77.1
U169	U169	Nitrobenzene	Nitrobenzene	77.1
U170	U170	p-Nitrophenol	4-Nitrophenol	77.1
U171	U171	Nitropropane, 2-	.	77.1
U182	U182	Paraldehyde	.	77.1
U188	U188	Phenol	.	77.1
U190	U190	Phthalic anhydride	Phthalic anhydride (measured as phthalic acid or phthalic anhydride)	77.1
U191	U191	2-Picoline	.	77.1
U196	U196	Pyridine	.	77.1
U201	U201	Resorcinol	Resorcinol	77.1
U204	U204	Selenium dioxide	Selenium	77.1
U207	U207	1,2,4,5-Tetrachlorobenzene	1,2,4,5-Tetrachlorobenzene	77.1
U208	U208	1,1,1,2-Tetrachloroethane	1,1,1,2-Tetrachloroethane	77.1
U210	U210	Tetrachloroethylene	.	77.1
U211	U211	Carbon tetrachloride	.	77.1
U215	U215	Thallium (I) carbonate	Thallium (measured in wastewaters only)	77.1
U217	U217	Thallium (I) nitrate	Thallium (measured in wastewaters only)	77.1
U218	U218	Thioacetamide	.	77.1
U219	U219	Thiourea	.	77.1
U220	U220	Toluene	.	77.1
U225	U225	Bromoform	Tribromomethane (Bromoform)	77.1
U226	U226	1,1,1-Trichloroethane	.	77.1
U227	U227	1,1,2-Trichloroethane	.	77.1
U228	U228	Trichloroethylene	.	77.1
U239	U239	Xylenes	Xylenes - mixed isomers (sum of o-, m- and p-xylene concentrations)	77.1
U328	U328	o-Toluidine	.	77.1
UNKDF		Unknown, waste may contain Dxxx and Fxxx constituents	.	1.0
UNKWN		Unknown	.	0.0
			Subtotal	7,684,989.0
TSCAA	TSCA	Asbestos		605,633.2
TSCAB	TSCA	PCBs ^c		585,348.5
			Subtotal	981.7

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Table 5-3. (continued).

Ucode identifier	Epacode	RCRA category	Subcategory	Estimated mass ^b (kg)
a. Estimated RCRA and TSCA contaminants summary representative of waste currently stored at the TSA.				
b. Based on assumed maximum concentrations of contaminants.				
c. An estimated 7,600 drums stored in the TSA are estimated to contain PCBs. These drums are estimated to be within code 000 (Unknown) or code 003 (Organic Setups) waste streams. For the purposes of treatment services RFP responses, PCB concentration within these 7,600 drums is considered to be > 500 ppm.				

6. INEL WASTE PROFILE SHEET FORMAT

The format and description of the contents of the detailed waste information provided in Appendices A and B for mixed and non-mixed ALLW and TRUW are provided below. Appendix A provides detailed information on the ALLW and Appendix B provides information on the TRUW. The appendices provide a series of detail tables based on similar subject matter (e.g., description, storage, matrix information, etc.), with the format of each table being similar in each appendix.

6.1 Identification and Description

Table 1 provides general identification and description information for each wastestream. The following fields appear in this table:

<i>Waste category</i>	A value of 2 denotes ALLW, a value of 3 denotes TRUW.
<i>Mixed waste</i>	A value of 1 denotes mixed waste, a value of 2 denotes non-mixed waste.
<i>Key code</i>	A unique number code assigned to each waste stream for tracking purposes.
<i>Waste stream identifier code</i>	An INEL text/number code which identifies each waste stream.
<i>Content code</i>	A number or text code for each waste stream which can be related to past identification practices.
<i>Waste stream name</i>	The waste stream name.
<i>Description</i>	A description of the waste stream. This is usually the waste stream description provided in WMIS.
<i>PCBs</i>	An indication whether PCBs may be present in the waste, a value of 1 denotes PCBs are expected to be in the waste, 2 denotes not expected, 3 denotes unknown.
<i>Asbestos</i>	An indication whether asbestos may be present in the waste, a value of 1 denotes asbestos is expected to be in the waste, 2 denotes not expected, 3 denotes unknown.
<i>Rad level</i>	An indication of the expected radiation level of the container. A value of 1 denotes waste is expected to be contact handled, a value of 2 denotes that some portion or all of the waste stream is expected to contain waste which may be remote handled (greater than 200 mrem/hr at contact).
<i>Generator site</i>	The name of the site that generated the waste.
<i>Combustibility</i>	An indication of the combustibility of the waste. A value of 1 denotes combustibility is estimated at greater than 90% (combustible). A value of 2 denotes combustibility is estimated at

between 10-90% (partially combustible). A value of 3 denotes combustibility is estimated at less than 10% (noncombustible)

The fields waste category, mixed waste, key code, waste stream identifier code, and content code fields are common for each subsequent appendix table.

Table 6-1 presents a summary listing of waste stream identifier codes and waste stream names.

Table 6-1. Summary of waste identifier code and name.*

Key	Waste stream ID	Content code	Waste stream name
Alpha Low Level Mixed Waste			
155	ID-AEO-100	100	GENERAL PLANT WASTE
156	ID-AEO-101	101	CUT UP GLOVEBOXES
297	ID-AEO-102	102	ABSORBED LIQUIDS
206	ID-AEO-104	104	ALPHA HOT CELL WASTE
300	ID-ANL-161	161	ANL-W ANALYTICAL CHEMISTRY LAB GLASSWARE
158	ID-BCO-201	201	NONCOMBUSTIBLE SOLIDS
301	ID-BCO-202	202	COMBUSTIBLE SOLIDS
302	ID-BCO-203	203	PAPER, METALS, GLASS
303	ID-BCO-204	204	SOLIDIFIED SOLUTIONS
72	ID-BTO-010	10	COMBUSTIBLES
142	ID-BTO-020	20	NONCOMPRESSIBLE, NONCOMBUSTIBLE
34	ID-BTO-030	30	SOLIDIFIED GRINDING SLUDGE, ETC.
299	ID-CPP-156	156	CHEM CELL RIP-OUT
188	ID-INL-150	150	LABORATORY WASTE
298	ID-INL-155	155	SCRAP
146	ID-MDO-803	803	METAL, EQUIPMENT, PIPES, VALVES, ETC.
160	ID-MDO-824	824	NONCOMBUSTIBLE EQUIPMENT BOXES
77	ID-MDO-826	826	COMBUSTIBLE EQUIPMENT BOXES OR FLOOR SWE
58	ID-MDO-834	834	HIGH-LEVEL ACID
59	ID-MDO-835	835	HIGH-LEVEL CAUSTIC
60	ID-MDO-836	836	HIGH-LEVEL SLUDGE/CEMENT
304	ID-MDO-838	838	<10 nCi/g NONCOMBUSTIBLE
191	ID-MDO-842	842	CONTAMINATED SOIL
305	ID-MDO-847	847	LSA <100 nCi/g COMBUSTIBLE
306	ID-MDO-848	848	LSA <100 nCi/g NONCOMBUSTIBLE
29	ID-OFS-111	111	RESEARCH GENERATED WASTE NONCOMPACTIBLE
157	ID-OFS-121	121	DECONTAMINATION AND DECOMMISSIONING WASTE
293	ID-RFO-000	0	NOT RECORDED - UNKNOWN
28	ID-RFO-001	1	FIRST STAGE SLUDGE
31	ID-RFO-002	2	SECOND STAGE SLUDGE

Table 6-1. (continued).

