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**Mixed Waste Focus Area
Technical Baseline Report
Volume 2**

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Mixed Waste Focus Area Technical Baseline Report

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MIXED WASTE FOCUS AREA WASTE DATA INFORMATION

 

Mixed Waste Focus Area Waste Data Information

Summary

As part of its overall program, the MWFA uses a national mixed waste data set to develop approaches for treating mixed waste that cannot be treated using existing capabilities at DOE or commercial facilities. The current data set was originally compiled under the auspices of the 1995 Mixed Waste Inventory Report. The data set has been updated over the past two years based on Site Treatment Plan revisions and clarifications provided by individual sites. The current data set is maintained by the MWFA staff and is known as MWFA97.

In 1996, the MWFA developed waste groupings, process flow diagrams, and treatment train diagrams to systematically model the treatment of all mixed waste in the DOE complex. The purpose of the modeling process was to identify treatment gaps and corresponding technology development needs for the DOE complex. Each diagram provides the general steps needed to treat a specific type of waste. The MWFA categorized each MWFA97 waste stream by waste group, treatment train, and process flow. Appendices B through F provide the complete listing of waste streams by waste group, treatment train, and process flow. The MWFA97 waste stream information provided in the appendices is defined in Table A-1.

Table A-1. 1997 MWFA Data Set

Data Field Name	Description
Waste Stream ID	MWFA97 waste stream tracking number used by the sites in their Site Treatment Plans. The first two characters identifies the current location of the waste.
MPC Code	Matrix Parameter Code (MPC) describes the physical characteristics of a waste stream. Detailed definitions for each code can be found in the DOE Waste Treatability Group Guidance, DOE/LLW-217, January 1995.
CPC Code	Contaminant Parameter Code (CPC) describes the regulatory classification of the waste stream. The CPC is based on the EPA codes and associated regulated contaminants existing in the waste stream. Detailed definitions for each code can be found in the DOE Waste Treatability Group Guidance, DOE/LLW-217, January 1995. Streams that do not have a CPC code were added after the 1995 MWIR.
LLW (m ³)	Identifies the waste stream inventory for this handling category. The LLW handling category includes waste that has less than 10 nCi/g of alpha contamination and is contact-handled. LLW was assigned to waste streams that are contact handled, and have N12, N20, T12, or T20 within the RPC code. LLW was also assigned to waste streams that are contact handled; have N19, N90, T19, or T90 within the RPC code; and are targeted to non-alpha treatment facilities.

Data Field Name	Description
Alpha (m ³)	Identifies the waste stream inventory for this handling category. The Alpha handling category identifies waste that has greater than 10 nCi/g of alpha contamination and is contact-handled. Alpha was assigned to waste streams that are contact handled, and have N11 or T11 within the RPC code. Alpha was also assigned to waste streams that are contact handled; have N19, N90, T19, or T90 within the RPC code; and are targeted to alpha treatment facilities.
RH (m ³)	Identifies the waste stream inventory for this handling category. The RH handling category identifies remote-handled waste with any level of alpha contamination.
Targeted TRT	The facility identified as the best current option for treating the waste per the site's STP. The facility can be existing or planned.
Cat (A, B, C, D, E)	This classification system was developed by the MWFA to categorize each targeted treatment facility with respect to the waste stream. Category A indicates the stream will be treated on-site in an existing facility. Category B indicates the stream will be treated off-site in an existing facility. Category C indicates the stream will be treated in a planned facility. Category D indicates the stream will be treated on-site at a commercial at a DOE installation under a private contract. Category E indicates that the stream will be treated off-site at a commercial facility at a DOE installation under a private contract.

Waste streams listed in the table without an inventory in a handling category are projected stream. The site is anticipating inventory generation within the next five years.

Data Sources

Background. The MWFA97 data set has its origins in the requirements of the Federal Facility Compliance Act of 1992 (FFCA). The FFCA required DOE to provide EPA, Congress, and the governors' offices of all states hosting DOE facilities a comprehensive national inventory of mixed waste streams, treatment facilities, and technology development activities. The Mixed Waste Inventory Report (MWIR) was completed in April 1993 and provided the baseline for developing a set of Site Treatment Plans (STPs). The STPs were developed by the sites over a two and one half year time period and established the site specific and national plan for treating all mixed waste in the DOE complex. In support of the STP development process, DOE updated the MWIR data set in 1994 and again in 1995. The 1995 MWIR was the last comprehensive effort to update detailed mixed waste inventory information on a national scale. By October 1, 1995, virtually every DOE site had established an agreement with their host site to implement their proposed STPs (also known as final STPs) in compliance with the FFCA. For sites who did not have an agreement in place, they were generally either operating in good faith with their host state until the agreement could be finalized, had an existing agreement in place that met the provisions of the FFCA, or had shipped all of its mixed waste off-site so the provisions of the FFCA were no longer applicable. Since the proposed STPs became the legally binding agreement between the sites and the states, the STPs also became the best source for official mixed waste stream and treatment facility information.

1995 MWIR Data. The 1995 MWIR data set contained the best available national information regarding mixed waste streams and treatment facilities. The sites provided the information to DOE-HQ throughout the spring and summer of 1995. The data set included detailed information for all waste streams in storage or anticipated to be generated before the year 2001. The data set also included detailed treatment system information for all existing and planned facilities that were considered viable circa 1995. The 1995 MWIR data was collected by the Radioactive Waste Technical Support Program (TSP), Lockheed Idaho Technology Company, in Idaho Falls, ID, in support of the DOE-HQ, EM-30. The 1995 MWIR waste stream data included fields for waste stream name, site contacts, historical stream tracking, generation source, narrative stream description, radiological characteristics, radionuclide listing, matrix parameter code and breakdown, regulatory characteristics, EPA codes, contaminant name and concentration, inventory quantity and date, annual generation estimates, and management activities. MWIR treatment data include a narrative description of the treatment system, treatment technologies, acceptable EPA codes, and regulated contaminants, isotopes, and matrix codes. The sites provided as much information as possible for the given time and budget constraints.

PSTP Data. The Proposed Site Treatment Plan (PSTP) data set was a compilation of information collected from the STPs and additional miscellaneous information collected from the sites. The PSTP data set only included information need by DOE-HQ to conduct complex-wide analysis and did not include all information found in the STPs. The PSTP data set was placed in a database at DOE-HQ and was updated throughout the STP development process. The last set of STPs were the Proposed Site Treatment Plans (PSTPs) and were the basis for compliance agreements between the individual DOE sites and host states. As the PSTPs were being finalized, the waste stream and treatment information from the data set was used by the Options Analysis Team (OAT) in making recommendations on complex-wide treatment configuration options. The PSTP data set was collected by MACTEC in Germantown, MD, in support of DOE-HQ, EM-30

The MWFA last used waste stream information from the PSTP data set to update the 1995 MWIR data set in January 1996. The updated data set became the MWFA96 and was the basis for developing the 1996 MWFA Technical Baseline. Updated data fields used in the development of the Technical Baseline included waste stream name, inventory, matrix parameter code (MPC), waste type, handling, alpha contamination, PCB presence and levels, and 5-year projects and treatment options. Updated treatment facility data fields used in the Technical Baseline development included system name, status, ability to treat alpha-contaminated waste, permit status, ability to treat high-level waste (HLW), and maximum design/operating capacity.

The PSTP data set had several fields in common with the 1995 MWIR data set and those fields were updated as the information was received by the MWFA. However, the MWIR 1995 data set included several data fields with detailed information that was not collected for the PSTP data set. The result was that while the large majority of waste streams had the most critical information updated (i.e. inventory, projections, MPC), the remaining information was not updated and any new streams added to the 1995 MWIR data set would not include that additional detailed information originally collected for all streams.

Site Treatment Plan Update Data. The MWFA began receiving STP updates from individual sites during the summer of 1996. The MWFA updated the MWFA97 waste streams to reflect changes that have occurred in the STPs. Most sites provide their states with updated

STPs every six months and almost all sites provide an annual update. Typical updates include changes in inventory due to generation and/or treatment and those changes are easily accommodated in MWFA97. The most difficult situation occurs when sites add a new stream. The MWFA adds the stream and as much information as available in the STP, but the STP level of information rarely goes to the level needed to populate all fields in MWFA97. The result is MWFA97 has some "data holes" from newly added streams that compromise the data. The best example is the lack of CPC codes for some streams in the listing provided in Appendices B through F. Another example is the lack of generation projections. Since each site provides STP updates to their host state on a different schedule, the currency of the data varies from site to site. Table A-2 provides the date and source of latest change for each site. Table A-4 lists the DOE sites and their two letter code identifiers.

Table A-2 MWFA97 Update Sources

Site	Source	Source Date
AE	Information update provided by DOE-CH	11/14/96
BC	Information update provided by site	11/12/96
BN	Information update provided by DOE-CH	12/2/96
BT	STP - Annual Update	4/30/96
CI	Information update provided by site	11/12/96
DP	Commissioner's Order ORO-2046	10/1/96
GA	STP Annual Report	10/30/96
KA	STP KAPL	8/12/96
KK	STP KAPL-Kesselring	8/12/96
KW	STP KAPL-Windsor	4/30/96
LA	LANL Annual STP Update	3/31/96
LB	STP Annual Report	10/30/96
LL	STP Annual Report	10/30/96
MU	STP Annual Report	10/30/96
NN	NN Site Treatment Plan Annual Update	4/30/96
NT	STP	3/1/96
OR	Commissioner's Order ORO-2046	10/1/96
PA	Site Treatment Plan Annual Update	3/1/96
PH	PH STP Annual Update	4/30/96
PN	PN STP	4/30/96
PO	Amended Site Treatment Plan	3/22/96
PS	PS STP	4/30/96
PX	Mixed Waste Inventory Table from STP provided by site.	11/19/96
RF	Annual Progress Report & Work Plan	3/15/96
RL	November 1996 STP Data Set provided by site	10/11/96
SR	Approved Site Treatment Plan	4/15/96
WS	1996 Annual update to STP	10/1/96
WV	STP for WVDP	9/1/96
YP	Commissioner's Order ORO-2046	10/1/96

Data Modification Based Upon the Idaho Spent Nuclear Fuel Agreement

The September 1, 1996, version of the INEEL STP indicates some of the MTRU waste may be shipped to Waste Isolation Pilot Plant (WIPP) prior to operation of the Advanced Mixed Waste Treatment Project (AMWTP). On October 16, 1995, the state of Idaho, the Department of the Navy, and the DOE established the Spent Nuclear Fuel Agreement (SNFA) that committed the INEEL to ship 65,000 cubic meters of transuranic waste to the WIPP by a target date of December 31, 2015, and in no event later than December 31, 2018. The agreement also states that by December 31, 2002, no fewer than 3,100 cubic meters (15,000 drum-equivalents) of transuranic waste shall have been shipped out of the State of Idaho.

The INEEL TRU Programs has identified portions of several MTRU streams for direct shipment to WIPP. Despite the inconsistency with the STP, it was felt that the MWFA should represent those portions as directly shipped to WIPP. Table A-3 provides the waste stream identification

number, waste stream title, and the portion of the stream designated to be shipped directly to WIPP without treatment at AMWTP

Table A-3 Distribution of INEEL Waste Streams per the SNFA

WS ID#	Waste Stream Title	STP Inventory (m ³)	SNFA Distribution	
			Inventory Assigned to AMWTF (m ³)	Inventory Assigned to WIPP (m ³)
IN-A157A	SPECIAL SETUPS (CEMENT)	226.83	173.58	53.25
IN-A161A	FIREBRICK	111.38	94.95	16.43
IN-A164A	ORGANIC AND SLUDGE IMMOBILIZATION SYSTEM	1.91	1.28	0.63
IN-A166A	SOLIDIFIED PROCESS SOLIDS	70.81	15.69	55.12
IN-A167A	SOLIDIFIED ORGANICS	164.09	46.15	117.94
IN-A169A	DRY PAPER AND RAGS	5,722.09	5,703.79	18.30
IN-A186A	COMBUSTIBLE WASTE	2,696.61	2,695.98	0.63
IN-A191A	SECOND STAGE SLUDGE	335.53	320.56	14.97
IN-A197A	MOIST PAPER AND RAGS	721.91	701.94	19.97
IN-A198A	PLASTICS, TEFLON, WASH, PVC	169.20	132.39	36.81
IN-A205A	LOW SPECIFIC ACTIVITY PLASTICS, PAPER	0.85	0.43	0.42
IN-A206A	HEPA FILTER WASTE	383.29	347.73	35.56
IN-A208A	ABSOLUTE 8 X 8 FILTERS	24.93	22.43	2.50
IN-A209A	INSULATION AND CHEMICAL WARFARE SERVICE	60.16	56.83	3.33
IN-A211A	CEMENTED INSULATION AND FILTER MEDIA	460.20	248.87	211.33
IN-A212A	CHEMICAL WARFARE SERVICE FILTERS	2,512.38	2,509.05	3.33
IN-A216A	FIRST STAGE SLUDGE	2,491.59	1,740.50	751.09
IN-A218A	BLDG 374 DRY SLUDGE	461.52	7.88	453.64
IN-A221A	SOLID LAB WASTE	14.42	1.73	12.69
IN-A222A	CEMENTED SLUDGE	110.45	69.06	41.39
IN-A230A	INORGANIC SOLID WASTE	18.23	8.46	9.77
IN-A240A	GLASS WASTE	174.61	166.91	7.70
IN-A243A	GLASS	244.40	189.28	55.12
IN-A247A	LEACHED RASHIG RINGS	198.49	129.43	69.06
IN-A250A	LEADED RUBBER	63.81	27.41	36.40
IN-A252A	LEADED RUBBER GLOVES AND APRONS	148.42	135.32	13.10
IN-A265A	BLACKTOP, CONCRETE, DIRT, AND SAND	53.15	43.79	9.36
IN-A272A	COARSE GRAPHITE	1.91	0.04	1.87
IN-A275A	GRAPHITE CORES	6.36	5.53	0.83
IN-A276A	GRAPHITE MOLDS	391.78	252.00	139.78
IN-A289A	DECONTAMINATION AND DECOMMISSIONING WASTE	25.78	25.57	0.21
IN-A294A	LEACHED NONSPECIAL SOURCE METAL	437.27	426.04	11.23
IN-A296A	NONSPECIAL SOURCE METAL	5,226.66	5,146.16	80.50
IN-A297A	HEAVY NONSPECIAL SOURCE METAL	25.76	4.75	21.01
IN-A300A	METAL WASTE	1,520.18	1,505.62	14.56
IN-A309A	ORGANIC SETUPS, OIL SOLIDS	569.37	417.12	152.25
IN-A311A	MOLTEN SALTS - 30% UNPULVERIZED	6.57	4.28	2.29
IN-A317A	LEACHED AND CEMENTED RESIN	49.46	36.77	12.69

Table A-4 Targeted Treatment

Table A-4 provides a listing of existing and planned targeted treatment systems and general treatment approaches. The codes are used in the MWFA97 database.

Treatment System ID#	Treatment System Name
AE-S001	Alkali Metal Passivation Booth (AMPB)
AE-S801	Building 306, Precipitation/Filtration Unit
AE-S802	Wet Oxidation System
AE-S804	Macroencapsulation
AE-S805	Surface Decontamination Unit
AE-S806	Building 306, MTRU Precipitation/Filtration System
AE-S807	Amalgamation
AW-S007	Remote Treatment Facility (RTF)
AW-S037	Sodium Process Facility
AW-S092	Generator Treatment Plans at ANL-W
BN-S701	Characterize to Determine Hazardous Constituents
BN-S801	Elementary Neutralization
BN-S802	Cyanide Destruction Treatability Study
BN-S804	On-site Treatability Study
DP-S002	TSCA Incinerator
DP-S801	Oak Ridge Commercial Option - B/C Pond
DP-S809	Transportable Vitrification System (TVS)
DP-S813	Oak Ridge Commercial Disposal - B/C Pond (Envirocare)
DP-S814	Oak Ridge Commercial Treatment - Broad Spectrum
DP-S816	Oak Ridge Commercial Treatment - Sludges
DP-S819	Commercial Disposal - TSCA Residues
DP-S820	Commercial Disposal - D018-D043 Debris
DS-S001	DSSI Commercial Facility
ET-S701	Characterization Required (MLLW)
ET-S702	Technology Assessment
EV-S003	Envirocare Commercial Facility
FM-S801	Ohio Option-Mobile Chem. Tmt Project
FM-S802	FEMP Waste Water Treatment System (Incineration Project)
FM-S805	Thorium Nitrate Tank T-2
GA-S701	Characterization Required
GA-S801	Onsite Neutralization
GJ-S801B	Mobile Thermal Desorption Process
GJ-S801C	Mobile Evaporative Oxidation Process
GJ-S804	Mobile Sort/Survey/Characterize/Decontaminate
IN-S003	WROC: Macroencapsulation
IN-S004	WROC/WERF: Stabilization - Portland Cement
IN-S005	WERF: Incineration - Controlled Air Incinerator
IN-S006	Portable Water Treatment Unit (PWTU)
IN-S030	HEPA Filter Leaching System (HFLS) (CPP-659)
IN-S033	ICPP Debris Treatment & Containment Facility - Water Washing
IN-S102	CPP659: Segregation
IN-S104	Lead Treatment Program: Commercial Decontamination
IN-S128	WROC: Mercury Retort for High Mercury Subcategory Waste
IN-S130	Treatment of Waste Under 40 CFR 262.34

Treatment System ID#	Treatment System Name
IN-S133	Generator Treatment Plans at ICPP/Stabilization
IN-S150	Advanced Mixed Waste Treatment Project
IN-S152	ICPP - RH Immobilization Facility
IN-S153	Generator Treatment Plans at ANL/Amalgamation
IN-S303	SCDF: Disposal - Contact-Handled
IN-S505	INEEL Direct Ship to WIPP
LA-S001	Mobile Lead Decontamination Trailer LANL
LA-S003	Mobile Reactive Metals Skid
LA-S004	Mobile Plating Wastes Acids/Bases Skid
LA-S701	Further Characterization
LA-S812	Los Alamos Commercial Stabilization or Macroencapsulation
LA-S834	Treatability Study for Oxidation of Cyanide Waste
LB-S004	Building 75: Unit 131 AFH
LB-S701	Characterization Required
LB-S702	Technology Assessment
LL-S002	Building 513 Solidification Unit
LL-S004	Area 514 Waste Water Treatment Tank Farm
LL-S701	Characterization Required
LL-S702	Technology Assessment
LL-S801	On Site Small-Scale Treatment
MD-S701	Characterize to determine hazard
NS-S003	NSSI Commercial Facility - Incineration
NT-S701	Characterize to Determine Rad/Haz Constituents
NT-S703	Treatability Assessment
NT-S801	TRU Waste Certification
NT-S803	RFP for Stabilization
NT-S999	Already Meets LDR
OH-S001	Ohio Option - Stabilization Project
OR-S005	TRU Processing Facility/WIPP Disposal
OR-S802	Actions Driven by CERCLA Record of Decision - ORNL
OR-S803	ORNL Chemical Detonation Facility
OR-S804	Compressed Gases
OR-S805	Oak Ridge Commercial Treatment - Scintillation Fluids
PA-S001	C-400-D Lime Precipitation Unit
PA-S701	Meets LDR Standard and/or Needs Sorting Characterization
PA-S902	Commercial Treatment and Disposal - Unassigned Vendor
PA-S903	Show no radiological contamination, then recycle/dispose/treat as hazardous waste
PA-S904	Commercial Recycling
PI-S801	Mobile Amalgamation Process (Bench Scale)
PO-S003	X-622 Groundwater Treatment Facility
PO-S005	X-705 Decontamination Facility: Microfiltration
PO-S701	Characterization of Highly Enriched Uranium Waste
PO-S802	Pretreatment/Regeneration
PO-S803	Repackage
PO-S805	Decontaminating Containers
PO-S806	Lab Packs Treatment
PO-S807	Metal Recovery
PO-S808	Physical Chemical Treatment