Key	Waste stream ID	Content code	Waste stream name
235	ID-RFO-003	3	ORGANIC SETUPS, OIL SOLIDS
57	ID-RFO-004	4	SPECIAL SETUPS (CEMENT)
223	ID-RFO-005	5	EVAPORATOR SALTS
35	ID-RFO-007	7	BLDG 374 DRY SLUDGE
192	ID-RFO-090	90	DIRT
55	ID-RFO-112	112	SOLIDIFIED ORGANICS
30	ID-RFO-113	113	SOLID LAB WASTE
56	ID-RFO-114	114	SOLIDIFIED INORGANIC PROCESS SOLUTION
73	ID-RFO-116	116	COMBUSTIBLE WASTE
141	ID-RFO-117	117	METAL WASTE
120	ID-RFO-118	118	GLASS WASTE
102	ID-RFO-119	119	HEPA FILTER WASTE
93	ID-RFO-122	122	INORGANIC SOLID WASTE
129	ID-RFO-123	123	LEADED RUBBER
159	ID-RFO-241	241	AMERICIUM PROCESS RESIDUE
32	ID-RFO-290	290	FILTER SLUDGE
33	ID-RFO-292	292	CEMENTED SLUDGE
171	ID-RFO-300	300	GRAPHITE
172	ID-RFO-301	301	GRAPHITE CORES
51	ID-RFO-302	302	BENELEX AND PLEXIGLASS
143	ID-RFO-320	320	TANTALUM
104	ID-RFO-328	328	FULFLO INCINERATOR FILTERS
74	ID-RFO-330	330	DRY PAPER AND RAGS
105	ID-RFO-335	335	ABSOLUTE 8 X 8 FILTERS
75	ID-RFO-336	336	MOIST PAPER AND RAGS
76	ID-RFO-337	337	PLASTICS, TEFLON, WASH, PVC
106	ID-RFO-338	338	INSULATION AND CHEMICAL WARFARE SERVICE
130	ID-RFO-339	339	LEADED RUBBER GLOVES AND APRONS
107	ID-RFO-360	360	INSULATION
94	ID-RFO-371	371	FIREBRICK
190	ID-RFO-374	374	BLACKTOP, CONCRETE, DIRT AND SAND
95	ID-RFO-375	375	OIL-DRI RESIDUE FROM INCINERATOR
108	ID-RFO-376	376	CEMENTED INSULATION FILTER MEDIA
217	ID-RFO-430	430	UNLEACHED ION COLUMN RESIN
218	ID-RFO-431	431	LEACHED RESIN
219	ID-RFO-432	432	LEACHED AND CEMENTED RESIN
121	ID-RFO-440	440	GLASS

Table 6-1. (continued).

Key	Waste stream ID	Content code	Waste stream name
122	ID-RFO-441	441	UNLEACHED RASHIG RINGS
123	ID-RFO-442	442	LEACHED RASHIG RINGS
131	ID-RFO-463	463	LEADED RUBBER GLOVES AND APRONS
52	ID-RFO-464	464	BENELEX AND PLEXIGLASS
144	ID-RFO-480	480	NONSPECIAL SOURCE METAL
145	ID-RFO-481	481	LEACHED NONSPECIAL SOURCE METAL
109	ID-RFO-490	490	CHEMICAL WARFARE SERVICE FILTERS
78	ID-RFO-900	900	LOW SPECIFIC ACTIVITY PLASTICS, PAPER, ETC.
161	ID-RFO-950	950	LOW SPECIFIC ACTIVITY METAL, GLASS, ETC.
79	ID-RFO-970	970	WOOD
61	ID-RFO-976	976	BLDG 776 PROCESS SLUDGE
62	ID-RFO-978	978	LAUNDRY SLUDGE
193	ID-RFO-990	990	DIRT
294	ID-RFO-9999	9999	PRE-73 DRUMS
240	ID-TAN-162	*	TAN DECON SOLVENT WASTES
241	ID-TAN-163	*	TAN DECON HEAVY METAL SOLIDS AND DEBRIS
774	LB-W012	*	BASIC SOLIDS w/METALS - HIGH ALPHA
Subtotal	84		
Alpha Low Level Non-Mixed Waste			
764	CH-ANL-RDA	*	ANLW ALPHA LOW LEVEL WASTE
207	ID-INL-153N	153	COMBUSTIBLE LAB WASTE
162	ID-MDO-825N	825	NONCOMBUSTIBLE EQUIPMENT DRUMS
36	ID-RFO-095N	95	SLUDGE
173	ID-RFO-115N	115	GRAPHITE WASTE
174	ID-RFO-310N	310	GRAPHITE SCARFINGS
175	ID-RFO-370N	370	CRUCIBLE, LECO
189	ID-RFO-372N	372	GRIT
194	ID-RFO-425N	425	FLUID BED ASH
96	ID-RFO-960N	960	CONCRETE, ASPHALT, ETC.
37	ID-RFO-995N	995	SLUDGE
208	ID-TRA-154N	154	SAMPLE FUEL
Subtotal	12		
Total	96		
Transuranic Mixed Waste			
391	CH-ANL-142T	*	LEAD CONTAMINATED WASTE
9	CH-ANL-180T	*	SODIUM - TRU

Table 6-1. (continued).

Key	Waste stream ID	Content code	Waste stream name
11	CH-ANL-182T	*	SODIUM POTASSIUM -NaK- TRU
15	CH-ANL-218T	*	ELECTROREFINER STRIPPED SALT - Ba AND Cd
17	CH-ANL-241T	*	TRU-CD-HOT CELL WASTE
19	CH-ANL-243T	*	ELEMENT HARDWARE FCF WASTE
21	CH-ANL-245T	*	ELECTROREFINER STRIPPED CADMIUM
22	CH-ANL-246T	*	ELECTROREFINER INSOLUBLES W/ CADMIUM
392	CH-ANL-503T	*	TRU WASTE USED PRE-FILTERS
390	CH-ANL-505T	*	ALHC UPGRADE DECON DEBRIS
163	ID-AEO-100T	100	GENERAL PLANT WASTE
164	ID-AEO-101T	101	CUT UP GLOVEBOXES
307	ID-AEO-102T	102	ABSORBED LIQUIDS
209	ID-AEO-104T	104	ALPHA HOT CELL WASTE
308	ID-AEO-105T	105	EMPTY BOTTLES
309	ID-AEO-106T	106	SPECIAL SOURCE MATERIAL
310	ID-AEO-107T	107	REMOTE-HANDLED WASTE
81	ID-AEO-110T	110	RESEARCH GENERATED WASTE COMPACTIBLE & C
83	ID-AEO-120T	120	DECONTAMINATION AND DECOMMISSIONING WASTE
313	ID-ANL-160T	160	ANL-W HFEF ANALYTICAL CHEMISTRY AND META
314	ID-ANL-162T	162	ANL-W FMF EFL Zr-U FUEL CASTING ALLOYS R
315	ID-ANL-163T	163	ANL-W ACL COLD-LINE ABSORBED LIQUID, MIS
166	ID-BCO-201T	201	NONCOMBUSTIBLE SOLIDS
317	ID-BCO-202T	202	COMBUSTIBLE SOLIDS
318	ID-BCO-203T	203	PAPER, METALS, GLASS
319	ID-BCO-204T	204	SOLIDIFIED SOLUTIONS
80	ID-BTO-010T	10	COMBUSTIBLES
148	ID-BTO-020T	20	NONCOMPRESSIBLE, NONCOMBUSTIBLE
43	ID-BTO-030T	30	SOLIDIFIED GRINDING SLUDGE, ETC.
213	ID-BTO-040T	40	SOLID BINARY SCRAP POWDER, ETC.
210	ID-CPP-151T	151	SOLIDIFIED FUEL SLUDGE
347	ID-CPP-172	*	HEPA FILTERS
204	ID-INL-142T	*	TRANSURANIC CONTAMINATED LEAD DEBRIS
195	ID-INL-150T	150	LABORATORY WASTE
311	ID-INL-155T	155	SCRAP
312	ID-INL-157T	157	MISCELLANEOUS SOURCES
320	ID-MDO-801T	801	RAGS, PAPER, WOOD, ETC.
135	ID-MDO-802T	802	DRY BOX GLOVES AND O-RINGS
152	ID-MDO-803T	803	METAL, EQUIPMENT, PIPES, VALVES, ETC.