Treatment System ID#	Treatment System Name
PO-S901	Commercial Offsite Recycling Facility(s)
PO-S902	Commercial Offsite Incinerator
PO-S903	Commercial Offsite Cyanide Destruction
PO-S904	Commercial Offsite Deactivation of Reactive Metals
PX-S803	Mobile Macroencapsulation
PX-S804	Sort/Survey/Characterize/Decontaminate
QX-S004	Quadrex Commercial Disposal Facility
RF-S001	Building 774 - Aqueous Process Waste Treatment
RF-S004	Process Waste Treatment Facility: Building 374
RF-S013	Miscellaneous Aqueous Waste Handling & Solidification Building 774
RF-S016	CTMP System 3-LLW Miscellaneous Waste Forms Immobilization
RF-S017	CTMP System 2/4B-LLW Buildings 374/774 Sludge Immobilization
RF-S019	CTMP System 5-LLW Surface Organic Contaminant Removal
RF-S020	Residue Stabilization
RF-S028	CTMP System 6-LLW Pondcrete Remix
RF-S801	CTMP Path F System-Treatment of MTRU Wastes to Meet WIPP
RL-S006	Waste Receiving And Processing Facility (WRAP I)
RL-S007	Waste Receiving And Processing Facility (WRAP IIA)
RL-S701	Evaluating Treatment Options
RL-S801	Encapsulation at Purex
RL-S802	Amalgamation at Purex
RL-S803	Commercial Thermal Treatment Facility
RL-S901	Needs disposal, no treatment needed
SA-S805	Treatability Study: Deactivate Water Reactives
SA-S806	TS: Chemically Deactivate Reactive Pyrophoric Metals
SA-S807	Mobile Treatability Study: Solidification/Neutralization
SA-S810	Mobile Packed Bed Reactor/Silent Discharge Plasma Treatment
SA-S811	Radionuclide Separation
SA-S812	Sorting of Hazardous Debris
SA-S813	TRU Treatment Technology Development
SR-S002	F/H Area Effluent Treatment Facility (ETF)
SR-S003	SRL (SRTC) Ion Exchange Treatment Probe - High Activity
SR-S004	SRL (SRTC) Ion Exchange Treatment Probe - Low Activity
SR-S007	Treatability Variance
SR-S015	M-Area Vendor Treatment Process
SR-S018	Consolidated Incineration Facility -Liquid &Solid Feeds
SR-S019	Processes Requiring Further Evaluation
SR-S701	MTRU & 10-100 nCi/g Characterization/Treatment
SR-S702	Decision TBD per ROD
SR-S801	Waste Already Meets Treatment Standard
SR-S802	ITP & LW Treatment - Treatability Variance
SR-S803	Treatment of Lab Waste as a 90-Day Generator
SR-S804	Offsite Vendor Treatment
SR-S806	D-Area Heavy Water Reclamation Process - Ion Exchange
SR-S808	Macroencapsulation as a 90-Day Generator
SR-S809	RH Macroencapsulation-Containment Building by Treat Variance
SR-S810	Macroencapsulation in a Permitted Containment Building.
WP-S001	WIPP Option
WS-S001	Site Water Treatment Plant Train 1

Treatment System ID#	Treatment System Name
WS-S004	Chemical Stabilization/Solidification
WS-S803	Deactivation followed by Stabilization
WS-S804	Amalgamation
WS-S807	Decontamination/Stabilization
WS-S808	Macroencapsulation with CSS
WV-S001	Integrated Radioactive Waste Treatment System
WV-S701	Further Characterization Required to Determine Treatment
WV-S702	Further Characterization Required to Determine Treatment
WV-S802	Contact Size Reduction Facility (CSRF)
WV-S803	Interim Waste Storage Facility
YP-S002	Central Pollution Control Facility (CPCF)
YP-S003	Cyanide Treatment Facility, Building 9201-5N
YP-S801	Actions Driven by CERCLA Record of Decision - Y-12

Table A-5 Site Codes

Table A-5 provides a listing of site codes and site names that are used in the MWFA97 database.

Site Code	Site Name
AC	Stanford Linear Accelerator Center
AE	Argonne National Laboratory - East
AL	Ames Laboratory - Iowa State Univ.
AW	Argonne National Laboratory - West
BC	Battelle Columbus Laboratories
BN	Brookhaven National Laboratory
BT	Bettis Atomic Power Laboratory
CI	Colonie Interim Storage Site
CN	Charleston Naval Shipyard
CP	Canoga Park
DP	K-25 Site
EH	Laboratory for Energy-Related Health Research
ET	Energy Technology Engineering Center - SSFL
FM	Fernald Environmental Management Project
FN	Fermi National Accelerator Laboratory
GA	General Atomics
GE	General Electric Vallecitos Nuclear Center
GJ	Grand Junction Projects Office
IN	Idaho National Engineering Laboratory
IT	Inhalation Toxicology Research Institute
KA	Knolls Atomic Power Laboratory - Schenectady
KC	Kansas City Plant
KK	Knolls Atomic Power Laboratory - Kesselring
KW	Knolls Atomic Power Laboratory - Windsor
LA	Los Alamos National Laboratory
LB	Lawrence Berkeley Laboratory
LL	Lawrence Livermore National Laboratory
MD	Mound Plant
MI	Mare Island Naval Shipyard

Site Code	Site Name
MS	Middlesex Sampling Plant
MU	University of Missouri Research Reactor
NB	New Brunswick Laboratory
NF	SFMP Niagara Falls Storage Sites
NN	Norfolk Naval Shipyard
NR	Naval Reactor Facility
NS	Newport News Naval Shipyard
NT	Nevada Test Site
OR	Oak Ridge National Laboratory
PA	Paducah Gaseous Diffusion Plant
PH	Pearl Harbor Naval Shipyard
PI	Pinellas Plant
PN	Portsmouth Naval Shipyard
PO	Portsmouth Gaseous Diffusion Plant
PP	Princeton Plasma Physics Laboratory
PS	Puget Sound Naval Shipyard
PX	Pantex Plant
RF	Rocky Flats Environmental Technology Site
RL	Richland Site
RM	RMI Titanium Company Extrusion Plant
SA	Sandia National Laboratory - Albuquerque
SL	Sandia National Laboratory - Livermore
SR	Savannah River Site
UC	University of California at Davis
WP	Waste Isolation Pilot Project
WS	Weldon Spring Site
WV	West Valley Demonstration Project
YP	Y-12 Plant

APPENDIX B

WASTEWATER DETAILED INFORMATION

 

SUMMARY

Treatment systems were developed on three levels to aid in the development of the MWFA Technical Baseline - Revision 0. Block flow diagrams, process flow diagrams, and treatment trains were generated based on PSTP data, with more detail added at each diagram level. The basic block flow diagram schemes did not change for the MWFA Technical Baseline - Revision 1. However, the process flow diagrams and the treatment trains were reviewed and updated based on current Site Treatment Plan (STP) information. This task involved reviewing the major process steps of each diagram to ensure their accuracy. The facility crosswalk tables associated with each process flow diagram were then updated based on the current STPs. The treatment system data for wastewater is included in this appendix. Descriptions of the treatment system information contained in Appendix B are given below.

The block flow diagram for wastewater (figure B-1) represents a general, upper level description of the treatment process (thermal, non-thermal, and stabilization). In all cases, fundamental block steps associated with each key process treatment step (highlighted blocks) were included. These fundamental steps consisted of back-end handling, front-end handling, pretreatment, and disposal. The following figure (Figure B-2) contains a table listing the total waste volumes in wastewater by category (Category A, Category B, Category C) and radioactivity (LLW, Alpha, Remote-Handled). Included in this figure is a breakdown of the assigned waste volume to be treated under each key treatment block step.

Process flow diagrams represent the next level of detail in the treatment system development. The wastewater process flow diagrams (Figures B-3, B-7, B-16) appear after the block flow diagram to provide additional detail to the treatment stages. The appropriate Category A (existing/on-site), Category B (existing/off-site), Category C (proposed/planned), Category D (privatized/on-site), and Category E (privatized/off-site) STP defined facilities were assigned to each of the process flow diagrams. Typically behind each process flow diagram appears a figure (Figures B-4, B-8, B-17) with a listing of the total volume of waste in each category. The waste stream volume calculated for Category C was further broken down into proposed process flows. The Category C waste stream volume breakdown is shown in a pie chart format on the same page as the waste volume table.

Based on STP information and associated documentation including numerous OAT documents, treatment trains (Figures B-5, B-6, B-9, B-10, B-11, B-12, B-13, B-14, B-15, B-18, B-19) were prepared for each process flow diagram. These treatment trains represent the most detailed description of the technologies associated with each STP. At this point, reference to specific facilities (i.e., IWPF, Mixed Waste Treatment Facility) was removed, in order to put this method on a technology-specific basis as opposed to a facility-specific basis. Waste stream inventory tables were generated for each treatment train (Tables B-1 through B-7). The waste stream inventory tables contain the waste streams applicable (or STP assigned) to that treatment train. These tables also categorized the waste stream volume as low level, alpha, or remote handled and identified the treatment facility category (Category A, Category B, Category C, Category D, Category E).

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Figure B-1. Major treatment block flow diagram for wastewater.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	148.1	2977.9	0.0	3126.0
Category B	64.9	0.2	0.0	65.1
Category C	675.0	113.4	2651.2	3191.1
Category D	0.0	0.3	0.0	0.3
Category E	2.1	0.0	0.0	2.1
Total	890.1	3091.8	2651.2	6633.1

Figure B-2. Wastewater treatment process volumes.

STP Preferred Options

Category A

- TSCA Incinerator
- WERF: Incineration - Controlled Air incinerator
- Consolidated Incineration Facility - Liquid & Solid Feeds

Category B

- TSCA Incinerator

Category C

- Physical Chemical Treatment
- Decision TBD per ROD
- Central Pollution Control Facility (CPCF)

Figure B-3. Wastewater, thermal treatment process flow.

Figure B-4. Wastewater, thermal treatment process volumes.

Figure B-5. Wastewater, thermal treatment process, incineration treatment train.

Table B-1. Wastewater thermal treatment process. Incineration treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
DP-W150	L1000	RT-O11-M12-C14	17.853			DP-S002	A
IN-A038A	L1290	RC-O11-M12-C12		1.28704		IN-S005	A
IN-A119A	L1110	RC-O11-M12-C16	0			IN-S005	A
IN-A120A	L1110	RC-O11-M12-C16	0.592			IN-S005	A
IN-A413	L1230		0.2036			IN-S005	A
OR-W049	L1000	RT-O11-M12-C14	4.845			DP-S002	A
SR-W047	L1000	RC-O90-M12-C90	0			SR-S018	A
SR-W070	L1290	RC-O11-M12-C90		2.5		SR-S018	A
SR-W071	L1290	RC-O11-M90-C90		24.9		SR-S018	A
YP-W188	L1000	RT-O11-M12-C14	5.367			DP-S002	A
Subtotal	A		28.86	28.69			
FM-B182	L1220	RC-O90-M11-C12		0.2		DP-S002	B
PA-A001	L1190	RC-O11-M11-C14	0.6			DP-S002	B
PA-A006	L1110	RT-O11-M12-C12	11.72			DP-S002	B
PA-A017	L1110	RC-O90-M11-C12	2.36			DP-S002	B
PA-A049	L1130	RT-O11-M11-C90	8.61			DP-S002	B
PA-B011	L1130	RT-O90-M11-C90	12.57			DP-S002	B
PA-B017	L1130	RT-O11-M12-C90	14.4			DP-S002	B
PA-B048	L1130	RC-O11-M90-C90	0.32			DP-S002	B
PA-B049	L1190	RC-O90-M11-C17	2.64			DP-S002	B
PA-C006	L1190	RT-O11-M12-C12	3.64			DP-S002	B
RM-W002	L1130	RC-O90-M11-C90	0			DP-S002	B
RM-W007	L1230	RC-O11-M90-C90	0			DP-S002	B
Subtotal	B		56.86	0.20			
Total			85.72	28.89			
Total Treatment Train Vol (m3)				114.61

Figure B-6. Wastewater, thermal treatment process, pretreatment to incineration treatment train.

Table B-2. Wastewater thermal treatment process. Pretreatment followed by incineration treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A427	L1130		0.9463			IN-S005	A
IN-B018A	L1110		0.09656			IN-S005	A
IN-B076A	L1110		0.01515			IN-S005	A
IN-B395A	L1190		0.02272			IN-S005	A
Subtotal	A		1.08				
DP-W027	L1000	RT-O11-M12-C14	134.764			YP-S002	C
DP-W030	L1000	RT-O11-M12-C16	30.861			YP-S002	C
DP-W149	L1000	RC-O11-M12-C14	307.655			YP-S002	C
DP-W151	L1000	RT-O11-M12-C17	16.489			YP-S002	C
OR-W048	L1000	RC-O11-M12-C17	28.629			YP-S002	C
PO-W009	L1220	RC-O11-M11-C12	12.104			PO-S808	C
PO-W044	L1230	RC-O11-M11-C90	0.208			PO-S808	C
PO-W053	L1110	RC-O11-M12-C12	18.933			PO-S808	C
PO-W055	L1190	RT-O11-M12-C12		33.283		PO-S808	C
YP-W187	L1000	RC-O11-M12-C14	84.039			YP-S002	C
YP-W189	L1000	RC-O11-M11-C17	17.52			YP-S002	C
Subtotal	C		651.20	33.28			
Total			652.28	33.28			
Total Treatment Train Vol (m3)				685.57

STP PREFERRED OPTIONS

Category A

Category B

Category C

B-15

- Building 306, Precipitation/Filtration Unit
- FEMP Waste Water Treatment System
- Thorium Nitrate Tank T-2
- Onsite Neutralization @ GA, SR, WS
- Building 75: Unit 131 AFH
- C-400-D Lime Precipitation Unit
- X-622 Groundwater Treatment Facility
- Process Waste Treatment Facility: Bldg 374
- Mobile Treatability Study: Solidification/Neutralization
- F/H Area Effluent Treatment Facility (ETF)
- SRL (SRTC) Ion Exchange Treatment Probe - High Activity
- SRL (SRTC) Ion Exchange Treatment Probe - Low Activity
- D-Area Heavy Water Reclamation Process - Ion Exchange
- Site Water Treatment Plant Train 1
- Integrated Radioactive Waste Treatment System
- Interim Waste Storage Facility
- Central Pollution Control Facility

- TSCA Incinerator
- Envirocare Commercial Facility
- Commercial Recycling
- Commercial Offsite Cyanide Destruction
- Cyanide Treatmnt Facility, Bldg 9201-5N

- Ohio Option-Mobile Chem. Tmt Project
- Mobile Evaporative Oxidation Process
- Portable Water Treatment Unit (PWTU)
- Mobile Plating Wastes Acids/Bases Skid
- Treatability Study for Oxidation of Cyanide Waste
- Characterize to Determine Rad/Haz Constituents
- Meets LDR Standard and/or Needs Sorting Charact.
- X-705 Decontamination Facility: Microfiltration
- Physical Chemical Treatment
- CTMP System 3-LLW Misc. Waste Forms Immobilization
- CTMP System 2/4B-LLW Bldgs 374/774 Sludge Immobilization
- CTMP System 5-LLW Surface Organic Contaminant Removal
- D-Area Heavy Water Reclamation Process - Ion Exchange

Figure B-7. Wastewater, non-thermal treatment process flow.

Figure B-8. Wastewater, non-thermal treatment process volumes.

Figure B-9. Wastewater, non-thermal treatment process, existing chemical/physical/biological treatment train.

Table B-3. Wastewater non-thermal treatment process. Existing chem/phys/bio treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AE-W014	L1190	RC-O90-M11-C90		0.04		AE-S801	A
FM-W096	L1130	RC-O90-M11-C90	0			FM-S802	A
FM-W325	L1130	RC-O90-M90-C11	0			FM-S802	A
FM-W329	L1110	RC-O90-M90-C12	0			FM-S802	A
FM-W393	L1110	RC-O11-M11-C12	9.4			FM-S802	A
GA-W005	L1110		0.22			GA-S801	A
GA-W009	L1120	RC-O90-M90-C12	0.002			GA-S801	A
LB-W001	L1110	RC-O11-M12-C14	0.553			LB-S004	A
LB-W002	L1120	RC-O11-M90-C14	0.184			LB-S004	A
LB-W011	L1110	RC-O11-M12-C14		0.0116		LB-S004	A
LB-W012	L1120	RC-O11-M90-C14		0.00095		LB-S004	A
OR-W050	L1000	RC-O90-M11-C17	0.637			YP-S002	A
PA-A011	L1120	RC-O90-M11-C12		0.01		PA-S001	A
PA-A032	L1120	RC-O90-M11-C90		0.8		PA-S001	A
PA-A048	L1110	RC-O90-M90-C12		0.01		PA-S001	A
PA-B006	L1120	RC-O90-M90-C12		5.17		PA-S001	A
PA-C011	L1190	RC-O90-M11-C90		3.37		PA-S001	A
PO-W050	L1130	RC-O11-M12-C12	45.496			PO-S003	A
PS-W018	L9000	RC-O90-M11-C12	0.3			RL-S006	A
RF-W078	L1130	RC-O11-M11-C17		1611		RF-S004	A
RF-W087	L1190	RC-O11-M11-C13		1272.63		RF-S004	A
SR-W007	L1000	RC-O11-M12-C12	48.2			SR-S004	A
SR-W008	L1000	RC-O11-M12-C12		55.8		SR-S003	A
SR-W032	L1000	RC-O90-M12-C90	6.6			SR-S806	A
SR-W050	L1290	RC-O11-M12-C90			0	SR-S803	A
WS-W042	L1190	RC-O11-M12-C13	0.24			WS-S803	A
WV-W004	L1000	RC-O90-M90-C12	0.5886			WV-S803	A
WV-W029	L1190	RC-O90-M11-C90	0.0335			WV-S001	A
WV-W034	L1210	RC-O90-M11-C12	0.0052			WV-S001	A
Subtotal	A		112.46	2948.84	0.00		
FM-W114	L1130	RC-O11-M90-C90	0			DP-S002	B
LB-W003	L1140	RC-O11-M11-C13	0.00035			YP-S003	B
PA-A018	L1140	RC-O90-M90-C13	0.05			YP-S003	B
PA-W036	L1130	RC-O90-M11-C90	3.32			PA-S904	B
PA-W046	L1140	RC-O90-M11-C13	0.52			YP-S003	B
PO-W014	L1240	RC-O90-M11-C13	1.664			PO-S903	B

Table B-3. Wastewater non-thermal treatment process. Existing chem/phys/bio treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PX-W034	L1290	RC-O11-M12-C90	2.46			EV-S003	B
Subtotal	B		8.01				
NT-W016	L1130	RC-O90-M11-C90	0			IN-S006	C
SR-W077	L1120			0		SR-S806	C
WV-W017	L1220	RC-O11-M90-C12	0.0433			WV-S701	C
Subtotal	C		0.04	0.00			
Total			120.52	2948.84		0.00	
Total Treatment Train Vol (m3)				3069.36

Figure B-10. Wastewater, non-thermal treatment process, non-existing mobile inorganic/organic treatment train.

Figure B-11. Wastewater, non-thermal treatment process, non-existing mobile inorganic treatment train.

Figure B-12. Wastewater, non-thermal treatment process, non-existing evap/drying @ Rocky Flats treatment train.

Figure B-13. Wastewater, non-thermal treatment process, non-existing cyanide, mercury and metals removal @ Rocky Flats treatment train.

Figure B-14. Wastewater, non-thermal treatment process, non-existing neutralization redox, and polishing treatment train.

Figure B-15. Wastewater, non-thermal treatment process, non-existing redox, neutralization precipitation, IX, filtration, GAC treatment train.

Table B-4. Wastewater non-thermal treatment process. All non-existing chem/phys/bio treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
FM-W008	L1130	RC-O90-M11-C90	0.2			FM-S801	C
FM-W115	L1110	RC-O11-M11-C12	3			FM-S801	C
FM-W211	L1110	RC-O90-M11-C12	0.6			FM-S801	C
FM-W308	L1110	RC-O11-M12-C12	2.4			FM-S801	C
FM-W332	L1110	RC-O11-M90-C12	0.2			FM-S801	C
FM-W366	L1210	RC-O90-M12-C12	0.2			FM-S801	C
FM-W503	L1110		0.4			FM-S801	C
LA-W913	L1290	RC-O90-M12-C17	1.85			LA-S004	C
LA-W914	L1290	RC-O90-M90-C14		1.4		LA-S004	C
LA-W915	L1290	RC-O11-M12-C17	0.13			LA-S004	C
PA-C015	L1190	RC-O90-M11-C12	1.8			PA-S701	C
PO-W008	L1120	RC-O90-M11-C90	1.248			PO-S005	C
PO-W010	L1110	RC-O90-M90-C12	0.436			PO-S808	C
PO-W011	L1210	RC-O90-M11-C14	1.335			PO-S808	C
PO-W023	L1230	RC-O90-M11-C90	5.2			PO-S808	C
PO-W034	L1230	RC-O90-M11-C90	0.624			PO-S808	C
PO-W079	L1220	RC-O90-M90-C12	0.332			PO-S808	C
PO-W080	L1290	RC-O90-M11-C12	1.325			PO-S808	C
PO-W081	L1230	RC-O90-M11-C90	2.365			PO-S808	C
RF-W016	L1110	RC-O90-M11-C12		9.42		RF-S016	C
RF-W047	L1190	RC-O11-M12-C17		6.01		RF-S019	C
RF-W053	L1110	RC-O90-M11-C12		1.05		RF-S016	C
RF-W054	L1140	RC-O90-M11-C16		0.44		RF-S016	C
RF-W079	L1290	RC-O11-M11-C17		59.1		RF-S017	C
SA-W914	L1190	RC-O11-M90-C12	0.01			GJ-S801C	C
SA-W916	L1140	RC-O90-M90-C13	0.001			LA-S834	C
Subtotal	C		23.66	77.42			
Total			23.66	77.42			
Total Treatment Train Vol (m3)				101.08

STP Preferred Options

Category A

- WROC/WERF: Stabilization - Portland Cement
- M-Area Vendor Treatment Process

Category B

Category C

- Ohio Option - Stabilization Project
- TRU Processing Facility/WIPP Disposal
- Actions Driven by CERCLA Record of Decision - ORNL

Figure B-16. Wastewater, direct stabilization treatment process flow.

Figure B-17. Wastewater, direct stabilization treatment process volumes.

Figure B-18. Wastewater, direct stabilization treatment, glass stabilization treatment train.

Figure B-18. Wastewater, direct stabilization treatment, glass stabilization treatment train.

Table B-5. Wastewater direct stabilization. Glass stabilization treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
SR-W039	L1210	RC-O90-M11-C12	5			SR-S015	A
Subtotal	A		5.00				
Total			5.00				
Total Treatment Train Vol (m3)				5.00

Figure B-19. Wastewater, direct stabilization treatment, waste pretreatment and stabilization treatment train.

Table B-6. Wastewater direct stabilization. Waste pretreatment followed by stabilization treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A015	L1100	RC-O90-M12-C90		0.4164		IN-S004	A
IN-A018A	L1110	RC-O90-M12-C12	0.01704			IN-S004	A
IN-A041A	L1100	RC-O90-M12-C90	0.4164			IN-S004	A
IN-A076A	L1100	RC-O90-M12-C12	0.01515			IN-S004	A
IN-A395A	L1100	RC-O90-M12-C90	0.09088			IN-S004	A
IN-A397A	L1130	RC-O90-M11-C90	0.2082			IN-S004	A
Subtotal	A		0.75	0.42			
FM-A182	L1220	RC-O90-M11-C12		0.2		OH-S001	C
OR-W039	L1000	RC-O90-M12-C12			1198.099	OR-S005	C
OR-W043	L1000	RC-O90-M12-C12			1453.143	OR-S802	C
Subtotal	C			0.20	2651.24		
Total			0.75	0.62	2651.24		
Total Treatment Train Vol (m3)				2652.61			

Table B-7. Wastewater, TBD.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
WV-W004	L1000			2.5		WV-S701	C
WV-W025	L1120	RC-O90-M90-C12	0.0956			WV-S701	C
Subtotal	C		0.10	2.50			
IN-B038A	L1290			0.32176		IN-S150	D
Subtotal	D			0.32			
BT-W028	L1130	RT-O11-M90-C90	2.1			IN-S150	E
Subtotal	E		2.10				
Total			2.20	2.82			
Total Treatment Train Vol (m3)				5.02			

APPENDIX C

COMBUSTIBLE ORGANICS DETAILED INFORMATION

SUMMARY

Treatment systems were developed on three levels to aid in the development of the MWFA Technical Baseline - Revision 0. Block flow diagrams, process flow diagrams, and treatment trains were generated based on PSTP data, with more detail added at each diagram level. The basic block flow diagram schemes did not change for the MWFA Technical Baseline - Revision 1. However, the process flow diagrams and the treatment trains were reviewed and updated based on current Site Treatment Plan (STP) information. This task involved reviewing the major process steps of each diagram to ensure their accuracy. The facility crosswalk tables associated with each process flow diagram were then updated based on the current STPs. The treatment system data for combustible organics is included in this appendix. Descriptions of the treatment system information contained in Appendix C are given below.

The block flow diagram for combustible organics (Figure C-1) represents a general, upper level description of the treatment process (thermal and non-thermal). In all cases, fundamental block steps associated with each key process treatment step (highlighted blocks) were included. These fundamental steps consisted of back-end handling, front-end handling, pretreatment, and disposal. The following figure (Figure C-2) contains a table listing the total waste volumes in combustible organics by category (Category A, Category B, Category C) and radioactivity (LLW, Alpha, Remote-Handled). Included in this figure is a breakdown of the assigned waste volume to be treated under each key treatment block step.

Process flow diagrams represent the next level of detail in the treatment system development. The combustible organics process flow diagrams (Figures C-3, C-8) appear after the block flow diagram to provide additional detail to the treatment stages. The appropriate Category A (existing/on-site), Category B (existing/off-site), Category C (proposed/planned), Category D (privatized/on-site), and Category E (privatized/off-site) STP defined facilities were assigned to each of the process flow diagrams. Typically, behind each process flow diagram appears a figure (Figures C-4, C-9) with a listing of the total volume of waste in each category. The waste stream volume calculated for Category C was further broken down into proposed process flows. The Category C waste stream volume breakdown is shown in a pie chart format on the same page as the waste volume table.

Based on STP information and associated documentation, including numerous OAT documents, treatment trains (Figures C-5, C-6, C-7, C-10, C-11, C-12, C-13) were prepared for each process flow diagram. These treatment trains represent the most detailed description of the technologies associated with each STP. At this point, reference to specific facilities (i.e., IWPF, Mixed Waste Treatment Facility) was removed in order to put this method on a technology-specific basis as opposed to a facility-specific basis. Waste stream inventory tables were generated for each treatment train (Tables C-1 through C-8). The waste stream inventory tables contain the waste streams applicable (or STP assigned) to that treatment train. These tables also categorized the waste stream volume as low level, alpha, or remote handled and identified the treatment facility category (Category A, Category B, Category C, Category D, Category E).

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Figure C-1. Major treatment block flow diagram for combustible organics.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	1110.1	166.2	0.0	1276.4
Category B	273.2	199.1	0.0	472.3
Category C	435.8	17.6	0.0	453.4
Category D	1.4	2.3	0.0	3.7
Category E	4.1	46.0	0.0	50.0
Total	1824.5	431.2	0.0	2255.8

C-8

Figure C-2. Combustible organics treatment process volumes.

L2000, S3200 Stream Treatment Train

STP Preferred Options

Category A

- TSCA Incinerator
- WERF: Incineration - Controlled Air Incinerator
- Consolidated Incineration Facility - Liquid & Solid Feeds
- FEMP Waste Water Treatment System (Incineration Project)
- Area 514 Waste Water Treatment Tank Farm
- Deactivation followed by Stabilization
- Integrated Radioactive Waste Treatment System
- Interim Waste Storage Facility

Category B

- TSCA Incinerator
- DSSI Commercial Facility
- WERF: Incineration - Controlled Air Incinerator
- Consolidated Incineration Facility - Liquid & Solid Feeds
- Commercial Offsite Cyanide Destruction

Category C

- TSCA Incinerator
- DSSI Commercial Facility
- WROC: Hg Retort for High Hg Subcat Wastes
- Pretreatment/Regeneration
- Commercial Offsite Incinerator
- Sort/Survey/Char./Decon
- Mobile Packed Bed Reactor/Silent Discharge Plasma Treat
- Characterize to Determine Haz. Constituents
- Elementary Neutralization
- Ohio Option-Mobile Chem. Tmt Project
- Mobile Evaporative Oxidation Process
- Com. Tmt & Disposal - Unassigned Vendor
- Metal Recovery
- Waste Rec. & Proc. Fac. (WRAP IIA)
- OR Commercial Treatment - Broad Spectrum
- Ohio Option - Stabilization Project

Figure C-3. Combustible organics, thermal treatment process flow.

C-10

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	1109.7	165.3	0.0	1275.0
Category B	272.7	199.1	0.0	471.8
Category C	329.3	13.1	0.0	342.4
Category D	0.0	0.0	0.0	0.0
Category E	0.0	0.0	0.0	0.0
Total	1711.7	377.5	0.0	2089.2

Figure C-4. Combustible organics, thermal treatment process volumes.

L2000, L2100, L2900 Stream Treatment Train

Category A

- TSCA Incinerator
- WERF: Incineration - Controlled Air Incinerator
- Consolidated Incineration Facility - Liquid & Solid Feeds

Category B

- TSCA Incinerator
- DSSI Commercial Facility
- WERF: Incineration - Controlled Air Incinerator
- Consolidated Incineration Facility - Liquid & Solid Feeds

Category C

- TSCA Incinerator
- DSSI Commercial Facility
- WROC: Mercury Retort for High for High Mercury Subcat Wastes
- Pretreatment/Regeneration
- Commercial Offsite Incinerator
- Sort/Survey/Char./Decon
- Mobile Packed Bed Reactor/Silent Discharge Plasma Treat

Figure C-5. Combustible organics, thermal treatment process of aqueous organic liquids treatment train.

Table C-1. Thermal treatment of aqueous organic liquids (L2000, L2100, L2900) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
DP-W034	L2000	RT-O11-M12-C17	19.202			DP-S002	A
DP-W142	L2000	SR	118.795			DP-S002	A
DP-W143	L2000	RT-O11-M12-C11	22.97			DP-S002	A
DP-W152	L2000	RT-O11-M11-C14	129.534			DP-S002	A
DP-W153	L2000	RC-O90-M12-C12	20.024			DP-S002	A
DP-W154	L2000	RT-O11-M12-C15	4.931			DP-S002	A
IN-A061A	L2120	RC-O11-M90-C11	0.0492			IN-S005	A
IN-A093A	L2100	RC-O11-M11-C90	0			IN-S005	A
IN-A100A	L2110	RC-O11-M11-C11	1.7716			IN-S005	A
IN-A380A	L2100	RC-O11-M90-C90	0.0757			IN-S005	A
OR-W008	L2000	RT-O11-M11-C11	18.5			DP-S002	A
OR-W051	L2000	RT-O11-M11-C14	38.287			DP-S002	A
OR-W052	L2000	RC-O90-M12-C12	2.737			DP-S002	A
OR-W053	L2000	RT-O11-M12-C17	0.361			DP-S002	A
SR-W001	L2000	RC-O11-M11-C11		15.6		SR-S018	A
SR-W035	L2000	RC-O11-M11-C90	2.8			SR-S018	A
SR-W045	L2100	RC-O11-M12-C90		149.7		SR-S018	A
YP-W183	L2000	RT-O11-M11-C90	92.147			DP-S002	A
YP-W190	L2000	RT-O11-M11-C14	111.996			DP-S002	A
YP-W191	L2000	RC-O90-M11-C12	2.227			DP-S002	A
YP-W192	L2000	RT-O11-M12-C17	7.023			DP-S002	A
Subtotal	A		593.43	165.30			
BN-W004	L2900	RC-O11-M90-C11	0.91			DS-S001	B
BT-W018	L2190	RC-O11-M11-C14		0		SR-S018	B
ET-W020	L2120	RC-O11-M12-C14	0.15			IN-S005	B
FM-W030	L2120	RC-O11-M90-C11	0			DP-S002	B
FM-W032	L2120	RC-O11-M90-C11	0			DP-S002	B
FM-W035	L2120	RC-O90-M90-C14	0			DP-S002	B
FM-W117	L2120	RC-O90-M90-C14	0			DP-S002	B
FM-W124	L2120	RC-O11-M90-C11	0			DP-S002	B
FM-W328	L2110	RC-O11-M11-C90	0			DP-S002	B
KA-W002	L2900	RC-O11-M12-C90	0			IN-S005	B
KA-W007	L2900	RC-O11-M12-C90	0.224			IN-S005	B
KK-W003	L2900	RC-O11-M12-C90	0			IN-S005	B
KK-W011	L2900	RC-O11-M12-C90	0			IN-S005	B
KW-W001	L2900	RC-O11-M12-C90		0		SR-S018	B

Table C-1. Thermal treatment of aqueous organic liquids (L2000, L2100, L2900) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
LA-W901	L2190	RC-O11-M12-C11	15.89			DS-S001	B
LA-W902	L2900	RC-O11-M90-C11	0.23			DS-S001	B
LB-W004	L2900	RC-O11-M12-C11	1.61			IN-S005	B
LB-W007	L2900	SR	0.058			IN-S005	B
LL-W016	L2110	RC-O11-M11-C90	0.21			DP-S002	B
PA-A037	L2110	RT-O11-M11-C14	3.52			DP-S002	B
PA-A038	L2120	RC-O11-M90-C90	0.01			DP-S002	B
PA-A039	L2110	RT-O11-M90-C11	12.21			DP-S002	B
PA-A052	L2120	RC-O11-M11-C11	6.29			DP-S002	B
PA-B001	L2120	RT-O11-M90-C14	0.4			DP-S002	B
PA-B030	L2900	RC-O90-M11-C90	0.2			DP-S002	B
PA-C048	L2110	RC-O11-M90-C90	1			DP-S002	B
PA-C049	L2120	RC-O90-M11-C90	1.2			DP-S002	B
PA-D006	L2120	RC-O90-M90-C12	0.72			DP-S002	B
PA-W044	L2120	RC-O11-M90-C11	0.4			DP-S002	B
PH-W002	L2110	RC-O11-M90-C90	0.2			IN-S005	B
PO-W012	L2120	RC-O90-M12-C14	1.248			DP-S002	B
PO-W019	L2900	RT-O11-M12-C17		124.919		DP-S002	B
PO-W028	L2900	RT-O11-M11-C14	1.872			DP-S002	B
PO-W029	L2120	RC-O90-M11-C90	1.664			DP-S002	B
PO-W041	L2120	RC-O11-M11-C90	2.496			DP-S002	B
PO-W048	L2190	RC-O90-M90-C14	9.395			DP-S002	B
PO-W056	L2190	RC-O90-M90-C11	0.208			DP-S002	B
PO-W057	L2900	RC-O11-M11-C14	49.6			DP-S002	B
PO-W077	L2110	RT-O11-M90-C90	3.442			DP-S002	B
PO-W078	L2120	RC-O11-M11-C14	8.436			DP-S002	B
PS-W004	L9000	RC-O11-M90-C90	0.25			IN-S005	B
RF-W046	L2900	RC-O11-M12-C17		58.62		DS-S001	B
SA-W907	L2900	RC-O11-M90-C11	0.2			DS-S001	B
WV-W008	L2000	RC-O90-M12-C90	0.0001			DS-S001	B
WV-W014	L2120	RC-O11-M90-C11	0.0716			DS-S001	B
WV-W018	L2100	RC-O90-M90-C11	0.0147			DS-S001	B
WV-W019	L2000	RC-O11-M11-C11	1.9382			DS-S001	B
WV-W021	L2900	RC-O90-M90-C11	0.0365			DS-S001	B
WV-W031	L2000	RC-O90-M90-C13	0.0004			DS-S001	B
Subtotal	B		126.30	183.54			

Table C-1. Thermal treatment of aqueous organic liquids (L2000, L2100, L2900) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
FM-W330	L2120	RC-O11-M12-C90	0			DP-S002	C
LA-W909	L2900	RC-O11-M12-C12	3.75			SA-S810	C
LA-W910	L2900	RT-O11-M11-C90	0.74			SA-S810	C
SA-W911	L2900	RC-O11-M11-C11	2.7			SA-S810	C
Subtotal	C		7.19				
Total			726.93	348.84			
Total Treatment Train Vol (m3)				1075.76			

L2200 Stream Treatment Train

STP Preferred Options

Category A

- WERF: Incineration - Controlled Air Incinerator
- Consolidated Incineration Facility - Liquid & Solid Feeds

Category B

- TSCA Incinerator
- DSSI Commercial Facility
- WERF: Incineration - Controlled Air Incinerator
- Consolidated Incineration Facility - Liquid & Solid Feeds

Category C

- DSSI Commercial Facility
- Sort/Survey/Char./Decon
- Mobile Packed Bed Reactor/Silent Discharge Plasma Treat

Figure C-6. Combustible organics, thermal treatment process of pure organic liquids treatment train.