Table 6-1. (continued).

Key	Waste stream ID	Content code	Waste stream name
117	ID-MDO-805T	805	ASBESTOS FILTERS
128	ID-MDO-810T	810	GLASS, FLASKS, SAMPLE VIALS, ETC.
45	ID-MDO-811T	811	EVAPORATOR AND DISSOLVER SLUDGE
118	ID-MDO-813T	813	GLASS FILTERS AND FIBERGLASS
179	ID-MDO-814T	814	CONTAMINATED MERCURY OR GRAPHITE CRUCIBL
321	ID-MDO-815T	815	CLASSIFIED PARTS
168	ID-MDO-824T	824	NONCOMBUSTIBLE EQUIPMENT BOXES
88	ID-MDO-826T	826	COMBUSTIBLE EQUIPMENT BOXES OR FLOOR SWE
89	ID-MDO-827T	827	COMBUSTIBLE EQUIPMENT DRUMS
67	ID-MDO-834T	834	HIGH-LEVEL ACID
68	ID-MDO-835T	835	HIGH-LEVEL CAUSTIC
69	ID-MDO-836T	836	HIGH-LEVEL SLUDGE/CEMENT
198	ID-MDO-842T	842	CONTAMINATED SOIL
322	ID-MDO-847T	847	LOW SPECIFIC ACTIVITY (< 100 nCi/g) COMB
323	ID-MDO-848T	848	LOW SPECIFIC ACTIVITY (< 100 nCi/g) NONC
39	ID-OFS-111T	111	RESEARCH GENERATED WASTE NONCOMPACTIBLE
165	ID-OFS-121T	121	DECONTAMINATION AND DECOMMISSIONING WAST
295	ID-RFO-000T	0	NOT RECORDED - UNKNOWN
38	ID-RFO-001T	1	FIRST STAGE SLUDGE
41	ID-RFO-002T	2	SECOND STAGE SLUDGE
236	ID-RFO-003T	3	ORGANIC SETUPS, OIL SOLIDS
65	ID-RFO-004T	4	SPECIAL SETUPS (CEMENT)
227	ID-RFO-005T	5	EVAPORATOR SALTS
44	ID-RFO-007T	7	BLDG 374 DRY SLUDGE
63	ID-RFO-112T	112	SOLIDIFIED ORGANICS
40	ID-RFO-113T	113	SOLID LAB WASTE
64	ID-RFO-114T	114	SOLIDIFIED INORGANIC PROCESS SOLUTION
82	ID-RFO-116T	116	COMBUSTIBLE WASTE
147	ID-RFO-117T	117	METAL WASTE
124	ID-RFO-118T	118	GLASS WASTE
110	ID-RFO-119T	119	HEPA FILTER WASTE
97	ID-RFO-122T	122	INORGANIC SOLID WASTE
132	ID-RFO-123T	123	LEADED RUBBER
167	ID-RFO-241T	241	AMERICIUM PROCESS RESIDUE
42	ID-RFO-292T	292	CEMENTED SLUDGE.
176	ID-RFO-300T	300	GRAPHITE
177	ID-RFO-301T	301	GRAPHITE CORES

Table 6-1. (continued).

Key	Waste stream ID	Content code	Waste stream name
53	ID-RFO-302T	302	BENELEX AND PLEXIGLASS
178	ID-RFO-312T	312	COARSE GRAPHITE
149	ID-RFO-320T	320	TANTALUM
111	ID-RFO-328T	328	FULFLO INCINERATOR FILTERS
84	ID-RFO-330T	330	DRY PAPER AND RAGS
112	ID-RFO-335T	335	ABSOLUTE 8 X 8 FILTERS
85	ID-RFO-336T	336	MOIST PAPER AND RAGS
86	ID-RFO-337T	337	PLASTICS, TEFLON, WASH, PVC
113	ID-RFO-338T	338	INSULATION AND CHEMICAL WARFARE SERVICE
133	ID-RFO-339T	339	LEADED RUBBER GLOVES AND APRONS
114	ID-RFO-360T	360	INSULATION
98	ID-RFO-371T	371	FIREBRICK
197	ID-RFO-374T	374	BLACKTOP, CONCRETE, DIRT, AND SAND
99	ID-RFO-375T	375	OIL-DRI RESIDUE FROM INCINERATOR
115	ID-RFO-376T	376	CEMENTED INSULATION AND FILTER MEDIA
225	ID-RFO-409T	409	MOLTEN SALTS - 30% UNPULVERIZED
226	ID-RFO-414T	414	DIRECT OXIDE REDUCTION SALT
220	ID-RFO-430T	430	UNLEACHED ION COLUMN RESIN
221	ID-RFO-431T	431	LEACHED RESIN
222	ID-RFO-432T	432	LEACHED AND CEMENTED RESIN
125	ID-RFO-440T	440	GLASS
126	ID-RFO-441T	441	UNLEACHED RASHIG RINGS
127	ID-RFO-442T	442	LEACHED RASHIG RINGS
87	ID-RFO-460T	460	WASHABLES, RUBBER, PLASTICS
134	ID-RFO-463T	463	LEADED RUBBER GLOVES AND APRONS
54	ID-RFO-464T	464	BENELEX AND PLEXIGLASS
150	ID-RFO-480T	480	NONSPECIAL SOURCE METAL
151	ID-RFO-481T	481	LEACHED NONSPECIAL SOURCE METAL
116	ID-RFO-490T	490	CHEMICAL WARFARE SERVICE FILTERS
66	ID-RFO-700T	700	ORGANIC AND SLUDGE IMMOBILIZATION SYSTEM
90	ID-RFO-900T	900	LOW SPECIFIC ACTIVITY PLASTICS, PAPER, E
169	ID-RFO-950T	950	LOW SPECIFIC ACTIVITY METAL, GLASS, ETC.
91	ID-RFO-970T	970	WOOD
70	ID-RFO-976T	976	BLDG 776 PROCESS SLUDGE
71	ID-RFO-978T	978	LAUNDRY SLUDGE --
46	ID-RFO-980T	980	EQUIPMENT
296	ID-RFO-9999T	9999	PRE-73 DRUMS

Table 6-1. (continued).