S3200 Stream Treatment Train

Figure C-7. Combustible organics, thermal treatment of organic process residues treatment train.

Table C-2. Thermal treatment of pure organic liquids (L2200) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A043A	L2210	RC-O11-M90-C90	0.1136			IN-S005	A
IN-A096A	L2210	RC-O11-M90-C90	0.3218			IN-S005	A
IN-A104A	L2220	RC-O11-M11-C90	0.3445			IN-S005	A
IN-A107A	L2220	RC-O90-M11-C90	0.2082			IN-S005	A
IN-A117A	L2220	RC-O90-M11-C90	0			IN-S005	A
IN-A148A	L2200	RC-O11-M90-C11	0.9387			IN-S005	A
IN-A149A	L2200	RC-O90-M11-C11	0.2082			IN-S005	A
IN-A394A	L2220	RC-O90-M11-C90	0.2082			IN-S005	A
IN-A415	L2220		0.2082			IN-S005	A
SR-W022	L2200	RC-O11-M12-C11		0		SR-S018	A
SR-W036	L2200	RC-O90-M12-C90	20			SR-S018	A
Subtotal	A		22.55	0.00			
BT-W001	L2220	RC-O90-M12-C90	0.42			SR-S018	B
BT-W003	L2220	RC-O90-M11-C90		1.26		SR-S018	B
BT-W033	L2220	RC-O90-M90-C11	0.21			IN-S005	B
FM-B251	L2220	RC-O90-M11-C11		0.4		DP-S002	B
FM-W031	L2220	RC-O11-M90-C11	0			DP-S002	B
FM-W036	L2220	RC-O90-M90-C11	0			DP-S002	B
FM-W089	L2210	RC-O11-M11-C11	0			DP-S002	B
FM-W108	L2220	RC-O11-M90-C90	0			DP-S002	B
FM-W119	L2220	RC-O11-M90-C90	0			DP-S002	B
FM-W306	L2220	RC-O90-M11-C11	0			DP-S002	B
FM-W309	L2210	RC-O11-M90-C90	0			DP-S002	B
FM-W312	L2220	RC-O11-M90-C90	0			DP-S002	B
FM-W313	L2220	RC-O11-M11-C11	0			DP-S002	B
FM-W316	L2220	RC-O11-M90-C11	0			DP-S002	B
FM-W335	L2220	RC-O90-M90-C11	0			DP-S002	B
FM-W378	L2220	RC-O11-M90-C11	0			DP-S002	B
FM-W478	L2220		0.4			DP-S002	B
IN-A064A	L2220	RT-O11-M90-C90	1.6656			DP-S002	B
LL-W008	L2210	RC-O11-M11-C11		12.6		DP-S002	B
LL-W009	L2290	RC-O11-M11-C90		1.28		DP-S002	B
LL-W014	L2220	RC-O11-M11-C11	1.59			DP-S002	B
PA-A019	L2220	RC-O90-M11-C90	10.61			DP-S002	B
PA-A030	L2220	RC-O90-M11-C90	0.52			DP-S002	B
PA-B037	L2210	RT-O11-M90-C14	2.37			DP-S002	B

Table C-2. Thermal treatment of pure organic liquids (L2200) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-B039	L2210	RT-O11-M11-C90	30			DP-S002	B
PA-B052	L2220	RC-O11-M11-C90	31.82			DP-S002	B
PA-C001	L2210	RC-O11-M90-C11	0.97			DP-S002	B
PA-D001	L2220	RC-O11-M11-C14	2.44			DP-S002	B
PA-D048	L2210	RC-O11-M90-C11	0.2			DP-S002	B
PA-D049	L2220	SR	0.41			DP-S002	B
PA-E001	L2290	RC-O11-M90-C11	1.24			DP-S002	B
PA-W002	L2220	RT-O90-M90-C14	0.6			DP-S002	B
PA-W005	L2220	RC-O11-M90-C11	0.05			DP-S002	B
PA-W040	L2210	RT-O11-M12-C90	2.41			DP-S002	B
PO-W040	L2220	RC-O11-M11-C11	0.643			DP-S002	B
RF-W015	L2290	RC-O11-M12-C14	43.31			DS-S001	B
RM-W009	L2210	RC-O11-M90-C11	0			DP-S002	B
RM-W011	L2210	RC-O11-M90-C90	5.6			DP-S002	B
WV-W003	L2210	RC-O11-M90-C11	0.0836			DS-S001	B
WV-W005	L2210	RC-O11-M90-C90	0.0522			DS-S001	B
WV-W009	L2220	RC-O11-M90-C11	0.0023			DS-S001	B
WV-W016	L2220	RC-O11-M90-C90	0.0003			DS-S001	B
WV-W032	L2220	RC-O11-M90-C17	0.0038			DS-S001	B
WV-W044	L2220	RC-O11-M90-C11	0.0183			DS-S001	B
Subtotal	B		137.64	15.54			
LA-W907	L2210	RC-O11-M12-C17	16.62			SA-S810	C
LA-W908	L2220	RC-O11-M12-C17	14.42			SA-S810	C
PX-W024	L2210	RC-O11-M11-C15	0.9			DS-S001	C
PX-W039	L2220	RC-O90-M12-C90	0.05			PX-S804	C
Subtotal	C		31.99				
Total			192.18	15.54			
Total Treatment Train Vol (m3)				207.72			

Table C-3. Thermal treatment of organic process residues (S3200) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
DP-W146	S3200	RT-O11-M12-C90	365.018			DP-S002	A
DP-W158	S3200	RT-O11-M11-C11	69.841			DP-S002	A
DP-W159	S3200	RC-O90-M12-C90	6.706			DP-S002	A
DP-W160	S3200	RC-O11-M12-C11	0.542			DP-S002	A
IN-B057A	S3222		0.018925			IN-S005	A
IN-B073A	S3211		0			IN-S005	A
OR-W057	S3200	RC-O11-M90-C14	0.452			DP-S002	A
OR-W058	S3200	RC-O90-M12-C12	0.013			DP-S002	A
OR-W059	S3200	RT-O90-M12-C15	0.001			DP-S002	A
YP-W196	S3200	RT-O11-M12-C14	45.513			DP-S002	A
YP-W197	S3200	RC-O90-M11-C12	4.506			DP-S002	A
YP-W198	S3200	RT-O11-M12-C17	1.095			DP-S002	A
Subtotal	A		493.71				
BT-W007	S3219	RC-O11-M90-C90	0.42			SR-S018	B
FM-W370	S3223	RC-O11-M90-C11	0.2			DP-S002	B
KA-W014	S3290	RC-O11-M12-C90	0			IN-S005	B
KK-W008	S3290	RC-O11-M12-C90	0			IN-S005	B
KW-W006	S3290	RC-O11-M12-C90	0			SR-S018	B
LL-W026	S3229	RC-O11-M11-C90	0.8			DP-S002	B
PA-F038	S3290	RC-O11-M90-C11	0.2			DP-S002	B
PA-I001	S3290	RC-O11-M90-C11	0.64			DP-S002	B
RM-W003	S3212	RC-O90-M11-C90	1.2			DP-S002	B
RM-W005	S3212	RC-O90-M11-C90	0.23			DP-S002	B
RM-W008	S3212	RC-O11-M90-C90	3.5			DP-S002	B
WS-W005	S3219	RC-O11-M90-C90	0.2			DP-S002	B
WS-W036	S3229	RT-O90-M11-C90	0.4			DP-S002	B
WS-W052	S3229	RC-O11-M90-C90	1.2			DP-S002	B
Subtotal	B		8.99				
IN-A073A	S3211	RC-O90-M12-C90	0			IN-S128	C
KA-W018	S3290	RC-O11-M12-C90		0.033		IN-S128	C
KW-W010	S3290	RC-O11-M12-C90		0		IN-S128	C
PO-W002	S3222	RC-O11-M90-C90	0.416			PO-S902	C
PO-W022	S3229	RC-O11-M12-C90		13.017		PO-S902	C
PO-W024	S3212	RT-O11-M12-C90	119.726			PO-S902	C
PO-W035	S3223	RC-O11-M11-C90	9.701			PO-S902	C

Table C-3. Thermal treatment of organic process residues (S3200) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PO-W058	S3211	RC-O11-M90-C90	157.622			PO-S802	C
PO-W072	S3219	RC-O11-M90-C90	2.496			PO-S902	C
Subtotal	C		289.96	13.05			
Total			792.66	13.05			
Total Treatment Train Vol (m3)				805.71			

L2000, S3200 Stream Treatment Train

STP Preferred Options

Category A

- FEMP Waste Water Treatment System (Incineration Project)
- Area 514 Waste Water Treatment Tank Farm
- Deactivation followed by Stabilization
- Integrated Radioactive Waste Treatment System
- Interim Waste Storage Facility

Category B

- Commercial Offsite Cyanide Destruction

Category C

- Elementary Neutralization
- OR Commercial Treatment - Broad Spectrum
- Ohio Option - Mobile Chem. Tmt Project
- Mobile Evaporative Oxidation Process
- Ohio Option - Stabilization Project
- Commercial Treatment and Disposal - Unassigned Vendor
- Metal Recovery
- Waste Receiving and Processing Facility (WRAP IIA)

Figure C-8. Combustible organics, non-thermal treatment process flow.

Figure C-9. Combustible organics, non-thermal treatment process volumes.

L2000, L2100, L2900 Stream Treatment Train

STP Preferred Options

Category A

- FEMP WW treatment system (Incineration Project)
- Area 514 Waste Water Treatment Tank Farm
- Deactivation followed by Stabilization
- Integrated Radioactive Waste Treatment System

Category B

- Commercial Offsite Cyanide Destruction

Category C

- Elementary Neutralization
- Ohio Option - Mobile Chem. Tmt. Project
- Mobile Evaporative Oxidation Process

Figure C-10. Combustible organics, non-thermal treatment process of aqueous organic liquids treatment train.

L2200 Stream Treatment Train

STP Preferred Options

Category A

Category B

Category C

- Oak Ridge Commercial Treatment - Broad Spectrum
- Ohio Option - Mobile Chem. Tmt. Project
- Ohio Option - Stabilization Project

Figure C-11. Combustible organics, non-thermal treatment of pure organic liquids treatment train.

Table C-4. Non-thermal treatment of aqueous organic liquids (L2000, L2100, L2900) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
LL-W004	L2120	RC-O11-M11-C12		0.94		LL-S004	A
WS-W076	L2000	RC-O11-M90-C13	0.4			WS-S803	A
WV-W007	L2190	RC-O11-M11-C12	0.0218			WV-S001	A
WV-W023	L2100	RC-O90-M90-C12	0.0074			WV-S803	A
WV-W026	L2100	RC-O90-M90-C12	0.0026			WV-S803	A
WV-W043	L2190	RC-O11-M90-C11	0.0019			WV-S001	A
Subtotal	A		0.43	0.94			
PO-W076	L2120	RC-O11-M90-C13	0.304			PO-S903	B
Subtotal	B		0.30				
FM-W208	L2120	RC-O90-M12-C12	0.2			FM-S801	C
FM-W403	L2120	RC-O90-M90-C11	0.2			FM-S801	C
LA-W906	L2190	RC-O11-M11-C14		2.08		GJ-S801C	C
Subtotal	C		0.40	2.08			
Total			1.14	3.02			
Total Treatment Train Vol (m3)				4.16			

Table C-5. Non-thermal treatment of pure organic liquids (L2200) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
FM-W058	L2220	RC-O90-M11-C11	0.2			FM-S801	C
FM-W310	L2220	RC-O90-M11-C90	0.2			OH-S001	C
FM-W429	L2220		0.4			FM-S801	C
YP-W201	L2000	RT-O11-M12-C90	12.178			DP-S814	C
Subtotal	C		12.98				
Total			12.98				
Total Treatment Train Vol (m3)				12.98			

S3200 Stream Treatment Train

STP Preferred Options

Category A

- TSCA Incinerator
- WERF: Incineration - Controlled Air Incinerator

Category B

- TSCA Incinerator
- WERF: Incineration - Controlled Air Incinerator
- Consolidated Incineration Facility - Liquid & Solid Feeds

Category C

- WROC: Mercury Retort for High Mercury Subcat Wastes
- Pretreatment/Regeneration
- Commercial Offsite Incinerator

Figure C-12. Combustible organics, non-thermal treatment of organic process residues treatment train.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	0.0	0.0	0.0	0.0
Category B	0.0	0.0	0.0	0.0
Category C	22.3	1.5	0.0	23.8
Category D	1.4	2.3	0.0	3.7
Category E	4.1	46.0	0.0	50.1
Total	27.8	49.8	0.0	77.6

Needs Characterization - 100%
(23.81 m³)

Figure C-13. Combustible organics, to be determined process volumes.

Table C-6. Non-thermal treatment of organic process residues (S3200) combustible organics.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
FM-W044	S3222	RC-O11-M11-C90	0.4			FM-S801	C
FM-W047	S3222	RT-O11-M11-C90	0.2			FM-S801	C
FM-W145	S3222	RC-O11-M90-C11	3.8			FM-S801	C
FM-W150	S3223	RC-O11-M90-C90	0.2			FM-S801	C
FM-W185	S3222	RC-O11-M90-C11	15.8			FM-S801	C
FM-W187	S3222	RC-O11-M90-C90	10.6			FM-S801	C
FM-W188	S3223	RC-O11-M90-C90	1			FM-S801	C
FM-W194	S3223	RC-O11-M90-C90		0.8		FM-S801	C
FM-W196	S3222	RC-O11-M90-C90	0.8			FM-S801	C
FM-W198	S3223	RC-O11-M90-C90	0.4			FM-S801	C
FM-W229	S3229	RC-O11-M90-C11		0.2		FM-S801	C
FM-W279	S3223	RC-O11-M90-C11	0.2			FM-S801	C
FM-W457	S3222		13			FM-S801	C
FM-W498	S3219		0.2			FM-S801	C
PA-C039	S3222	RT-O11-M90-C11	5			PA-S902	C
PA-E038	S3222	RT-O11-M11-C90	4.68			PA-S902	C
PA-H001	S3223	RC-O90-M90-C11	0.4			PA-S902	C
PA-K049	S3229	RC-O11-M11-C90	8.24			PA-S902	C
PO-W051	S3290	RC-O90-M11-C90	5.996			PO-S807	C
Subtotal	C		70.92	1.00			
Total			70.92	1.00			
Total Treatment Train Vol (m3)				71.92			

Table C-7. Needs characterization/insufficient information combustible organics, need characterization.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
BN-W009	L2900	ST	16.4			BN-S701	C
GA-W010	L2290	ST	0.012			GA-S701	C
GA-W043	L2900		0.02			GA-S701	C
LB-W129	S3211			0.0005		LB-S701	C
LB-W130	S3200			0.00008		LB-S701	C
MD-W019	L2290		1			MD-S701	C
NT-B009	S3229	RC-O11-M11-C12		1.4		NT-S701	C
NT-W002	S3222	RC-O11-M90-C90	0.114			NT-S701	C
NT-W015	L2120	RC-O11-M90-C11	0.21			NT-S701	C
NT-W029	S3220			0.1		NT-S701	C
PA-H006	S3230	RC-O90-M90-C12	3.89			PA-S701	C
PA-J049	S3211	RC-O11-M90-C90	0.32			PA-S701	C
PA-L049	S3230	RC-O11-M90-C90	0.07			PA-S701	C
PA-W047	L2210	RC-O11-M90-C90	0.2			PA-S701	C
WV-W022	L2100	RC-O11-M90-C90	0.0105			WV-S701	C
WV-W042	S3230	RC-O90-M11-C11	0.0652			WV-S701	C
Subtotal	C		22.31	1.50			
Total			22.31	1.50			
Total Treatment Train Vol (m3)				23.81			

Table C-8. Needs characterization/insufficient information combustible organics, TBD.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A021A	L2100	RC-O11-M11-C12	0.3218			IN-S150	D
IN-A318A	S3211	RC-O90-M90-C11		0.424		IN-S150	D
IN-A320A	S3211	RC-O90-M90-C11		1.908		IN-S150	D
RL-W180	L2200	RC-O11-M90-C90	0.208			RL-S803	D
RL-W645	L2290		0.833			RL-S803	D
Subtotal	D		1.36	2.33			
BT-W010	L2220	RT-O11-M11-C90	0.48			IN-S150	E
BT-W029	S3223	RC-O11-M90-C90	0.84			IN-S150	E
BT-W031	S3223	RT-O11-M90-C90	2.73			IN-S150	E
LB-W014	L2900	RC-O11-M12-C14		0		IN-S150	E
LB-W017	L2900	SR		0		IN-S150	E
RF-W017	L2210	RT-O11-M12-C11		39.01		IN-S150	E
RF-W049	L2900	RC-O11-M12-C14		6.94		IN-S150	E
Subtotal	E		4.05	45.95			
Total			5.41	48.28			
Total Treatment Train Vol (m3)				53.69			

 

APPENDIX D

INORGANIC HOMOGENEOUS SOLIDS AND SOILS DETAILED INFORMATION

SUMMARY

Treatment systems were developed on three levels to aid in the development of the MWFA Technical Baseline - Revision 0. Block flow diagrams, process flow diagrams, and treatment trains were generated based on PSTP data, with more detail added at each diagram level. The basic block flow diagram schemes did not change for the MWFA Technical Baseline - Revision 1. However, the process flow diagrams and the treatment trains were reviewed and updated based on current Site Treatment Plan (STP) information. This task involved reviewing the major process steps of each diagram to ensure their accuracy. The facility crosswalk tables associated with each process flow diagram were then updated based on the current STPs. The treatment system data for inorganic homogeneous solids and soils is included in this appendix. Descriptions of the treatment system information contained in Appendix D are given below.