Key	Waste stream ID	Content code	Waste stream name
316	ID-IAN-200T	200	AMERICIUM SOURCES
327	ID-TRA-291T	*	TRU HEAVY METAL SLUDGE
Subtotal	115		
Transuranic Non-Mixed Waste			
763	CH-ANL-538	*	RSWF TRANSURANIC WASTE
786	CH-ANL-539	*	FCF TRU (CH) DISCARDED METAL DEBRIS
787	CH-ANL-540	*	FCF (RH) MISCELLANEOUS TRU WASTE
788	CH-ANL-541	*	FCF TRU (CH) COMBUSTIBLES
789	CH-ANL-542	*	ANL-752 TRU WASTE
790	CH-ANL-543	*	FCF TRU (CH) COMPACTIBLE WASTE
791	CH-ANL-544	*	FCF (RH) TRU GLASS-METAL WASTE
766	CH-ANL-HST	*	ANLW TRANSURANIC HAZARDOUS SCRAP
759	CH-ANL-SCTN	*	ANLW TRANSURANIC SCRAP
214	ID-BTO-012TN	12	MISCELLANEOUS SOURCES
215	ID-BTO-015TN	15	NEUTRON SOURCES
237	ID-BTO-050TN	50	SOLIDIFIED SOLUTIONS
154	ID-BTO-081TN	81	MET SAMPLES FISSILE
216	ID-INL-152TN	152	PU NEUTRON SOURCES
211	ID-INL-153TN	153	COMBUSTIBLE LAB WASTE
92	ID-MDO-804TN	804	PLASTIC, TYGON, MANIPULATOR BOOTS, ETC.
170	ID-MDO-825TN	825	NONCOMBUSTIBLE EQUIPMENT DRUMS
180	ID-RFO-115TN	115	GRAPHITE WASTE
224	ID-RFO-124TN	124	TRU PYROCHEMICAL SALT WASTE
181	ID-RFO-303TN	303	SCARFED GRAPHITE CHUNKS
182	ID-RFO-310TN	310	GRAPHITE SCARFINGS
183	ID-RFO-311TN	311	GRAPHITE HEELS
119	ID-RFO-361TN	361	INSULATION HEELS
184	ID-RFO-370TN	370	LECO CRUCIBLES
196	ID-RFO-372TN	372	GRIT
185	ID-RFO-391TN	391	CRUCIBLES AND SAND
186	ID-RFO-392TN	392	SAND, SLAG AND CRUCIBLES
187	ID-RFO-393TN	393	SAND, SLAG, AND CRUCIBLE HEELS
228	ID-RFO-410TN	410	MOLTEN SALTS - 30% PULVERIZED
229	ID-RFO-411TN	411	ELECTROREFINING SALT
230	ID-RFO-412TN	412	GIBSON SALTS
153	ID-RFO-416TN	416	ZINC MAGNESIUM ALLOY METAL

Table 6-1. (continued).

Key	Waste stream ID	Content code	Waste stream name
199	ID-RFO-420TN	420	VIRGIN INCINERATOR ASH
200	ID-RFO-421TN	421	ASH HEELS
201	ID-RFO-422TN	422	SOOT
202	ID-RFO-425TN	425	FLUID BED ASH
100	ID-RFO-960TN	960	CONCRETE, ASPHALT, ETC.
47	ID-RFO-995TN	995	SLUDGE
212	ID-TRA-154TN	154	SAMPLE FUEL
Subtotal	39		
Total	154		
Grand	250		

a. IMWI Database, September 1995.

6.2 Storage

Table 2 provides storage information for each wastestream. In addition to the above common fields, the following fields appear in this section:

<i>Container Type</i>	Type of container used for waste storage, i.e., drum, box, bin, insert.
<i>Form</i>	The physical form of the waste. A blank or the letter S denotes a solid waste. The letter L denotes a liquid waste.
<i>Number of containers</i>	Number of container within each container type.
<i>Volume (m³)</i>	The estimated volume of the containers in cubic meters based on typical waste volumes for each container.
<i>Mass (kg)</i>	The estimated gross mass (container mass and mass of the waste).

At the INEL, stored TRU and ALLW wastes are tracked by two database systems: the Radioactive Waste Management Information System (RWMIS) and the Transuranic Waste Database (TWDB). RWMIS is thought to accurately represent the total quantity of waste in storage. However, it is missing content codes for many shipments, making it impossible to assign containers to a waste stream represented at the content code level. TWDB provides content code information for all containers identified in the database, but is missing a large percentage (~20%) of the total waste. Various studies have attempted to resolve the discrepancies between these two databases. For this report, the IMWI database, which reflects FFCA reporting information and resolves discrepancies between the RWMIS and TWDB, was used as the basis for

inventory information. This database reports inventory values by typical container type. The following typical container volumes (external) were used in estimates of gross waste volume:

Drum	0.212 m ³
Box	3.17 m ³
Bin	3.50 m ³
Insert	0.212 m ³

The IMWI cites a previous study which used TWDB and RWMIS reports to resolve known discrepancies, and found that the two databases are in good agreement except for the missing volume of waste (~20%) in TWDB.

The difference in waste quantity between RWMIS and the known content code quantities was calculated and assigned to a pseudo content code, 9999. A waste mass was calculated for this code by using the average density of all other content codes and the above calculated volume. This calculation assumes that content code 9999 composition is similar to the other waste with known content codes.

6.3 Waste Matrix Component Data

Table 3 contains estimated bulk waste matrix component information. Fields in addition to the common fields included in this section are:

<i>Matrix code</i>	A matrix code per DOE waste treatability group guidance, DOELLW-217, Rev 0, January 1995.
<i>Component</i>	Waste media or contaminant name.
<i>Concentration low level</i>	Estimated lower concentration level.
<i>Concentration typical</i>	Estimated typical concentration level.
<i>Concentration upper level</i>	Estimated upper concentration level.
<i>Units</i>	Concentration units.

6.4 Radionuclide Contaminant and Alpha Activity Concentration Data

Table 4 provides radionuclide and alpha activity waste characterization data as derived from analysis of the INEL TWDB database. This database reports radionuclide information at the container level with content code information making possible summaries at the waste stream level, however, it reports information for only two primary radionuclides. It should be noted that the radionuclide and activity information provided per waste stream may represent a subset of that waste stream and in total represents a subset of the total estimated activity as highlighted in section 6.2. However, the information does provide useful information primarily for the alpha activity. Reference should be made to Section 4 of this report for additional information on other radionuclides, information sources and activity.

The TRU alpha activity reported consists of alpha-emitting transuranium radionuclides (an alpha-emitting radionuclide having an atomic number greater than 92 and half-life greater than 20 years). All transuranium decay chain progeny classified as TRU are included. All activity calculations are based on a 15-year post purification date, or decay date. Fifteen years is a representative waste age average.