The block flow diagram for inorganic homogeneous solids and soils (Figure D-1) represents a general, upper level description of the treatment process (thermal and stabilization). In all cases, fundamental block steps associated with each key process treatment step (highlighted blocks) were included. These fundamental steps consisted of back-end handling, front-end handling, pretreatment, and disposal. The following figure (Figure D-2) contains a table listing the total waste volumes in inorganic homogeneous solids and soils by category (Category A, Category B, Category C) and radioactivity (LLW, Alpha, Remote-Handled). Included in this figure is a breakdown of the assigned waste volume to be treated under each key treatment block step.

Process flow diagrams represent the next level of detail in the treatment system development. The inorganic homogeneous solids and soils process flow diagrams (Figures D-3, D-9) appear after the block flow diagram to provide additional detail to the treatment stages. The appropriate Category A (existing/on-site), Category B (existing/off-site), Category C (proposed/planned), Category D (privatized/on-site), and Category E (privatized/off-site) STP defined facilities were assigned to each of the process flow diagrams. Typically behind each process flow diagram appears a figure (Figures D-4, D-10) with a listing of the total volume of waste in each category. The waste stream volume calculated for Category C was further broken down into proposed process flows. The Category C waste stream volume breakdown is shown in a pie chart format on the same page as the waste volume table.

Based on STP information and associated documentation, including numerous OAT documents, treatment trains (Figures D-5, D-6, D-7, D-11, D-12, D-13, D-14, D-15, D-16, D-17, D-18, D-19, D-20, D-21) were prepared for each process flow diagram. These treatment trains represent the most detailed description of the technologies associated with each STP. At this point, reference to specific facilities (i.e., IWPF, Mixed Waste Treatment Facility) was removed in order to put this method on a technology-specific basis as opposed to a facility-specific basis. Waste stream inventory tables were generated for each treatment train (Tables D-1 through D-18). The waste stream inventory tables contain the waste streams applicable (or STP assigned) to that treatment train. These tables also categorized the waste stream volume as low level, alpha, or remote handled and identified the treatment facility category (Category A, Category B, Category C, Category D, Category E).

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Figure D-1. Major treatment block flow diagram for inorganic homogeneous solids and soils.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	2749.8	568.5	0.7	3318.9
Category B	47.6	2.4	0.0	50.0
Category C	43080.7	20444.1	849.6	64374.4
Category D	703.0	8441.3	0.0	9144.3
Category E	0.9	20.0	0.0	20.9
Total	46581.9	29476.3	850.3	76908.5

Figure D-2. Inorganic homogeneous solids and soils treatment process volumes.

STP Preferred Options

Category A

- WERF: Incineration - Controlled Air Incinerator
- M-Area Vendor Treatment Process
- Consolidated Incineration Facility - Liquid & Solid Feeds

Category B

- TSCA Incinerator
- DSSI Commercial Facility
- WERF: Incineration - Controlled Air Incinerator
- NSSI Commercial Facility - Incineration

Category C

- Ohio Option - Mobile Chem. Treatment Project
- WERF Incineration - Controlled Air Incinerator
- WROC: Mercury Retort for High Mercury Subcat Wastes
- ICPP - RH Immobilization Facility
- Commercial Offsite Incinerator
- CTMP System 2/4B-LLW Buildings 374/774 Sludge Immobilization

Figure D-3. Inorganic homogeneous solids and soils, thermal treatment process flow.

Figure D-4. Inorganic homogeneous solids and soils, thermal treatment process volumes.

Figure D-5. Inorganic homogeneous solids and soils, thermal treatment process, incineration treatment train.

Table D-1. Inorganic homogeneous solids and soils thermal treatment process. Incineration treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A009	S3130	RC-O11-M11-C90	0.2082			IN-S005	A
IN-A008A	S3000	RC-O11-M90-C90	0.2082			IN-S005	A
IN-A037A	S3121	RC-O11-M90-C90	0.2082			IN-S005	A
IN-A378A	S3114	RC-O11-M90-C90	0.2082			IN-S005	A
SR-W018	S3121	RC-O90-M11-C90		260		SR-S018	A
SR-W028	S3124	RC-O90-M11-C90		1		SR-S018	A
SR-W042	S3131	RC-O11-M12-C11	5.4			SR-S018	A
SR-W046	S3111	RC-O90-M12-C90	0			SR-S018	A
Subtotal	A		6.23	261.00			
FM-W262	S3129	RC-O11-M90-C90		2.2		DP-S002	B
FM-W339	S3149	RC-O90-M90-C11		0.2		DP-S002	B
IN-A435	S3131		0.0189			DP-S002	B
KA-W003	S3114	RC-O11-M90-C90	0.021			IN-S005	B
PA-C037	S3132	RC-O11-M90-C11	0.4			DP-S002	B
PA-D038	S3139	RC-O11-M90-C11	0.72			DP-S002	B
PA-G001	S3132	RC-O11-M90-C11	5.21			DP-S002	B
PA-W003	S3132	RC-O90-M12-C11	8.24			DP-S002	B
WS-W030	S3132	RT-O11-M90-C11	0.2			DP-S002	B
WS-W044	S3132	RT-O11-M12-C11	0.2			DP-S002	B
WV-W010	S3132	RC-O90-M90-C11	0.0241			DS-S001	B
WV-W012	S3132	RC-O90-M11-C11	0.0368			DS-S001	B
WV-W020	S3110	RC-O90-M12-C90	1.6054			NS-S003	B
Subtotal	B		16.68	2.40			
FM-W258	S3190	RC-O90-M11-C11		0.2		FM-S801	C
FM-W381	S3160	RC-O90-M90-C11	0.2			FM-S801	C
PO-W017	S3132	RC-O11-M11-C11	32.89			PO-S902	C
PO-W032	S3132	RC-O11-M11-C11	2.932			PO-S902	C
PO-W066	S3129	RC-O11-M11-C90	8.112			PO-S902	C
Subtotal	C		44.13	0.20			
Total			67.04	263.60			
Total Treatment Train Vol (m3)				330.64

Figure D-6. Inorganic homogeneous solids and soils, thermal treatment process, vitrification treatment train.

Table D-2. Inorganic homogeneous solids and soils thermal treatment process. Vitrification treatment process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
SR-W005	S3121	RC-O90-M11-C90		15.4		SR-S015	A
SR-W029	S3150	RC-O90-M11-C90		1		SR-S015	A
SR-W037	S3120	RC-O90-M11-C90	2503			SR-S015	A
SR-W038	S3120	RC-O90-M11-C90		0.4		SR-S015	A
Subtotal	A		2503.00	16.80			
IN-A193A	S3120	RC-O11-M90-C90			0.424	IN-S152	C
IN-A257A	S3100	RC-O90-M11-C90			0.228	IN-S152	C
IN-A337A	S3100				0.212	IN-S152	C
IN-A387A	S3120	RC-O11-M12-C16			0	IN-S152	C
IN-B244A	S3100				1.64724	IN-S152	C
IN-B245A	S3100			1.351712		IN-S152	C
IN-B247A	S3100			0.9773736		IN-S152	C
IN-B248A	S3100				1.38436	IN-S152	C
IN-B381A	S3100				0.2432	IN-S152	C
Subtotal	C			2.33	4.14		
Total			2503.00	19.13	4.14		
Total Treatment Train Vol (m3)				2526.27

Figure D-7. Inorganic homogeneous solids and soils, thermal treatment process, microwave treatment train.

Table D-3. Inorganic homogeneous solids and soils thermal treatment process. Microwave treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RF-W009	S3121	RC-O11-M12-C16		458.43		RF-S017	C
RF-W022	S3111	RC-O11-M12-C90		10.29		RF-S017	C
Subtotal	C			468.72			
Total				468.72			
Total Treatment Train Vol (m3)				468.72

Figure D-8. Inorganic homogeneous solids and soils, thermal treatment process, non-existing Hg/incineration/stabilization treatment train @ Idaho.

Table D-4. Inorganic homogeneous solids and soils thermal treatment process. Nonexisting mercury/incineration/stabilization treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A033A	S3120	RC-O90-M12-C90		2.2902		IN-S128	C
IN-A046A	S3110	RC-O90-M11-C11	0.4164			IN-S005	C
IN-A053A	S3118	RC-O11-M12-C12	0			IN-S128	C
IN-A059A	S3121	RC-O90-M12-C90	0.8328			IN-S128	C
IN-A102A	S3130	RC-O11-M11-C11	2.298528			IN-S005	C
IN-A388A	S3110	RC-O11-M12-C16	0			IN-S005	C
IN-A391A	S3131	RC-O90-M11-C90	0.0189			IN-S005	C
IN-A405A	S3100	RC-O90-M12-C90	0.2549			IN-S005	C
IN-B075A	S4100			0.01514		IN-S128	C
KW-W011	S3190	RC-O90-M12-C90		0		IN-S128	C
NN-W001	S3131	RC-O90-M11-C90	0.8			IN-S005	C
PS-W006	S3150	RC-O11-M90-C90	0.84			IN-S005	C
Subtotal	C		5.46	2.31			
Total			5.46	2.31			
Total Treatment Train Vol (m3)				7.77

STP Preferred Option

Category A

- Generator Treatment plans at ANL-W
- FEMP Waste Water Tmt Sys (Incineration Project)
- WROC/WERF: Stabilization - Portland Cement
- Generator Tmt Plans at ICPP/Stabilization
- Bldg 513 Solidification Unit
- Area 514 Waste Water Tmt Tank Farm
- C-400-D Lime Precipitation Unit
- Process Waste Tmt Fac.: Bldg 374
- Residue Stabilization
- Chemical Stabilization/Solidification
- Deactivation followed by Stabilization
- Integrated Radioactive Waste Tmt System

Category B

- Envirocare Commercial Facility
- WROC/WERF: Stabilization - Portland Cement
- Cyanide Tmt Fac., Bldg 9201-5N

Category C

- Oak Ridge Com. Option - B/C Pond
- Oak Ridge Com. Tmt - Broad Spectrum
- Oak Ridge Com. Tmt - Sludges
- Commercial Disposal - TSCA Residues
- Ohio Option - Mobile Chem. Tmt Project
- WROC: Macroencapsulation
- WROC/WERF: Stab. - Portland Cement
- ICPP-RH Immobilization Facility
- Los Alamos Com. Stab. or Macroencaps.
- Ohio Option - Stabilization Project
- TRU Processing Fac./WIPP Disposal
- Meets LDR Stand. and/or Needs Sorting Characterization
- Com. Tmt and Disposal - Unassigned Vndr
- Metal Recovery
- CTMP Sys 3-LLW Misc. Waste Forms Immob.
- CTMP Sys 6-LLW Pondcrete Remix
- CTMP Path F Sys -Tmt of MTRU Wastes to Meet WIPP
- Waste Rec. and Processing Fac. (WRAP IIA)
- Encapsulation at Purex
- RH Macro-Contain. Bldg by Treat Variance
- Actions Driven by CERCLA ROD - Y-12

Figure D-9. Inorganic homogeneous solids and soils, stabilization process flow.

Figure D-10. Inorganic homogeneous solids and soils, stabilization process volumes.

Figure D-11. Inorganic homogeneous solids and soils, stabilization process, generator treatment plan treatment train @ Idaho.

Table D-5. Inorganic homogeneous solids and soils stabilization process. Generator treatment plan - treatment train @ Idaho.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A012	S3141	RC-O90-M11-C90			0	AW-S092	A
AW-A016	S3100	RC-O90-M11-C90			0	AW-S092	A
AW-A020	S3000	RC-O90-M11-C90			0.69	AW-S092	A
AW-A021	S5110	RC-O90-M11-C15			0	AW-S092	A
AW-A022	S3150	RC-O90-M11-C90			0	AW-S092	A
Subtotal	A				0.69		
Total					0.69		
Total Treatment Train Vol (m3)				0.69

Table D-6. Inorganic homogeneous solids and soils stabilization process. Decon/macro stabilization @ Idaho treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A019A	S3150	RC-O90-M12-C90	7.0787			IN-S004	A
IN-A032A	S3150	RC-O90-M11-C90	3.2479			IN-S004	A
IN-A048A	S4100	RC-O90-M11-C90	0.0303			IN-S004	A
IN-A060A	S4100	RC-O90-M12-C90	0.6284			IN-S004	A
IN-A078A	S3111	RC-O90-M11-C90	3.4031			IN-S004	A
IN-A079A	S3111	RC-O90-M11-C90	13.9151			IN-S004	A
IN-A087A	S3110	RC-O90-M11-C90	0			IN-S004	A
IN-A121A	S3110	RC-O90-M11-C90	0.22			IN-S004	A
IN-A377A	S3150	RC-O90-M12-C90	1.6239			IN-S004	A
IN-A383A	S4100	RC-O90-M11-C90	0.1136			IN-S004	A
IN-A384A	S4100	RC-O90-M11-C90	0.2082			IN-S004	A
IN-A386A	S3149	RC-O90-M11-C90	2.3091			IN-S004	A
Subtotal	A		32.78				
SR-W049	S3129	RC-O90-M12-C90	1			IN-S004	B
Subtotal	B		1.00				
IN-A155A	S3110	RC-O90-M11-C90	0.0379			IN-S003	C
Subtotal	C		0.04				
Total			33.82				
Total Treatment Train Vol (m3)				33.82

Figures D-13. Inorganic homogeneous solids and soils, stabilization process, polymer/grout treatment train.

Table D-7. Inorganic homogeneous solids and soils stabilization process. Polymer/grout treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
FM-W101	S3129	RC-O11-M11-C11	0			FM-S802	A
IN-A428	S4200		0.1136			IN-S004	A
IN-B102A	S3130		0.199872			IN-S004	A
LL-W002	S3121	RC-O11-M11-C90	137.67			LL-S004	A
LL-W005	S3129	RC-O11-M11-C90		5.2		LL-S002	A
LL-W010	S4100	RC-O11-M11-C90	12.08			LL-S002	A
LL-W023	S4300	RC-O90-M11-C90	6.62			LL-S002	A
LL-W025	S3150	RC-O11-M11-C90		141.3		LL-S002	A
PA-B019	S3149	RC-O90-M11-C90		0.53		PA-S001	A
PA-F006	S3144	RC-O90-M90-C12		0.22		PA-S001	A
PA-L030	S3160	RC-O90-M11-C12		0.01		PA-S001	A
PA-W026	S3149	RC-O90-M11-C90		0.52		PA-S001	A
RF-W080	S3143	RC-O11-M11-C15		130.1		RF-S004	A
WS-W002	S3149	RC-O90-M11-C90	4.3			WS-S004	A
WS-W008	S3132	RC-O90-M12-C11	0.2			WS-S004	A
WS-W024	S3119	RC-O90-M11-C90	1.2			WS-S004	A
WS-W053	S3129	RC-O90-M11-C90	0.6			WS-S004	A
WS-W055	S3119	RC-O90-M11-C90	35.8			WS-S004	A
WS-W071	S3129	RC-O90-M12-C90	6.8			WS-S004	A
WV-W027	S3110	RC-O90-M90-C11	0.4414			WV-S001	A
WV-W033	S3110	RC-O90-M11-C11	0.0008			WV-S001	A
WV-W047	S3110	RC-O90-M11-C90	0.0024			WV-S001	A
Subtotal	A		206.03	277.88			
ET-W009	S3131	RC-O90-M11-C90	13.64			IN-S004	C
ET-W019	S3141	RC-O90-M11-C90	0.64			IN-S004	C
FM-A251	S3149	RC-O90-M11-C11		0.4		OH-S001	C
FM-W059	S4100	RC-O11-M90-C90	0.2			FM-S801	C
FM-W090	S3131	RC-O90-M11-C90	0			OH-S001	C
FM-W156	S3121	RC-O90-M11-C90	46.6			FM-S801	C
FM-W159	S3119	RC-O90-M11-C90	2			FM-S801	C
FM-W166	S3190	RC-O11-M90-C90		0.6		FM-S801	C
FM-W210	S3144	RC-O90-M11-C90	0.4			OH-S001	C
FM-W212	S3143	RC-O90-M11-C11	0.2			FM-S801	C
FM-W224	S3149	RC-O90-M11-C90		1.4		FM-S801	C
FM-W242	S3144	RC-O90-M11-C90		21.2		FM-S801	C
FM-W245	S3119	RC-O90-M11-C90		11.4		FM-S801	C

Table D-7. Inorganic homogeneous solids and soils stabilization process. Polymer/grout treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
FM-W246	S3129	RC-O90-M11-C90		0.2		FM-S801	C
FM-W252	S3149	RC-O90-M11-C90	6.2			FM-S801	C
FM-W259	S3144	RC-O90-M11-C90	4.8			FM-S801	C
FM-W340	S3129	RC-O90-M11-C90	0.4			FM-S801	C
FM-W345	S3144	RC-O90-M11-C90	0.2			OH-S001	C
FM-W361	S3116	RC-O90-M90-C15		4.4		OH-S001	C
FM-W432	S3900		0.6			FM-S801	C
FM-W438	S3144		0.4			FM-S801	C
IN-A020A	S3113	RC-O90-M12-C90	0.9369			IN-S004	C
IN-A035A	S3122	RC-O11-M12-C90	1.8738			IN-S004	C
IN-A075A	S4100	RC-O90-M11-C90	0.28766			IN-S004	C
IN-A146A	S3120	RC-O90-M12-C90			2.082	IN-S152	C
IN-A399A	S4100	RC-O11-M12-C16			0.7419	IN-S152	C
IN-A409A	S4100	RC-O90-M11-C90	7.4573			IN-S004	C
IN-B190A	S3121				1.1137014	IN-S152	C
IN-B191A	S3121				6.8476	IN-S152	C
IN-B216A	S3121			40.2563832		IN-S152	C
IN-B228A	S3121			20.748864		IN-S152	C
IN-B316A	S3150				0.4452	IN-S152	C
IN-B317A	S3150			2.06064		IN-S152	C
IN-B379A	S3122		0.12492			IN-S004	C
IN-D027A	S4000	RC-O90-M11-C90	3.0938			IN-S004	C
KA-W012	S3190	RC-O90-M12-C12		0.346		RL-S007	C
KK-W007	S3190	RC-O11-M12-C12		0.32		RL-S007	C
KW-W005	S3190	RC-O90-M12-C90	0			RL-S007	C
PA-B024	S3190	RC-O90-M11-C90	5.44			PA-S701	C
PA-D039	S4100	RC-O11-M90-C90	3.2			PA-S701	C
PA-E048	S3190	RC-O90-M90-C12	0.04			PA-S701	C
PA-G006	S3160	RC-O90-M90-C12	1.45			PA-S701	C
PA-H049	S3149	RC-O90-M90-C11	0.01			PA-S701	C
PH-W001	S3150	RC-O90-M11-C90	2.14			RL-S007	C
PH-W003	S3131	RC-O90-M11-C90	0.004			RL-S007	C
PN-W002	S3131	RC-O90-M11-C90	0.01			RL-S007	C
PN-W003	S3150	RC-O90-M11-C90	0.21			RL-S007	C
PO-W005	S3129	RC-O11-M11-C90	2.307			PO-S807	C
PO-W026	S3119	RC-O90-M11-C90	50.96			PO-S807	C
PO-W036	S3119	RC-O90-M11-C90	1.248			PO-S807	C

Table D-7. Inorganic homogeneous solids and soils stabilization process. Polymer/grout treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PO-W037	S3129	RC-O90-M11-C90	0.832			PO-S807	C
PO-W075	S3119	RC-O90-M11-C90	0.208			PO-S807	C
PS-W014	S3119	RC-O90-M11-C90	0.05			RL-S007	C
RF-W018	S3150	RC-O11-M12-C14		9415.82		RF-S028	C
RF-W019	S3150	RC-O11-M11-C11		5549.16		RF-S016	C
RF-W088	S3122	RC-O11-M11-C13		1565		RF-S028	C
RL-W018	S3190	RC-O90-M11-C14	105.847			RL-S007	C
RL-W019	S3119	RC-O90-M11-C12	0.888			RL-S007	C
RL-W020	S3129	RC-O90-M12-C14	47.388			RL-S007	C
RL-W022	S3113	RC-O90-M90-C14	15.221			RL-S007	C
RL-W038	S3119	RC-O90-M12-C12	0.02			RL-S007	C
RL-W047	S4200	RC-O90-M11-C90	1.946			RL-S007	C
RL-W048	S4200	RC-O90-M90-C17	1.956			RL-S007	C
RL-W068	S3122	RC-O11-M11-C11	832.654			RL-S007	C
RL-W069	S3122	RC-O11-M11-C11	1874.129			RL-S007	C
RL-W070	S3122	RC-O90-M90-C11	668.01			RL-S007	C
RL-W089	S3119	RC-O90-M11-C90	0.11			RL-S007	C
RL-W094	S3190	ST	36.755			RL-S007	C
RL-W098	S4100	ST	9.119			RL-S007	C
RL-W120	S4200	RC-O90-M12-C90	0.2			RL-S007	C
RL-W121	S4100	RC-O90-M11-C90	0.21			RL-S007	C
RL-W445	S4200	RC-O11-M90-C90	0			RL-S007	C
RL-W581	S3113	RC-O90-M90-C11	0.208			RL-S007	C
RL-W589	S3113	ST-O90-M90-C90	0.208			RL-S007	C
RL-W592	S3129	RC-O90-M11-C90	0.208			RL-S007	C
RL-W593	S3129	RC-O90-M12-C90	2.707			RL-S007	C
RL-W594	S3129	RT-O90-M12-C90	0.416			RL-S007	C
RL-W596	S4200	RC-O90-M12-C90	2.082			RL-S007	C
RL-W614	S3129	RC-O90-M11-C90	0.416			RL-S007	C
RL-W615	S3129	RC-O90-M12-C90	0.208			RL-S007	C
RL-W616	S3129	RT-O90-M11-C90	0.208			RL-S007	C
RL-W617	S3129	RT-O90-M12-C90	0.416			RL-S007	C
RL-W618	S4200	RC-O90-M12-C90	1.041			RL-S007	C
RL-W619	S3190	RC-O90-M12-C90	0.208			RL-S007	C
RL-W620	S4200	RC-O90-M12-C90	0.416			RL-S007	C
RL-W630	S3113	RC-O90-M12-C90	0.208			RL-S007	C
RL-W631	S3129	RC-O90-M11-C90	3.502			RL-S007	C

Table D-7. Inorganic homogeneous solids and soils stabilization process. Polymer/grout treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W633	S3160	RC-O90-M11-C12	2.707			RL-S007	C
RL-W635	S4200	RC-O90-M11-C90	0.208			RL-S007	C
RL-W640	S3141	ST-O90-M90-C90	1.249			RL-S007	C
RL-W648	S3113	RC-O90-M11-C11	0.208			RL-S007	C
RL-W649	S3113	RC-O90-M11-C12	0.208			RL-S007	C
RL-W650	S3113	RC-O90-M11-C90	0.416			RL-S007	C
RL-W651	S3113	RC-O90-M90-C12	0.416			RL-S007	C
RL-W652	S3113	ST-O90-M90-C90	0.833			RL-S007	C
RL-W655	S3119	RC-O90-M11-C90	1.287			RL-S007	C
RL-W656	S3119	RC-O90-M90-C12	0.208			RL-S007	C
RL-W658	S3129	RC-O90-M12-C90	0.208			RL-S007	C
RL-W659	S3142	ST-O90-M90-C90	0.208			RL-S007	C
RL-W660	S3149	ST-O90-M90-C90	0.208			RL-S007	C
RL-W662	S4200	ST-O90-M90-C90	0.208			RL-S007	C
RL-W753	S3900	RC-O11-M11-C90	11.281			RL-S007	C
Subtotal	C		3784.92	16633.31	11.23		
Total			3990.95	16911.19	11.23		
Total Treatment Train Vol (m3)				20913.37

Figure D-14. Inorganic homogeneous solids and soils, stabilization process, TRU stabilization treatment train.

Table D-8. Inorganic homogeneous solids and soils stabilization process. TRU stabilization treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
SR-W053	S3111	RC-O11-M12-C90		0.1		RF-S020	A
Subtotal	A			0.10			
OR-W046	S3100	RC-O90-M12-C90			591.283	OR-S005	C
RF-W008	S4200	RC-O11-M11-C13		1.26		RF-S801	C
RF-W013	S3150	RC-O11-M12-C13		109.41		RF-S801	C
Subtotal	C			110.67	591.28		
Total				110.77	591.28		
Total Treatment Train Vol (m3)				702.05

Figure D-15. Inorganic homogeneous solids and soils, stabilization process, deactivate and stabilize treatment train.

Table D-9. Inorganic homogeneous solids and soils stabilization process. Deactivation/stabilization treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
WS-W019	S3143	RC-O90-M90-C11	1			WS-S803	A
Subtotal	A		1.00				
RF-W010	S3121	RC-O11-M12-C17		149.37		RF-S801	C
RF-W036	S3119	RC-O11-M12-C90		4.2		RF-S801	C
RF-W040	S3111	RC-O11-M12-C90		1.89		RF-S801	C
RF-W058	S3141	RC-O11-M12-C16		2.94		RF-S801	C
RF-W059	S3119	RC-O90-M11-C13		11.97		RF-S801	C
RF-W068	S3129	RC-O11-M12-C12		18.9		RF-S801	C
RF-W076	S3119	RC-O11-M12-C90		0.21		RF-S801	C
Subtotal	C			189.48			
Total			1.00	189.48			
Total Treatment Train Vol (m3)				190.48

Figure D-16. Inorganic homogeneous solids and soils, stabilization process, mobile macroencapsulation treatment train.

Table D-10. Inorganic homogeneous solids and soils stabilization process. Mobile macroencapsulation treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AE-W016	S3121	RC-O90-M12-C90		0.28		AE-S804	A
AE-W017	S3121	RC-O11-M12-C90		0		AE-S804	A
AE-W020	S4100	RC-O90-M12-C90		0.54		AE-S804	A
AE-W022	S4100	RC-O90-M12-C90		0.75		AE-S804	A
AE-W046	S3143			0.45		AE-S804	A
Subtotal	A			2.02			
FM-W080	S4100	RC-O11-M90-C90	0.2			FM-S801	C
FM-W085	S4100	RC-O11-M90-C90	0.2			FM-S801	C
FM-W088	S4100	RC-O11-M90-C90	0.2			FM-S801	C
FM-W091	S4100	RC-O11-M90-C90	0.4			FM-S801	C
FM-W121	S4100	RC-O11-M90-C90	1.2			FM-S801	C
FM-W122	S4100	RC-O11-M90-C90	0.2			FM-S801	C
FM-W165	S3119	RC-O11-M90-C90		0.8		FM-S801	C
FM-W171	S3119	RC-O11-M90-C90		0.2		FM-S801	C
FM-W180	S3141	RC-O90-M11-C90	0.2			FM-S801	C
FM-W206	S3129	RC-O90-M11-C12		0.2		FM-S801	C
FM-W207	S3129	RC-O90-M90-C12	0.2			FM-S801	C
FM-W213	S3143	RC-O90-M11-C11	0.6			FM-S801	C
FM-W221	S3111	RC-O11-M11-C90		1.8		FM-S801	C
FM-W226	S3129	RC-O11-M11-C90		0.4		FM-S801	C
FM-W240	S3144	RC-O11-M90-C90		7.6		FM-S801	C
FM-W241	S3144	RC-O11-M90-C90		1		FM-S801	C
FM-W243	S3144	RC-O11-M90-C90		8.4		FM-S801	C
FM-W247	S3149	RC-O11-M11-C90		0.8		FM-S801	C
FM-W250	S3149	RC-O11-M90-C90	0.2			FM-S801	C
FM-W253	S3119	RC-O11-M90-C90		0.4		FM-S801	C
FM-W265	S3119	RC-O90-M11-C90	0.2			FM-S801	C
FM-W282	S3144	RC-O11-M90-C90		69.4		FM-S801	C
FM-W284	S4100	RC-O11-M90-C90	0.2			FM-S801	C
FM-W341	S3144	RC-O11-M11-C90		0.4		FM-S801	C
FM-W342	S3149	RC-O90-M11-C90		1		OH-S001	C
FM-W367	S3141	RC-O90-M11-C90	13.2			FM-S801	C
FM-W369	S3121	RC-O11-M90-C90	3.8			FM-S801	C
FM-W398	S3144	RC-O90-M11-C90	1.4			FM-S801	C
FM-W436	S3118		0.4			FM-S801	C
FM-W458	S4100		136.8			FM-S801	C

Table D-10. Inorganic homogeneous solids and soils stabilization process. Mobile macroencapsulation treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
FM-W465	S4100		25.6			FM-S801	C
FM-W495	S3114		0.2			FM-S801	C
FM-W502	S3143		3.4			FM-S801	C
SR-W009	S3119	RC-O90-M11-C90			9.86	SR-S809	C
Subtotal	C		188.80	92.40	9.86		
Total			188.80	94.42	9.86		
Total Treatment Train Vol (m3)				293.08

Figure D-17. Inorganic homogeneous solids and soils, stabilization process, commercial treatment train

Table D-11. Inorganic homogeneous solids and soils stabilization process. Commercial treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
DP-W002	S3100	RT-O11-M12-C14	93.453			DP-S819	C
DP-W007	S3100	RT-O11-M12-C11	137.955			DP-S816	C
DP-W011	S3100	RC-O90-M11-C90	10349.783			DP-S813	C
DP-W019	S3100	RC-O90-M11-C90	9150.011			DP-S801	C
DP-W020	S3100	RC-O90-M12-C90	35.95			DP-S809	C
DP-W140	S3100	RT-O11-M11-C90	515.018			DP-S816	C
DP-W141	S3100	RC-O11-M11-C90	307.193			DP-S809	C
DP-W147	S4000	RT-O90-M12-C90	196.137			DP-S814	C
DP-W148	S3100	RC-O11-M12-C90	177.832			DP-S809	C
DP-W155	S3100	RC-O11-M12-C17	4.598			DP-S809	C
DP-W156	S3100	RC-O11-M12-C14	140.434			DP-S809	C
DP-W157	S3100	RT-O11-M12-C11	81.901			DP-S809	C
DP-W161	S4000	RC-O90-M11-C90	27.151			DP-S814	C
DP-W162	S4000	RT-O11-M12-C90	30.528			DP-S814	C
DP-W163	S4000	RT-O11-M12-C90	29.267			DP-S814	C
LA-W904	S4100	RC-O90-M12-C90	10.53			LA-S812	C
LA-W905	S4100	RC-O11-M90-C11		39.32		LA-S812	C
OR-W054	S3100	RC-O11-M12-C17	1.327			DP-S809	C
OR-W055	S3100	RC-O90-M12-C14	1.66			DP-S809	C
OR-W056	S3100	RC-O11-M12-C17	2.21			DP-S809	C
OR-W060	S4000	RC-O90-M11-C12	3.25			DP-S814	C
OR-W061	S4000	RC-O11-M12-C11	0.176			DP-S814	C
OR-W062	S4000	RC-O11-M12-C90	0.662			DP-S814	C
PA-A013	S3121	RC-O11-M11-C12		7.31		PA-S902	C
PA-A020	S3112	RC-O90-M11-C90		6.45		PA-S902	C
PA-A024	S3119	RC-O90-M11-C90	0.21			PA-S902	C
PA-A033	S3119	RC-O90-M12-C90	0.2			PA-S902	C
PA-A034	S3119	RC-O90-M11-C90	0.12			PA-S902	C
PA-B020	S3114	RT-O90-M11-C90	1.64			PA-S902	C
PA-B033	S4100	RC-O90-M12-C90	2.8			PA-S902	C
PA-B038	S3114	RC-O11-M90-C90	0.73			PA-S902	C
PA-C020	S3129	RC-O90-M11-C90	0.4			PA-S902	C
PA-C024	S4100	RC-O90-M11-C90	1.2			PA-S902	C
PA-C030	S4100	RC-O90-M11-C90	0.21			PA-S902	C
PA-C038	S3129	RT-O11-M90-C90	0.43			PA-S902	C
PA-D015	S3129	RC-O90-M11-C90	1.35			PA-S902	C
PA-D020	S3190	RC-O90-M11-C90		78.83		PA-S902	C

Table D-11. Inorganic homogeneous solids and soils stabilization process. Commercial treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-E006	S3129	RC-O90-M90-C12		18.44		PA-S902	C
PA-E049	S3112	RC-O90-M11-C90	0.2			PA-S902	C
PA-F001	S3114	RC-O90-M90-C11	0.2			PA-S902	C
PA-F049	S3114	RC-O11-M90-C90	1.2			PA-S902	C
PA-G049	S3129	RT-O90-M11-C12	0.53			PA-S902	C
PA-W010	S3129	RC-O90-M12-C12	0.64			PA-S902	C
PA-W022	S3121	RC-O90-M11-C90		1.01		PA-S902	C
PA-W023	S3129	RC-O90-M11-C90	0.01			PA-S902	C
PA-W025	S3160	RC-O90-M11-C90	5.16			PA-S902	C
PA-W027	S3121	RC-O90-M11-C90	0.32			PA-S902	C
PA-W028	S3119	RC-O90-M11-C90	0.32			PA-S902	C
PA-W031	S3129	RT-O90-M11-C90	2.56			PA-S902	C
PO-W003	S3112	RC-O90-M11-C90	5.019			DP-S814	C
PO-W015	S3121	RC-O90-M12-C90	308.487			DP-S814	C
PO-W016	S3121	RC-O90-M11-C90		96.14		DP-S814	C
PO-W018	S3115	RC-O11-M12-C90	71.15			DP-S814	C
PO-W027	S3111	RC-O11-M11-C90		10.416		DP-S814	C
PO-W039	S4100	RC-O11-M90-C90	4019.805			DP-S814	C
PO-W042	S3129	RC-O90-M11-C12	14.768			DP-S814	C
PO-W043	S3125	RC-O90-M12-C90	28.08			DP-S814	C
PO-W063	S4100	RC-O90-M11-C90	22.74			DP-S814	C
PO-W064	S3131	RC-O11-M11-C90	4.368			DP-S814	C
PO-W069	S4900	RT-O11-M12-C17	159.952			DP-S814	C
YP-W001	S4000	RT-O11-M11-C90	390.159			YP-S801	C
YP-W002	S4000	RC-O11-M12-C90	2953.867			DP-S814	C
YP-W005	S3100	RC-O11-M11-C90	6539.92			DP-S816	C
YP-W006	S4000	RT-O11-M11-C90	3110.197			YP-S801	C
YP-W193	S3100	RT-O11-M12-C17	4.294			DP-S809	C
YP-W194	S3100	RC-O11-M12-C14	17.941			DP-S809	C
YP-W195	S3100	RT-O11-M12-C14	19.56			DP-S809	C
YP-W199	S4000	RC-O90-M11-C12	1.628			DP-S814	C
YP-W200	S4000	RT-O11-M12-C12	6.795			DP-S814	C
Subtotal	C		38996.19	257.92			
Total			38996.19	257.92			
Total Treatment Train Vol (m3)				39254.10

Figure D-18. Inorganic homogeneous solids and soils, stabilization process, Envirocare treatment train.

Table D-12. Inorganic homogeneous solids and soils stabilization process. Envirocare treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PX-W010	S3111	RC-O90-M12-C90	22.42			EV-S003	B
PX-W041	S4100	RC-O11-M12-C90	0.11			EV-S003	B
PX-W043	S3113	RC-O90-M12-C90	1.87			EV-S003	B
PX-W045	S3111		4.16			EV-S003	B
RM-W006	S3141	RC-O90-M11-C90	1.35			EV-S003	B
RM-W015	S3141	RC-O90-M11-C90	0			EV-S003	B
RM-W016	S3141	RC-O90-M11-C90	0			EV-S003	B
Subtotal	B		29.91				
Total			29.91				
Total Treatment Train Vol (m3)				29.91

Figure D-19. Inorganic homogeneous solids and soils, stabilization process, cyanide destruction/stabilization treatment train.

Table D-13. Inorganic homogeneous solids and soils stabilization process. Cyanide destruction/stabilization treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-B018	S3190	RC-O90-M90-C13	0.01			YP-S003	B
Subtotal	B		0.01				
Total			0.01				
Total Treatment Train Vol (m3)				0.01

Figure D-20. Inorganic homogeneous solids and soils, extraction/oxidation treatment process, mercury, CN, chemical removal and oxidation treatment train.

Table D-14. Inorganic homogeneous solids and soils extraction/oxidation process. Mercury, CN, chemical removal and oxidation treatment train.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RF-W007	S3144	LD		66.15		RF-S019	C
RF-W025	S3114	RC-O11-M11-C90		0.71		RF-S019	C
RF-W050	S4200	RC-O11-M12-C15		444.15		RF-S019	C
RF-W062	S3150	RC-O11-M12-C13		0.42		RF-S019	C
RF-W071	S3129	RC-O11-M12-C17		164.15		RF-S019	C
Subtotal	C			675.58			
Total				675.58			
Total Treatment Train Vol (m3)				675.58

Figure D-21. Inorganic homogeneous solids and soils, TBD process volumes.