Values of gross mass presented in the tables are based on stored quantities for which radiological data are available. For this reason, these values may not agree with those reported in the storage inventory section. Gross mass refers to container mass plus waste mass. Waste mass refers to the mass of the waste only, and does not include the mass of the container. Both are provided in the event some of the waste may be treatable after container removal.

In addition, it should be noted that Pu-52 and Pu-83 are database nomenclature for weapons-grade plutonium (WG Pu) and heat-source plutonium (HS Pu), respectively. The reader is referred to Section 4 for the nominal isotopic compositions of these mixtures.

Information for each waste stream is divided into two major parts. The first part, Alpha Activity Concentration Profile, uses the transuranic alpha activity concentration intervals identified in Table 6-2. Since transuranic alpha activity concentration is currently the fundamental unit for classifying and managing defense-generated waste forms, these intervals were chosen to provide a more complete representation of the waste within a designated waste stream (content code). It should be noted that due to limitations of the nondestructive assay equipment, alpha activity concentrations below 100 nCi/g are not measured with a high degree of confidence. Therefore, the lowest interval used is

$$0 \leq \text{TRU alpha activity concentration} < 100 \text{ nCi/g.}$$

Because alpha low-level waste is by definition less than 100 nCi/g, all waste described in Appendix A (ALLW) is categorized within Interval 0.

In the second part, Isotopic Composition Profile, radionuclides present in the designated waste stream (content code) are identified. The mass (in grams) of each radionuclide is tabulated. In addition, the associated TRU alpha activity, non-TRU alpha activity, and total alpha activity are provided per gram of gross mass and per gram of waste mass, respectively, for each radionuclide. For explanation of the determination of TRU and non-TRU alpha activity, see Section 4 of this report.

The term "gross mass" is defined as the net container mass plus mass of the waste within the container. In contrast, "waste mass" is defined as the mass of the waste in the container. Waste mass does not include the mass of the container. In cases where liners or other packaging materials have been used, the weight of these materials is considered part of the waste mass. For conversion from gross mass to waste mass, the following empty container weights are commonly used:

Drum (55 gal)	50 lbs (22.7 kg)
Box (4 × 4 × 7 ft)	620 lbs (281.2 kg)
Bin (4.2 × 4.9 × 6 ft)	676 lbs (306.6 kg)

A brief description of each column heading used in Section E is provided below.

Alpha Activity Concentration Profile

Interval Number Transuranic alpha activity concentration interval from Table 6-2.

Table 6-2. TRU alpha activity concentration intervals.^a

Interval number	Interval description	
0		TRU alpha activity conc < 100 nCi/g ^b
1	100 nCi/g	TRU alpha activity conc < 500 nCi/g
2	500 nCi/g	TRU alpha activity conc < 1,000 nCi/g
3	1,000 nCi/g	TRU alpha activity conc < 2,000 nCi/g
4	2,000 nCi/g	TRU alpha activity conc < 3,000 nCi/g
5	3,000 nCi/g	TRU alpha activity conc < 4,000 nCi/g
6	4,000 nCi/g	TRU alpha activity conc < 5,000 nCi/g
7	5,000 nCi/g	TRU alpha activity conc < 6,000 nCi/g
8	6,000 nCi/g	TRU alpha activity conc < 7,000 nCi/g
9	7,000 nCi/g	TRU alpha activity conc < 8,000 nCi/g
10	8,000 nCi/g	TRU alpha activity conc < 9,000 nCi/g
11	9,000 nCi/g	TRU alpha activity conc < 10,000 nCi/g
12	10,000 nCi/g	TRU alpha activity conc < 20,000 nCi/g
13	20,000 nCi/g	TRU alpha activity conc < 30,000 nCi/g
14	30,000 nCi/g	TRU alpha activity conc < 40,000 nCi/g
15	40,000 nCi/g	TRU alpha activity conc < 50,000 nCi/g
16	50,000 nCi/g	TRU alpha activity conc < 60,000 nCi/g
17	60,000 nCi/g	TRU alpha activity conc < 70,000 nCi/g
18	70,000 nCi/g	TRU alpha activity conc < 80,000 nCi/g
19	80,000 nCi/g	TRU alpha activity conc < 90,000 nCi/g
20	90,000 nCi/g	TRU alpha activity conc < 100,000 nCi/g
21	100,000 nCi/g	TRU alpha activity conc < 200,000 nCi/g
22	200,000 nCi/g	TRU alpha activity conc < 300,000 nCi/g
23	300,000 nCi/g	TRU alpha activity conc < 400,000 nCi/g
24	400,000 nCi/g	TRU alpha activity conc < 500,000 nCi/g
25	500,000 nCi/g	TRU alpha activity conc < 600,000 nCi/g
26	600,000 nCi/g	TRU alpha activity conc < 700,000 nCi/g
27	700,000 nCi/g	TRU alpha activity conc < 800,000 nCi/g
28	800,000 nCi/g	TRU alpha activity conc < 900,000 nCi/g
29	900,000 nCi/g	TRU alpha activity conc < 1,000,000 nCi/g
30	1,000,000 nCi/g	TRU alpha activity conc < 2,500,000 nCi/g
31	2,500,000 nCi/g	TRU alpha activity conc < 5,000,000 nCi/g
32	5,000,000 nCi/g	TRU alpha activity conc < 7,500,000 nCi/g
33	7,500,000 nCi/g	TRU alpha activity conc < 10,000,000 nCi/g
34	10,000,000 nCi/g	TRU alpha activity conc

a. EDF RWMC-716, 3/4/94.

b. TRU alpha activity concentration per gross mass (nCi/g).

TRU Alpha Activity Concentration

TRU alpha activity concentration interval description.

Interval Gross Mass (kg)

The total gross mass within the specified interval.

Interval Waste Mass (kg)

The total waste mass within the specified interval.

Isotopic Composition Profile

Major Nuclide/Pu Mix

The major radionuclide(s) or plutonium mixture(s) reported present in the waste are identified. Radionuclides for which data are reported are shown in Section 4, Table 4-5. Pu-52 and Pu-83 are database nomenclature for weapons-grade plutonium (WG Pu) and heat-source plutonium (HS Pu), respectively. The reader is referred to Section 4, Table 4-6 for the nominal isotopic compositions of these mixtures.

Nuclide/Pu Mix Mass (g)

The mass, in grams, of the radionuclide or plutonium mixture present.

Nuclide/Pu Mix Mass per Gross Mass (g/g)

The concentration of the radionuclide or plutonium mixture in the waste (in grams) per gram of gross mass.

TRU Alpha Activity per Gross Mass (nCi/g)

The transuranic alpha activity concentration in the waste in nanocuries per gram of gross mass.

Non-TRU Alpha Activity per Gross Mass (nCi/g)

The nontransuranic alpha activity concentration in the waste in nanocuries per gram of gross mass.

Total Alpha Activity per Gross Mass (nCi/g)

The sum of TRU alpha activity mass plus non-TRU alpha activity per gross mass.

Nuclide/Pu Mix Mass per Waste Mass (g/g)

The concentration of the radionuclide of plutonium mixture in the waste in grams per gram of waste mass.

TRU Alpha Activity per Waste Mass (nCi/g)

The transuranic alpha activity concentration in the waste in nanocuries per gram of waste mass.

Non-TRU Alpha Activity per Waste Mass (nCi/g)

The nontransuranic alpha activity concentration in the waste in nanocuries per gram of waste mass.

Total Alpha Activity per Waste Mass (nCi/g)

Sum of the TRU alpha activity per waste mass and non-TRU alpha activity per waste mass.

6.5 EPA Hazardous Contaminant Data

Table 5 identifies hazardous constituents as defined under the Resource Conservation and Recovery Act (RCRA) reported to be present in the waste. Hazardous waste code number(s), associated hazardous waste descriptions, and baseline contaminant concentrations are reported to assist in treatment facility design. This section only includes mixed wastes.

In addition to the common fields, the following fields appear in this table.

<i>Ucode</i>	An INEL code used to link the EPA code with the RCRA category and subcategory.
<i>EPA Code</i>	The hazardous waste number [as defined in Title 40 of the Code of Federal Regulations Part 268 (40 CFR 268)] for the constituent reported.
<i>Category</i>	Hazardous waste description as defined in 40 CFR 268.
<i>Subcategory</i>	Treatment subcategory as defined in 40 CFR 268.
<i>CAS #</i>	Chemical abstract system number for chemical constituent.
<i>Estimated Concentration (wt%)</i>	Estimated concentration of constituent present in the waste.
<i>Estimated Maximum Concentration (wt%)</i>	Estimated maximum concentration of hazardous constituent present in the waste.

Source information used to identify the presence of contaminants was in accordance with the current INEL FFCA database and supporting documentation used for compliance of the Federal Facilities Compliance Act reporting requirements. Information provided to comply with these reporting requirements contained estimated listings of contaminants present in the waste; however, definitive information on contaminant concentrations present in the waste is not available at this time. Further document review for presence of contaminants resulted in the additional listing of some constituents in a few of the waste streams.

The concentration information presented in this table was derived from engineering review and estimation. Additional compilations and assumptions were made in order to expand and quantify concentration values and present bounding estimates. Confidence in the accuracy of the estimated concentration values is low, however this information is considered the best available at this time.

Estimated maximum concentrations are considered to represent bounding values for listed constituents with a margin of conservatism. The intent of this presentation is to provide a consistent basis for use in preparation and evaluation of proposals for treatment services. Waste stream or content code entries showing no concentration values indicate that no information was available.

7. INFORMATION FOR USE WHEN NO OTHER WASTE DATA OR INFORMATION ARE AVAILABLE

For some content codes, data may be unavailable. The lack of data may be for several reasons, including incomplete historical records, or data needs (i.e., presence of RCRA constituents) identified after waste collection and storage records were completed many years ago.

This section has been prepared to provide the reader with base case waste characterization data for use when no known data for a waste stream are available. These base case data are designed for use in waste treatment studies or other instances where a complete set of waste characterization data for the wastes are required. Use of these base case data will reduce assumptions or other conclusions drawn from an incomplete data set for these waste types.

A set of "design basis" data for the ALLW and TRUW is provided in this report section. This data provides information considered "typical" of the INEL stored mixed and non-mixed alpha low-level waste and mixed and non-mixed transuranic waste. The waste matrix/source characteristics of this base case are specified in a manner that reasonably approximates a significant fraction of the overall inventory population. For such base case data to be reasonable, consideration must be given to nominal matrix compositions, source mass, and source compositions. This has been accounted for in the preparation of this data. The resultant source mass and waste concentration data to be applied to empty record cases is reasonable in terms of the actual characteristics of the INEL stored wastes.

The base case data for the alpha low-level waste^a presented in this report are based on a typical solidified waste form. Values are based on one 55-gallon sludge drum weighing 475 lbs (216 kg) gross mass, 400 lbs (182 kg) waste mass. The source composition of the sludge is comprised of a nominal WG Pu composition at 15 years post purification at a mass per container of 0.2 grams. In addition, the sludge contains a mixture of RCRA hazardous constituents, primarily organic chemicals. Design base case data are presented on pages 7-5 to 7-10.

The design case data for the transuranic waste^b presented in this report are based on a typical drum filled with a heterogenous waste mixture of combustibles and lead. Values are based on one 55-gallon drum weighing 175 lbs (79.4 kg) gross mass, 100 lbs (45.5 kg) waste mass. The source composition is comprised of a nominal WG Pu composition at 15 years post purification at a mass per container of 2.5 grams. In addition, the waste contains lead, which is a RCRA hazardous constituent. Design base case data are presented on page 7-11 to 7-16.

It is suggested that the values in the base cases be used only where no data are available. Examples for use are shown as follows.

a. Design base case data for ALLW from M. L. Apel, G. K. Becker, Z. K. Ragan, J. Frasure, B. D. Raivo, L. G. Gale, and D. P. Pace, *Radiological, Physical and Chemical Characterization of Low-Level Alpha Contaminated Wastes Stored at the Idaho National Engineering Laboratory*, Idaho National Engineering Laboratory, EG&G Idaho, Inc., EGG-RWMC-11189, March 1994.

b. Design base case data for TRUW from M. L. Apel, G. K. Becker, Z. K. Ragan, J. Frasure, B. D. Raivo, L. G. Gale, and D. P. Pace, *Radiological, Physical and Chemical Characterization of Transuranic Wastes Stored at the Idaho National Engineering Laboratory*, Idaho National Engineering Laboratory, EG&G Idaho, Inc., EGG-RWMC-11190, March 1994.

Alpha low-level waste:

Example 1: The INEL waste stream ID-INL-155 does not report hazardous constituent data.

Page 7-7 provides a listing of eight EPA Hazardous Waste Codes and associated data are provided. These data include an estimated concentration (wt%) and assumed maximum concentration (wt%) for each of these constituents.

To complete the waste characterization data for INEL waste stream ID-INL-155, the reader should use the chemical constituents, estimated constituent concentrations, and assumed maximum constituent concentrations provided on page 7-7.

This process is to be implemented for the remaining chemical constituents of interest.

$$\begin{aligned} \text{DES-BASIS-ALLW Methanol Conc} \times \text{Gross Mass ID-INL-155} \\ = \text{Mass Methanol in ID-INL-155} \end{aligned} \quad (7-1)$$

Example 2: The INEL waste stream ID-RFO-328 does not report alpha activity concentration or isotopic composition data.

Pages 7-8 and 7-9 provide activity and composition data. In this profile sheet, one radionuclide mixture (Pu-52, weapons-grade plutonium) is identified. The TRU and non-TRU alpha activity concentration data for this contaminant are also provided using both a gross mass (216 kg) and waste mass (182 kg).