Table D-15. Inorganic homogeneous solids and soils additional characterization, targeted to WIPP

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
BC-W004	S4200	RC-O11-M12-C12	0.714			RL-S006	A
RL-W283	S4000	RC-O90-M11-C90		9.776		RL-S006	A
RL-W286	S3110	ST		0.21		RL-S006	A
RL-W310	S4200	RC-O11-M90-C11		0.283		RL-S006	A
RL-W336	S3110	ST		0.42		RL-S006	A
Subtotal	A		0.71	10.69			
AE-W040	S3121	RC-O90-M12-C90		0		WP-S001	C
LA-W047	S3150	RC-O11-M12-C90		152.45		WP-S001	C
LA-W048	S3129	RC-O90-M11-C90		1089.6214		WP-S001	C
LA-W051	S3190	RC-O11-M11-C90		449.8609		WP-S001	C
PA-A015	S3129	RC-O90-M11-C90		0.8		WP-S001	C
RF-W026	S3114	RC-O11-M90-C90		0.21		WP-S001	C
Subtotal	C			1692.94			
Total			0.71	1703.63			
Total Treatment Train Vol (m3)				1704.35			

Table D-16. Inorganic homogeneous solids and soils additional characterization, TRT Variance

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
SR-W060	S3113	RC-O90-M12-C90	0.2			SR-S007	C
Subtotal	C		0.20				
Total			0.20				
Total Treatment Train Vol (m3)				0.20			

Table D-17. Inorganic homogeneous solids and soils additional characterization

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
BN-W005	S3150	RC-O90-M11-C12	2			BN-S701	C
ET-W030	S3150		0.0003			ET-S701	C
LB-W023	S3140	SR		0		LB-S702	C
LB-W122	S3118			0.27		LB-S701	C
LB-W123	S3150			0.859		LB-S701	C
LB-W124	S3114			0.381		LB-S701	C
LB-W125	S3114			0.05		LB-S702	C
LB-W126	S3900			0.0005		LB-S701	C
LB-W127	S3900			0.00108		LB-S701	C
LB-W128	S3900			0.00014		LB-S701	C
LB-W131	S3900			0.0005		LB-S701	C
LL-W022	S3116	RC-O11-M90-C90	16.36			LL-S701	C
MD-W020	S3114		7.3			MD-S701	C
MD-W021	S3114		3.1			MD-S701	C
MD-W023	S3113		5.2			MD-S701	C
NT-A009	S3129	RC-O90-M11-C12		260		NT-S803	C
NT-W005	S4100	RT-O90-M90-C90	0.11			NT-S701	C
NT-W017	S4100	LD	1			NT-S999	C
NT-W018	S4100	LD	0			NT-S999	C
NT-W019	S4100	RC-O90-M11-C90		31.9		NT-S701	C
NT-W026	S4100			2.7		NT-S701	C
OR-W041	S3100	RC-O90-M12-C90			46.929	OR-S802	C
OR-W042	S3100	RC-O90-M12-C90			175.647	OR-S802	C
RL-W161	S3114	RC-O11-M90-C90		1		RL-S701	C
RL-W166	S3114	ST			1	RL-S701	C
RL-W167	S3114	RC-O90-M11-C90		1.2		RL-S701	C
RL-W171	S3110	RC-O90-M11-C90	5.83			RL-S007	C
RL-W172	S3110	RC-O90-M12-C90	0.865			RL-S007	C
RL-W173	S3110	RC-O90-M90-C90	0.208			RL-S007	C
RL-W183	S3110	RC-O90-M12-C90	0.416			RL-S007	C
RL-W198	S3110	RC-O90-M11-C90	1.457			RL-S007	C
RL-W203	S3110	RC-O90-M11-C90	1.476			RL-S007	C
RL-W204	S3110	RC-O90-M12-C90	0.208			RL-S007	C
RL-W205	S3110	RC-O90-M90-C12	1.666			RL-S007	C
RL-W207	S4200	RC-O90-M12-C90	0.833			RL-S007	C
RL-W222	S3150	ST	0.965			RL-S007	C
RL-W224	S3110	ST	2.29			RL-S007	C

Table D-17. Inorganic homogeneous solids and soils additional characterization

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W225	S4200	ST	0.53			RL-S007	C
RL-W480	S3110	RC-O11-M90-C90			0	RL-S701	C
RL-W484	S4200	RC-O11-M90-C90			0	RL-S701	C
RL-W517	S3113	TS-O90-M90-C90		0.21		RL-S701	C
RL-W570	S3190	RC-O11-M90-C90			0	RL-S701	C
RL-W575	S4200	RC-O11-M90-C90			0	RL-S701	C
RL-W578	S3190	RC-O90-M11-C90			0	RL-S701	C
RL-W612	S3111	RC-O90-M11-C90	0.625			RL-S007	C
RL-W716	S3112	RC-O90-M11-C90			9.48	RL-S701	C
RL-W745	S3900	RC-O11-M90-C90			0	RL-S701	C
SR-W031	S3120	RC-O90-M11-C90	0.6			SR-S019	C
SR-W048	S4900	RC-O11-M12-C90		16.8		SR-S019	C
WV-W036	S3131	RC-O11-M11-C90	7.9024			WV-S701	C
WV-W041	S3131	RC-O90-M11-C90		0.0417		WV-S701	C
WV-W049	S3131			2.83		WV-S701	C
Subtotal	C		60.94	318.24	233.06		
Total			60.94	318.24	233.06		
Total Treatment Train Vol (m3)				612.24			

Table D-18. Inorganic Homogeneous Solids and Soils, TBD - Privatized Unit

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A039A	S3110	RC-O90-M12-C90		0.3218		IN-S150	D
IN-A157A	S3150	RC-O11-M11-C12		173.58		IN-S150	D
IN-A159A	S3120	RC-O90-M12-C11		0.848		IN-S150	D
IN-A163A	S3113	RC-O11-M90-C90		0.848		IN-S150	D
IN-A164A	S3114	RC-O11-M90-C90		1.28		IN-S150	D
IN-A165A	S3120	RC-O11-M11-C90		4.028		IN-S150	D
IN-A166A	S3120	RC-O11-M11-C90		15.69		IN-S150	D
IN-A167A	S3150	RC-O11-M90-C90		46.15		IN-S150	D
IN-A168A	S3114	RC-O11-M90-C90		5.088		IN-S150	D
IN-A174A	S3113	RC-O90-M90-C14		151.156		IN-S150	D
IN-A175A	S3113	RC-O90-M90-C14		39.856		IN-S150	D
IN-A176A	S3113	RC-O90-M90-C12		178.928		IN-S150	D
IN-A177A	S3113	RC-O90-M90-C12		176.172		IN-S150	D
IN-A178A	S3150	RC-O11-M12-C12		880.224		IN-S150	D
IN-A179A	S3150	RC-O11-M12-C12		5.512		IN-S150	D
IN-A180A	S3120	RC-O11-M12-C12	63.824			IN-S150	D
IN-A181A	S3120	RC-O11-M12-C12		9.51		IN-S150	D
IN-A182A	S3120	RC-O11-M12-C12		25.36		IN-S150	D
IN-A187A	S3120	RC-O11-M11-C90		0.212		IN-S150	D
IN-A188A	S3120	RC-O11-M12-C12		1.06		IN-S150	D
IN-A190A	S3121	RC-O11-M12-C12		57.8122986		IN-S150	D
IN-A191A	S3121	RC-O11-M12-C12		320.56		IN-S150	D
IN-A192A	S3121	RC-O11-M12-C12		464.28		IN-S150	D
IN-A194A	S3121	RC-O11-M12-C12		285.332		IN-S150	D
IN-A195A	S3113	RC-O11-M90-C12		2.544		IN-S150	D
IN-A196A	S3120	RC-O11-M11-C12		0.212		IN-S150	D
IN-A215A	S3120	RC-O11-M11-C12		4.876		IN-S150	D
IN-A216A	S3121	RC-O11-M12-C12		1740.5		IN-S150	D
IN-A218A	S3121	RC-O11-M12-C12		7.88		IN-S150	D
IN-A219A	S3120	RC-O11-M90-C90		9.54		IN-S150	D
IN-A221A	S3113	RC-O11-M90-C12		1.73		IN-S150	D
IN-A222A	S3120	RC-O11-M11-C12		69.06		IN-S150	D
IN-A223A	S3113	RC-O11-M90-C90		3.18		IN-S150	D
IN-A228A	S3121	RC-O11-M12-C12		1276.05514		IN-S150	D
IN-A229A	S3150	RC-O11-M11-C12		103.88		IN-S150	D
IN-A244A	S3100	RC-O11-M11-C14		163.07676		IN-S150	D
IN-A245A	S3100	RC-O11-M11-C14		167.612288		IN-S150	D

Table D-18. Inorganic Homogeneous Solids and Soils, TBD - Privatized Unit

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A247A	S3100	RC-O11-M11-C12		129.43		IN-S150	D
IN-A248A	S3100	RC-O11-M11-C12		137.05164		IN-S150	D
IN-A249A	S3100	RC-O90-M12-C90		2.756		IN-S150	D
IN-A261A	S4200	RC-O11-M90-C11		99.64		IN-S150	D
IN-A262A	S4200	RC-O90-M12-C12		85.59		IN-S150	D
IN-A263A	S4200	RC-O90-M12-C12		38.04		IN-S150	D
IN-A270A	S4200	RC-O11-M90-C11		28.62		IN-S150	D
IN-A271A	S3190	RC-O90-M12-C90		0.424		IN-S150	D
IN-A309A	S3114	RT-O11-M11-C90		417.12		IN-S150	D
IN-A310A	S3114	RT-O11-M11-C90		1001.852		IN-S150	D
IN-A311A	S3140	RC-O11-M90-C90		4.28		IN-S150	D
IN-A313A	S3143	RC-O90-M90-C11		13.558		IN-S150	D
IN-A314A	S3140	RC-O11-M90-C90		1.06		IN-S150	D
IN-A315A	S3143	RC-O90-M90-C11		0.636		IN-S150	D
IN-A316A	S3150	RC-O11-M11-C90		8.4588		IN-S150	D
IN-A317A	S3150	RC-O11-M11-C90		36.77		IN-S150	D
IN-A331A	S3150	SR		0.636		IN-S150	D
IN-A332A	S3150			0.848		IN-S150	D
IN-A339A	S3100			10.582		IN-S150	D
IN-A346A	S3113	SR	13.464			IN-S150	D
IN-A347A	S3113			54.296		IN-S150	D
IN-A381A	S3100	RC-O11-M12-C16	0.2432			IN-S150	D
RL-W021	S3114	RC-O90-M12-C90	0.21			RL-S803	D
RL-W029	S3114	RC-O90-M11-C14	35.025			RL-S803	D
RL-W031	S3114	RC-O90-M11-C12	1.05			RL-S803	D
RL-W049	S4200	RC-O11-M90-C11	39.678			RL-S803	D
RL-W050	S4200	RC-O11-M90-C90	1.243			RL-S803	D
RL-W051	S4100	RC-O11-M12-C90	0.21			RL-S803	D
RL-W052	S3114	RC-O11-M90-C11	3.085			RL-S803	D
RL-W053	S3114	RC-O11-M11-C11	1.487			RL-S803	D
RL-W054	S3129	RC-O11-M12-C11	10.624			RL-S803	D
RL-W061	S3114	RC-O11-M11-C90	1.05			RL-S803	D
RL-W087	S3119	RC-O11-M90-C90	7.144			RL-S803	D
RL-W090	S3119	RC-O11-M90-C11	17.425			RL-S803	D
RL-W108	S3119	RT-O11-M90-C90	5.6			RL-S803	D
RL-W114	S3119	RC-O11-M11-C12	0.835			RL-S803	D
RL-W119	S4200	RC-O11-M11-C12	0.2			RL-S803	D

Table D-18. Inorganic Homogeneous Solids and Soils, TBD - Privatized Unit

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W122	S4200	RC-O11-M11-C11	10.7			RL-S803	D
RL-W123	S4200	RC-O11-M90-C14	1.24			RL-S803	D
RL-W124	S3119	RC-O11-M12-C90	1.26			RL-S803	D
RL-W140	S4200	RC-O11-M90-C90	67.873			RL-S803	D
RL-W143	S3114	RC-O11-M11-C90	0.322			RL-S803	D
RL-W145	S3114	RC-O11-M90-C90	0.208			RL-S803	D
RL-W148	S3119	RC-O90-M90-C11	0.2			RL-S803	D
RL-W149	S3119	RC-O11-M11-C11	0.208			RL-S803	D
RL-W153	S4100	RC-O11-M11-C11	0.208			RL-S803	D
RL-W170	S3110	RC-O11-M90-C90	1.457			RL-S803	D
RL-W174	S4200	RC-O11-M90-C90	5.83			RL-S803	D
RL-W181	S3110	RC-O11-M11-C90	0.208			RL-S803	D
RL-W182	S3110	RC-O11-M90-C12	19.328			RL-S803	D
RL-W184	S4200	RC-O11-M11-C90	21.817			RL-S803	D
RL-W185	S4200	RC-O11-M90-C12	261.732			RL-S803	D
RL-W196	S3110	RC-O11-M11-C14	4.069			RL-S803	D
RL-W197	S3110	RC-O11-M90-C90	7.495			RL-S803	D
RL-W201	S3110	RC-O11-M12-C14	1.249			RL-S803	D
RL-W202	S3110	RC-O11-M90-C14	2.631			RL-S803	D
RL-W206	S4200	RC-O11-M90-C12	1.041			RL-S803	D
RL-W219	S4200	RT-O11-M11-C90	0.644			RL-S803	D
RL-W231	S4200	RC-O11-M90-C90	31.855			RL-S803	D
RL-W452	S3110	RC-O90-M11-C90	0			RL-S803	D
RL-W454	S3110	RC-O90-M90-C13	0			RL-S803	D
RL-W466	S4200	RC-O11-M90-C90	0			RL-S803	D
RL-W548	S3190	RC-O11-M90-C90	0			RL-S803	D
RL-W559	S3190	RC-O11-M90-C90	0			RL-S803	D
RL-W561	S4200	RC-O11-M90-C90	0			RL-S803	D
RL-W563	S4200	RC-O11-M90-C90	0			RL-S803	D
RL-W565	S4200	RC-O11-M90-C90	0			RL-S803	D
RL-W576	S3140		0			RL-S803	D
RL-W580	S3113	RC-O11-M90-C90	0.208			RL-S803	D
RL-W587	S3112	RC-O11-M90-C90	0.208			RL-S803	D
RL-W588	S3113	RC-O11-M90-C90	2.498			RL-S803	D
RL-W590	S3129		1.457			RL-S803	D
RL-W591	S3129	RC-O11-M90-C90	0.625			RL-S803	D
RL-W595	S3132	RC-O11-M90-C90	1.457			RL-S803	D

Table D-18. Inorganic Homogeneous Solids and Soils, TBD - Privatized Unit

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W613	S3129	RC-O11-M90-C90	0.208			RL-S803	D
RL-W626	S3129		22.694			RL-S803	D
RL-W632	S3132	RC-O11-M90-C90	0.208			RL-S803	D
RL-W634	S4200	RC-O11-M90-C90	1.666			RL-S803	D
RL-W646	S3113		0.208			RL-S803	D
RL-W647	S3113	RC-O11-M90-C90	0.833			RL-S803	D
RL-W653	S3119	RC-O11-M90-C12	0.322			RL-S803	D
RL-W654	S3119	RC-O11-M90-C90	0.322			RL-S803	D
RL-W657	S3129		0.416			RL-S803	D
RL-W661	S4200	RC-O11-M90-C90	11.697			RL-S803	D
RL-W751	S3900		1.457			RL-S803	D
RL-W752	S3900	RC-O11-M11-C90	12.578			RL-S803	D
Subtotal	D		703.03	8465.60			
BT-W005	S3131	RC-O90-M11-C90	0.22			IN-S150	E
BT-W009	S4100	RC-O11-M90-C90	0.63			IN-S150	E
BT-W013	S4100	RC-O11-M90-C90		0.84		IN-S150	E
BT-W017	S3115	RC-O90-M11-C90	0.001			IN-S150	E
KA-W015	S4900	RC-O11-M12-C90		0		IN-S150	E
KA-W019	S3190	RC-O90-M12-C90		0.012		IN-S150	E
KK-W013	S4100	RC-O11-M12-C90		0.02		IN-S150	E
KK-W017	S3900	RT-O11-M12-C90		1.28		IN-S150	E
KW-W009	S4100	RC-O11-M12-C90		0		IN-S150	E
KW-W014	S3900	RT-O90-M11-C11	0			IN-S150	E
RF-W027	S3132	RC-O11-M11-C11		17.87		IN-S150	E
Subtotal	E		0.85	20.02			
Total			703.89	8485.62			
Total Treatment Train Vol (m3)				9189.51			

APPENDIX E

DEBRIS DETAILED INFORMATION

SUMMARY

Treatment systems were developed on three levels to aid in the development of the MWFA Technical Baseline - Revision 0. Block flow diagrams, process flow diagrams, and treatment trains were generated based on PSTP data, with more detail added at each diagram level. The basic block flow diagram schemes did not change for the MWFA Technical Baseline - Revision 1. However, the process flow diagrams and the treatment trains were reviewed and updated based on current Site Treatment Plan (STP) information. This task involved reviewing the major process steps of each diagram to ensure their accuracy. The facility crosswalk tables associated with each process flow diagram were then updated based on the current STPs. The treatment system data for debris is included in this appendix. Descriptions of the treatment system information contained in Appendix E are given below.

The block flow diagram for debris (Figure E-1) represents a general, upper level description of the treatment process (thermal, non-thermal, stabilization, and thermal desorption). In all cases, fundamental block steps associated with each key process treatment step (highlighted blocks) were included. These fundamental steps consisted of back-end handling, front-end handling, pretreatment, and disposal. The following figure (Figure E-2) contains a table listing the total waste volumes in debris by category (Category A, Category B, Category C) and radioactivity (LLW, Alpha, Remote-Handled). Included in this figure is a breakdown of the assigned waste volume to be treated under each key treatment block step.

Process flow diagrams represent the next level of detail in the treatment system development. The debris process flow diagrams (Figures E-3, E-7, E-12, E-15) appear after the block flow diagram to provide additional detail to the treatment stages. The appropriate Category A (existing/on-site), Category B (existing/off-site), Category C (proposed/planned), Category D (privatized/on-site), and Category E (privatized/off-site) STP defined facilities were assigned to each of the process flow diagrams. Typically, behind each process flow diagram appears a figure (Figures E-4, E-8, E-13, E-16, E-19) with a listing of the total volume of waste in each category. The waste stream volume calculated for Category C was further broken down into proposed process flows. The Category C waste stream volume breakdown is shown in a pie chart format on the same page as the waste volume table.