To complete the waste characterization data for INEL waste stream ID-RFO-328, the reader should use the design basis radionuclide mixture, Pu-52. To determine the mass of Pu-52 in ID-RFO-328, the Pu Mix Mass/Gross Mass concentration in ID-RFO-328 must be normalized to the respective Design Basis Case concentration. This normalization and determination of the associated mass of Pu-52 in ID-RFO-328 is done as follows:

$$\text{Design Basis Pu-52 concentration} = \frac{\text{Mass of Pu-52 in DES-BASIS-ALLW}}{\text{Gross Mass in DES-BASIS-ALLW}} \quad (7-2)$$

$$\begin{aligned} \text{Design Basis Pu-52 concentration} \times \text{Gross Mass ID-RFO-328} \\ = \text{Pu-52 mass in ID-RFO-328} \end{aligned} \quad (7-3)$$

In this example,

$$\text{Design Basis Pu-52 concentration} = \frac{0.2 \text{ g Pu-52}}{216,000 \text{ g Gross Mass}} \quad (7-4)$$

$$\text{Design Basis Pu-52 concentration} = 9.27\text{E-}07 \frac{\text{g Pu-52}}{\text{g Gross Mass}} \quad (7-5)$$

$$9.27\text{E-}07 \frac{\text{g Pu-52}}{\text{g Gross Mass}} \times 78,000 \text{ g Gross Mass} = 0.0702 \text{ g Pu-52 in ID-RFO-328} \quad (7-6)$$

Therefore the total alpha activity for ID-RFO-328 would be estimated as 5.74E+06 nanocuries by the following equation.

$$0.072 \text{ g Pu-52} \times 7.977E-02 \frac{\text{Ci}}{\text{g Pu-52}} \times 1.0E+09 \frac{\text{nCi}}{\text{Ci}} = 5.74E+06 \text{ nCi TRU } \alpha \text{ activity} \quad (7-7)$$

To obtain the TRU alpha activity concentration, the TRU alpha activity computed above is divided by the gross mass in ID-RFO-328 as shown below. The conversion factor used to convert Pu-52 mass to TRU alpha activity (in Ci) is found in Table 4-6.

$$\frac{5.74E+06}{78,000} \frac{\text{nCi TRU } \alpha \text{ activity}}{\text{g Gross Mass ID-RFO-328}} = 73.6 \frac{\text{nCi}}{\text{g Gross Mass}} \quad (7-8)$$

The non-TRU alpha activity per gross mass, TRU alpha activity per waste mass, and non-TRU alpha activity per waste mass are determined in a similar manner. Since the gross mass is the same, the total alpha activity per gross mass is determined by summing the TRU alpha activity per gross mass and the non-TRU alpha activity per gross mass. A parallel calculation is performed for the total alpha activity per waste mass.

Example 3: The INEL waste stream ID-RFO-000 does not report Waste Matrix Constituents data.

Page 7-10 provides matrix data. In this profile sheet, an estimated typical matrix composition for a sludge drum is presented.

To complete the waste matrix constituent characterization data in waste stream ID-RFO-000, the reader should use the mass fraction data presented on page 7-10, Section F. For example, to compute the total mass of a given constituent in ID-RFO-000, the reader should multiply the respective Composition (wt%) value by the gross mass in ID-RFO-000. To illustrate:

$$\text{Mass Oil-dri in ID-RFO-000} = \text{Wt\% Oil-dri in DES-BASIS-ALLW} \times \text{Gross Mass in ID-RFO-000} \quad (7-9)$$

$$600 \text{ kg Oil-dri} = 1.0 \text{ Wt\%} \times 60,000 \text{ kg} \quad (7-10)$$

Note: This method will yield a rough estimate acceptable for use when no data are available. For the waste streams that contain composition data, the mass of the container and any liner is *not* included in the wt% breakdown.

Transuranic waste:

Information for the transuranic waste for when no data is identified in the profile sheets is obtained in a similar manner to the above examples, using the page 7-11 to 7-16 information.

A. IDENTIFICATION

INEL ID/Name: DES-BASIS

N/A

C. Code/Name: ALLW

Default Design Basis Information For Alpha Low Level Waste
(Mixed or Non-mixed)

B. DESCRIPTION

INEL ID (WMIS) Description:

N/A

Total Volume (m3): .21

Gross Mass (kg): 215.46

Drum Equivalents: 1.00

Physical Form: SOLID

Physical Type: SLUDGE

PCBs:

Combustibility:

- Combustible (>90%)
- Partially Combustible (10%-90%)
- Noncombustible (<10%)

Waste Type

- ALLW
- ALLMW
- TRUW
- TRUMW

Rad. Level

- Contact-Handled
- Remote-Handled

Content Code Description:

This Waste ID and Content Code represent a design basis set of information for the alpha low level (mixed or non-mixed) waste considered typical and for use when no other information is available.

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INEL Waste Profile Sheet

ALLMW DES-BASIS-ALLW

C. STORAGE

# of Cont.	Container Type	Total Vol. (m3)	Gross Mass (kg)	Waste Description
1	DM	0.21	215.46	
Subtotal	1	0.21	215.46	

Total	1	.21 m3	215.46 kg	
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- 1. Values in this table represent actual quantities in storage.
- 2. Gross mass = Net container mass + mass of waste. Volume is based on container estimated external volumes.

D. Design Basis EPA Contaminant Concentration Data

HAZARDOUS CONSTITUENTS

EPA Haz. Waste Code	Category	Chemical Constituent	Design Basis Information		
			CAS #	Estimated Concentration (wt%)	Assumed Max Concentration (wt%)
D002	CORROSIVE	ACID		0.5	1.0
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING	1,1,1-TRICHLOROETHANE	71-55-8	0.2	1.0
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	0.5	1.0
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING	CARBON TETRACHLORIDE	58-23-5	5.0	10.0
F002	SPENT HALOGENATED SOLVENTS	METHYLENE CHLORIDE	75-9-2	0.1	1.0
F003	SPENT NON-HALOGENATED SOLVENTS	METHANOL	67-56-1	0.003	1.0
F003	SPENT NON-HALOGENATED SOLVENTS	N-BUTYL ALCOHOL	71-36-3	0.001	1.0
F003	SPENT NON-HALOGENATED SOLVENTS	XYLENES (TOTAL)	1330-20-7	0.005	1.0

E. Design Basis Radionuclide and Alpha Concentration Information

ALPHA ACTIVITY CONCENTRATION PROFILE

Interval Number	TRU Alpha Activity Concentration	Interval Gross Mass (kg)	Interval Waste Mass (kg)
0	nCi/g < 100	2.16E+02	1.82E+02
Totals		2.16E+02	1.82E+02

1. The TRU alpha activity concentration reported in this section consists of alpha-emitting transuranium radionuclides (a radionuclide having an atomic number greater than 92 and half-life greater than 20 years). All transuranium decay chain progeny classified as TRU are included. All activity calculations are based on a 15 year post purification date or decay date. Fifteen years is a representative waste age average.

2. Values may not agree with those reported in Section C since values in this table are based on stored waste quantities for which radiological data are available.

3. Pu-52 and Pu-83 are database nomenclature for weapons grade plutonium (WG Pu) and heat source plutonium (HS Pu), respectively. See Section 2 Table 2.2 for the nominal isotopic compositions.

4. Gross Mass=Container net mass+ waste mass. Waste Mass = Mass of Waste only.

E. Design Basis Radionuclide and Alpha Activity Concentration Information, Cont'd.

ISOTOPIC COMPOSITION PROFILE

Major Nuclide / Pu Mix	Nuclide / Pu Mix Mass (g)	Nuclide / Pu Mix Mass per Gross Mass (g/g)	TRU Alpha Activity per Gross Mass (nCi/g)	Non-TRU Alpha Activity per Gross Mass (nCi/g)	Total Alpha Activity per Gross Mass (nCi/g)	Nuclide / Pu Mix Mass per Waste Mass (g/g)	TRU Alpha Activity per Waste Mass (nCi/g)	Non-TRU Alpha Activity per Waste Mass (nCi/g)	Total Alpha Activity per Waste Mass (nCi/g)
PU-52	2.00E-01	9.27E-07	7.40E+01	3.89E-03	7.40E+01	1.10E-06	8.78E+01	4.62E-03	8.79E+01

F. Design Basis Bulk Waste Materials

WASTE MATRIX CONSTITUENTSPHYSICAL/CHEMICAL COMPOSITION

Major Category	Minor Category	Constituent	Composition (wt%)
<u>Non-Combustible</u> (<10% Combustible)	Glass -	Glass Rasching Rings	
		Other Glass	
	Metals -	Carbon Steel	
		Stainless Steel	
		Aluminum (AL)	
		Tantalum 10W	
		Miscellaneous Metal	
		Lead (Bulk Pb)	
		Other HVPM(Zn,Cd)	
	Misc. Non-Combustible -	Ceramic (molds)	
		Firebrick	
		Concrete	
		Portland Cement	
		Dirt/Soil	
		Ash	
		Oil dri	1.0
		Vermiculite	0.3
		Salts	
		Filters/Insulation -	Glass Filter Media
	Asbestos (filter, insulation)		
Filter Dust			
Magnesia (insulations)			
Inorganic Sludge -	Sludge High Na2O (1st Stage)		
	Sludge High CaO (2nd Stage)		
	Aqueous Solutions		
Partially Combustible -	Leaded Rubber		
	Organic Sludge	97.6	
	Uncemented Resin		
	Cemented Resin		
	Asphalt		
	Benelex/lead		
	Sheetrock		
Plastics -	Polyethylene	0.9	
	Polyvinyl Chloride (PVC)	0.2	
Rubber -	Tellon		
	Plexiglass		
Misc. Combustibles -	Rubber		
	Surgeons' Glove		
	Graphite (molds)		
	Paper		
	Wood		
	Cardboard		
	Cloth		
<u>Partial Combustible</u> (10%-90% Combustible)			
<u>Combustibles</u> (>90% Combustible)			

A. IDENTIFICATION

INEL ID/Name: DES-BASIS

N/A

C. Code/Name: TRUW

Default Design Basis Information For Transuranic Waste (Mixed or Non-mixed)

B. DESCRIPTION

INEL ID (WMIS) Description:

N/A

Content Code Description:

This Waste ID and Content Code represent a design basis set of information for the transuranic waste (mixed or non-mixed) considered typical and for use when no other information is available.

Total Volume (m3): .21

Gross Mass (kg): 79.38

Drum Equivalents: 1.00

Physical Form: SOLID

Physical Type: OTHER

PCBs:

Combustibility:

- Combustible (>90%)
- Partially Combustible (10%-90%)
- Noncombustible (<10%)

Waste Type

- ALLW
- ALLMW
- TRUW
- TRUMW

Rad. Level

- Contact-Handled
- Remote-Handled

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INEL Waste Profile Sheet

TRUMW DES-BASIS-TRUW

C. STORAGE

# of Cont.	Container Type	Total Vol. (m3)	Gross Mass (kg)	Waste Description
1	DM	0.21	79.38	
Subtotal 1		0.21	79.38	

Total 1	.21 m3	79.38 kg
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- 1. Values in this table represent actual quantities in storage.
- 2. Gross mass = Net container mass + mass of waste. Volume is based on container estimated external volumes.

D. Design Basis EPA Contaminant Concentration Data

HAZARDOUS CONSTITUENTS

EPA Haz. Waste Code	Category	Chemical Constituent	Design Basis Information		
			CAS #	Estimated Concentration (wt %)	Assumed Max Concentration (wt %)
D008	LEAD		7439-92-1	20.0	30.0

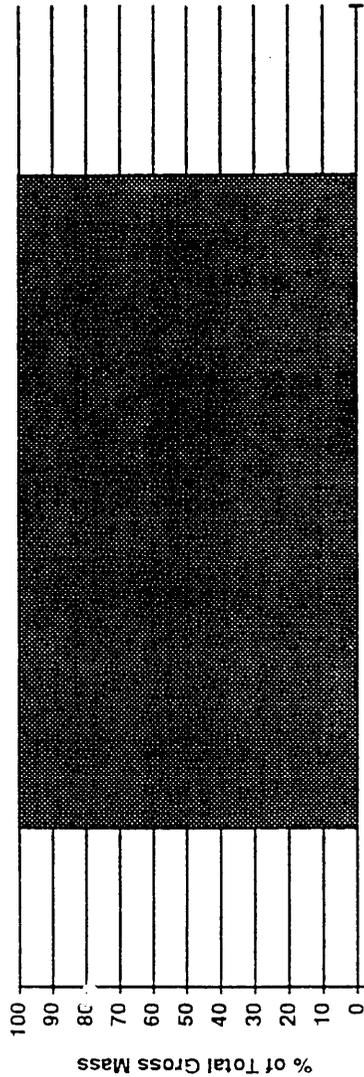
E. Design Basis Radionuclide and Alpha Activity Concentration Information

ALPHA ACTIVITY CONCENTRATION PROFILE

Interval Number	TRU Alpha Activity Concentration	Interval Gross Mass (kg)	Interval Waste Mass (kg)
4	2,000 <= nCi/g < 3,000	7.96E+01	4.55E+01
Totals		7.96E+01	4.55E+01

- The TRU alpha activity concentration reported in this section consists of alpha-emitting transuranium radionuclides (a radionuclide having an atomic number greater than 92 and half-life greater than 20 years). All transuranium decay chain progeny classified as TRU are included. All activity calculations are based on a 15 year post purification date or decay date. Fifteen years is a representative waste age average.
- Values may not agree with those reported in Section C since values in this table are based on stored waste quantities for which radiological data are available.
- Pu-52 and Pu-83 are database nomenclature for weapons grade plutonium (WG Pu) and heat source plutonium (HS Pu), respectively. See Section 2 Table 2.2 for the normal isotopic compositions.
- Gross Mass=Container net mass+waste mass. Waste Mass = Mass of Waste only.

Alpha Activity Distribution



E. Design Basis Radionuclide and Alpha Activity Concentration Information, Cont'd.

ISOTOPIC COMPOSITION PROFILE

Major Nuclide / Pu Mix	Nuclide / Pu Mix Mass (g)	Nuclide / Pu Mix Mass per Gross Mass (g/g)	TRU Alpha Activity per Gross Mass (nCi/g)	Non-TRU Alpha Activity per Gross Mass (nCi/g)	Total Alpha Activity per Gross Mass (nCi/g)	Nuclide / Pu Mix Mass per Waste Mass (g/g)	TRU Alpha Activity per Waste Mass (nCi/g)	Non-TRU Alpha Activity per Waste Mass (nCi/g)	Total Alpha Activity per Waste Mass (nCi/g)
PU-52	2.50E+00	3.14E-05	2.51E+03	1.32E-01	2.51E+03	5.50E-05	4.39E+03	2.31E-01	4.39E+03