Based on STP information and associated documentation including numerous OAT documents, treatment trains (Figures E-5, E-6, E-9, E-10, E-11, E-14, E-17, E-18) were prepared for each process flow diagram. These treatment trains represent the most detailed description of the technologies associated with each STP. At this point, reference to specific facilities (i.e., IWPF, Mixed Waste Treatment Facility) was removed in order to put this method on a technology-specific basis as opposed to a facility-specific basis. Waste stream inventory tables were generated for each treatment train (Tables E-1 through E-11). The waste stream inventory tables contain the waste streams applicable (or STP assigned) to that treatment train. These tables also categorized the waste stream volume as low level, alpha, or remote handled and identified the treatment facility category (Category A, Category B, Category C, Category D, Category E).

FIGURES

E-1	Major treatment block flow diagram for debris.....	E-7
E-2	Debris treatment process volumes.....	E-8
E-3	Debris, thermal treatment process flow.....	E-9
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E-5	Debris, thermal treatment process, incineration treatment train.....	E-11
E-6	Debris, thermal treatment process, melter treatment train.....	E-17
E-7	Debris, non-thermal treatment process flow.....	E-20
E-8	Debris, non-thermal treatment process volumes.....	E-21
E-9	Debris, non-thermal treatment process, MTRU WIPP treatment train (MIR 1000-5000).....	E-22
E-10	Debris, non-thermal treatment process, decontamination treatment train.....	E-28
E-11	Debris, non-thermal treatment process, HEPA leach treatment train.....	E-30
E-12	Debris, stabilization treatment process flow.....	E-32
E-13	Debris, stabilization treatment process volumes.....	E-33
E-14	Debris, stabilization treatment process, encapsulation treatment train.....	E-34
E-15	Debris, thermal desorption treatment process flow.....	E-41
E-16	Debris, thermal desorption treatment process volumes.....	E-42
E-17	Debris, thermal desorption treatment process, desorption treatment train.....	E-43
E-18	Debris, thermal desorption treatment process, Hg treatment train.....	E-45
E-19	Debris, TBD process volumes.....	E-46

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E-1	Debris, thermal treatment, incineration.....	E-12
E-2	Debris, thermal treatment, melter.....	E-18
E-3	Debris, non-thermal treatment, MTRU WIPP.....	E-23

E-4	Debris, non-thermal treatment, decontamination.....	E-29
E-5	Debris, non-thermal treatment, HEPA leach.....	E-31
E-6	Debris, stabilization treatment, encapsulation.....	E-35
E-7	Debris, thermal desorption, desorption.....	E-44
E-8	Debris, thermal desorption, mercury treatment.....	E-46
E-9	Debris, TBD, additional characterization.....	E-48
E-10	Debris, TBD, Contractual privatized treatment.....	E-50
E-11	Debris, TBD, unknown.....	E-55

Figure E-1. Major treatment block flow diagram for debris.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	2325.1	1116.2	45.4	3486.7
Category B	201.2	4.7	0.0	206.0
Category C	5123.2	15847.9	836.3	21807.4
Category D	96.8	51255.0	0.0	51351.8
Category E	32.6	94.4	0.0	127.0
Total	7779.0	68318.2	881.7	76978.8

Figure E-2. Debris treatment process volumes.

STP Preferred Options

Category A

- TSCA Incinerator
- FEMP Waste Water Treatment System
- WERF Incinerator
- CIF Incinerator

Category B

- TSCA Incinerator
- WERF Incinerator
- NSSI Incinerator
- CIF Incinerator
- Contact Size Reduction Facility (CSRF)

Category C

- Remote Treatment Facility (RTF)
- TSCA Incinerator
- Mobile Chemical Treatment Project
- RH Immobilization Facility
- Commercial Offsite Incinerator
- MTRU & 10-100 nCi/g Characterization Treatment

Figure E-3. Debris, thermal treatment process flow.

Figure E-4. Debris, thermal treatment process volumes.

Figure E-5. Debris, thermal treatment process, incineration treatment train.

Table E-1. Debris - thermal treatment, incineration.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A001	S5400	RC-O90-M11-C90	0.412236			IN-S005	A
AW-A013	S5400	RC-O90-M12-C90	0			IN-S005	A
AW-B002	S5300		0.027345			IN-S005	A
AW-B037	S5112		0.099			IN-S005	A
DP-W004	S5300	RT-O11-M12-C90	6.981			DP-S002	A
DP-W167	S5300	RT-O11-M11-C90	94.907			DP-S002	A
DP-W168	S5300	RC-O90-M12-C12	45.753			DP-S002	A
DP-W169	S5300	RT-O11-M12-C90	6.109			DP-S002	A
FM-W424	S5330		0			FM-S802	A
IN-A027A	S5410	RC-O90-M11-C90	1.160175			IN-S005	A
IN-A047A	S5300	RC-O11-M11-C90	0.2082			IN-S005	A
IN-A049A	S5300	RC-O90-M12-C90	0.56214			IN-S005	A
IN-A057A	S5440	RC-O11-M11-C90	0.056775			IN-S005	A
IN-A109A	S5300	RC-O90-M11-C90	1.7609724			IN-S005	A
IN-A110A	S5300	RC-O90-M12-C90	4.596336			IN-S005	A
IN-A115A	S5440	RC-O11-M90-C90	0.1			IN-S005	A
IN-A122A	S5300	RC-O11-M12-C16	30.627232			IN-S005	A
IN-A124A	S5300	RC-O90-M12-C90	1.2905244			IN-S005	A
IN-A125A	S5400	RC-O11-M11-C90	0.48			IN-S005	A
IN-A156A	S5440	RC-O90-M11-C90	0.4164			IN-S005	A
IN-A382A	S5300	RC-O11-M12-C11	5.4661			IN-S005	A
IN-A407A	S5440	RC-O90-M12-C90	0.3218			IN-S005	A
IN-A414	S5313		0			IN-S005	A
IN-A430	S5300		0			IN-S005	A
IN-B020A	S5300		0.3123			IN-S005	A
IN-B072A	S5410		0.20501			IN-S005	A
OR-W066	S5300	RT-O11-M11-C11	0.68			DP-S002	A
OR-W067	S5300	RC-O90-M11-C90	1.018			DP-S002	A
SR-W003	S5330	RC-O11-M12-C90	9.3			SR-S018	A
SR-W012	S5300	RC-O11-M12-C90		3.2		SR-S018	A
SR-W051	S5410	RC-O90-M12-C90	0.8			SR-S018	A
SR-W055	S5000	RC-O11-M90-C90		739		SR-S018	A
SR-W073	S5310	RC-O90-M11-C90		1.8		SR-S018	A
YP-W205	S5300	RT-O11-M11-C14	38.171			DP-S002	A
YP-W206	S5300	RC-O90-M11-C12	14.482			DP-S002	A
YP-W207	S5300	RT-O11-M12-C16	2.265			DP-S002	A

Table E-1. Debris - thermal treatment, incineration.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
Subtotal	A		268.57	744.00			
AE-W031	S5390	RC-O11-M90-C90	0			DP-S002	B
BN-W011	U9999	TS	0.28			DP-S002	B
BT-W002	S5330	RC-O11-M90-C90		0.21		SR-S018	B
CN-W001	S5330	RC-O90-M11-C90	0.7			SR-S018	B
CN-W004	S5410	RC-O90-M11-C90	1			SR-S018	B
FM-W442	S5490		0.2			DP-S002	B
IN-A436	S5330		0.6246			DP-S002	B
KA-W006	S5390	RC-O11-M90-C90	0.342			IN-S005	B
KA-W009	S5390	RC-O11-M12-C90	0.461			IN-S005	B
KA-W013	S5390	RC-O11-M90-C90	0.001			IN-S005	B
KK-W005	S5440	RC-O11-M12-C90	1.02			IN-S005	B
KK-W009	S5390	RC-O11-M90-C90	0			IN-S005	B
KW-W003	S5390	RC-O11-M12-C90	0			SR-S018	B
LB-W009	S5440	RT-O11-M12-C11	0.0224			IN-S005	B
LL-W015	S5410	RC-O11-M12-C90	3.49			IN-S005	B
NN-W002	S5330	RC-O90-M11-C90	0.24			SR-S018	B
PA-B013	S5390	RC-O90-M11-C12	0.2			DP-S002	B
PA-B034	S5330	RC-O90-M11-C90	0.6			DP-S002	B
PA-C019	S5390	RC-O90-M11-C90	0.02			DP-S002	B
PA-C032	S5330	RC-O11-M11-C90	0.6			DP-S002	B
PA-D024	S5330	RT-O90-M11-C90	3.06			DP-S002	B
PA-E033	S5313	RC-O90-M12-C90	0.6			DP-S002	B
PA-F030	S5390	RC-O90-M11-C90	3.01			DP-S002	B
PA-F033	S5390	RC-O90-M12-C90	0.62			DP-S002	B
PA-G020	S5319	RC-O90-M11-C90	0.2			DP-S002	B
PA-G048	S5390	RC-O11-M90-C11	0.2			DP-S002	B
PA-H020	S5330	RT-O90-M11-C90	1.26			DP-S002	B
PA-I006	S5319	RC-O90-M90-C12	1.76			DP-S002	B
PA-I020	S5390	RC-O90-M12-C90	1.83			DP-S002	B
PA-J020	S5490	RT-O90-M11-C90	0.2			DP-S002	B
PA-J038	S5319	RT-O11-M90-C90	1.8			DP-S002	B
PA-K001	S5330	RC-O90-M90-C11	0.2			DP-S002	B
PA-K038	S5320	RT-O11-M90-C90	8			DP-S002	B
PA-L038	S5330	RC-O11-M90-C11	13.33			DP-S002	B
PA-M038	S5390	RT-O11-M11-C11	43.95			DP-S002	B

Table E-1. Debris - thermal treatment, incineration.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-N049	S5312	RC-O11-M11-C12	0.6			DP-S002	B
PA-O049	S5330	RT-O11-M11-C90	1.03			DP-S002	B
PA-P049	S5390	RC-O11-M11-C90	1.32			DP-S002	B
PH-W004	S5330	RC-O90-M11-C90	0.23			IN-S005	B
PN-W015	S5390	RC-O90-M11-C90	0			SR-S018	B
PS-W005	S5330	RC-O11-M90-C90	6.83			IN-S005	B
PS-W009	S5440	RC-O11-M90-C90	0.02			IN-S005	B
PS-W011	S5900	RC-O11-M11-C90	0.19			IN-S005	B
WV-W038	S5122	RC-O90-M12-C90	0.2882			NS-S003	B
WV-W040	S5110	TS	1.9315			WV-S802	B
Subtotal	B		102.26	0.21			
FM-W002	S5390	RC-O11-M90-C90	0.2			FM-S801	C
FM-W010	S5330	RC-O11-M11-C90	1.2			FM-S801	C
FM-W015	S5390	RC-O11-M90-C90	0.4			FM-S801	C
FM-W017	S5330	RC-O11-M12-C90	0.2			FM-S801	C
FM-W018	S5390	RC-O11-M11-C90	0.2			FM-S801	C
FM-W021	S5330	RC-O11-M11-C90	0.4			FM-S801	C
FM-W024	S5390	RC-O11-M90-C90	0.4			FM-S801	C
FM-W028	S5330	RC-O11-M11-C90	0.2			FM-S801	C
FM-W038	S5190	RC-O90-M12-C90	0.2			FM-S801	C
FM-W040	S5440	RC-O11-M11-C90	0			FM-S801	C
FM-W072	S5490	RC-O11-M90-C90	0.2			FM-S801	C
FM-W073	S5490	RC-O11-M90-C90	0.2			FM-S801	C
FM-W086	S5330	RC-O11-M90-C90	0.2			FM-S801	C
FM-W100	S5125	RC-O90-M12-C90	1.6			FM-S801	C
FM-W102	S5112	RC-O90-M11-C90	0.2			FM-S801	C
FM-W106	S5330	RC-O11-M90-C90	0.2			FM-S801	C
FM-W118	S5490	RC-O11-M90-C90	3.8			FM-S801	C
FM-W123	S5112	RC-O90-M11-C90	2.8			FM-S801	C
FM-W125	S5490	RC-O90-M11-C90	4.8			FM-S801	C
FM-W134	S5490	RC-O11-M90-C90	1.8			FM-S801	C
FM-W142	S5490	RT-O11-M11-C90	3.8			FM-S801	C
FM-W143	S5490	RC-O11-M90-C90	0.4			FM-S801	C
FM-W144	S5123	RC-O90-M11-C90	4.4			FM-S801	C
FM-W175	S5390	RC-O11-M11-C90		1.4		FM-S801	C
FM-W204	S5420	RC-O11-M90-C90	0.8			FM-S801	C

Table E-1. Debris - thermal treatment, incineration.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
FM-W214	S9000	RC-O11-M90-C11	0.4			FM-S801	C
FM-W217	S5330	RC-O11-M90-C90	0.8			FM-S801	C
FM-W219	S5126	RC-O11-M90-C90		0.4		FM-S801	C
FM-W222	S5330	RC-O90-M11-C90	0.2			FM-S801	C
FM-W269	S5330	RC-O11-M90-C90	0.8			FM-S801	C
FM-W299	S5490	RC-O11-M11-C90	0.6			FM-S801	C
FM-W300	S5390	RC-O11-M90-C90	0.2			FM-S801	C
FM-W305	S5490	RC-O11-M90-C90	1.2			FM-S801	C
FM-W326	S5190	RC-O90-M12-C90	0			FM-S801	C
FM-W349	S5330		0.2			FM-S801	C
FM-W373	S5490	RC-O11-M90-C90	1			FM-S801	C
FM-W374	S5111	RC-O11-M90-C90	0.4			FM-S801	C
FM-W375	S5112	RC-O90-M11-C90	0.4			FM-S801	C
FM-W425	S5330		0.2			FM-S801	C
FM-W443	S5121		1			FM-S801	C
FM-W444	S5410		0.2			FM-S801	C
FM-W445	S5440		0.2			FM-S801	C
FM-W449	S5490		0.4			FM-S801	C
FM-W450	S5121		0.2			FM-S801	C
FM-W451	S5490		2.4			FM-S801	C
FM-W452	S5119		1.2			FM-S801	C
FM-W453	S5119		0.4			FM-S801	C
FM-W454	S5121		2.4			FM-S801	C
FM-W455	S5490		2.2			FM-S801	C
FM-W456	S5490		4			FM-S801	C
FM-W459	S5490		4.8			FM-S801	C
FM-W460	S5450		25.2			FM-S801	C
FM-W463	S5440		0.2			FM-S801	C
FM-W464	S5490		0.2			FM-S801	C
FM-W481	S9000		0.2			FM-S801	C
PO-W001	S5440	RC-O11-M90-C90	19.383			PO-S902	C
PO-W013	S5390	RC-O90-M11-C90	94.44			PO-S902	C
PO-W021	S5440	RC-O90-M11-C90	3.536			PO-S902	C
PO-W038	S5390	RC-O11-M90-C90	290.39			PO-S902	C
PO-W045	S5119	RC-O11-M11-C90	5.635			PO-S902	C
PO-W052	S5440	RC-O11-M12-C90		268.493		PO-S902	C
PO-W060	S5490	RC-O11-M11-C90	312.861			PO-S902	C

Table E-1. Debris - thermal treatment, incineration.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PO-W062	S5390	RC-O90-M11-C90	6.24			PO-S902	C
PO-W065	S5490	RC-O11-M11-C11	8.378			PO-S902	C
PO-W071	S5490	RC-O11-M90-C90	1.248			PO-S902	C
SR-W006	L2000	RC-O90-M90-C11		0.1		SR-S701	C
SR-W025	S5400	RC-O11-M12-C17		3604.8		SR-S701	C
SR-W026	S5400	RC-O11-M12-C17		92.4		SR-S701	C
SR-W027	S5400	RC-O11-M12-C17		3362		SR-S701	C
SR-W033	S5400	RC-O11-M12-C17		8		SR-S701	C
YP-W003	S5300	RC-O11-M12-C90	7.592			DP-S002	C
Subtotal	C		829.90	7337.59			
Total			1200.73	8081.80			
Total Treatment Train Vol (m3)				9282.54

Figure E-6. Debris, thermal treatment process, melter treatment train.

Table E-2. Debris - thermal treatment, melter.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A018	X7520	RC-O90-M90-C15			14.0241	AW-S007	C
AW-A019	X7520	RC-O90-M90-C15			0.2549	AW-S007	C
AW-B024	S5320				0.12724	IN-S152	C
IN-A340A	S5400	SR			0.424	IN-S152	C
IN-A341A	S5440				0.212	IN-S152	C
IN-A342A	S5110				3.812	IN-S152	C
IN-A349A	S5400			24.74		IN-S152	C
IN-B158A	S5440				89.792955	IN-S152	C
IN-B160A	S5440				138.26886	IN-S152	C
IN-B169A	S5440			52.5492604		IN-S152	C
IN-B197A	S5440			56.42965		IN-S152	C
IN-B198A	S5310			1.1756082		IN-S152	C
IN-B208A	S5410			1.3119		IN-S152	C
IN-B217A	S5310				3.388224	IN-S152	C
IN-B234A	S5410				0.8268	IN-S152	C
IN-B242A	S5122				1.908	IN-S152	C
IN-B243A	S5122			3.2943834		IN-S152	C
IN-B252A	S5311			11.8090984		IN-S152	C
IN-B253A	S5311				0.4876	IN-S152	C
IN-B254A	S5311			0.81408		IN-S152	C
IN-B255A	S5311				0.106	IN-S152	C
IN-B260A	S5300			15.624824		IN-S152	C
IN-B268A	S5110				0.3276036	IN-S152	C
IN-B282A	S5420				21.7512	IN-S152	C
IN-B283A	S5420			0.954		IN-S152	C
IN-B293A	S5420				2.0377416	IN-S152	C
IN-B294A	S5420			5.939014		IN-S152	C
IN-B295A	S5420				33.44017	IN-S152	C
IN-B296A	S5420			16.7789952		IN-S152	C
IN-B297A	S5420				2.862	IN-S152	C
IN-B298A	S5420			7.4604		IN-S152	C
IN-B306A	S5400			203.959137		IN-S152	C
IN-B307A	S5400				1.422096	IN-S152	C
IN-B308A	S5400			1.6558624		IN-S152	C
IN-B352A	S5400				149.6826	IN-S152	C
IN-C109A	S5300	RC-O90-M11-C90			0.0177876	IN-S152	C
IN-C124A	S5300	RC-O90-M12-C90			0.0130356	IN-S152	C

Table E-2. Debris - thermal treatment, melter.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-D110A	S5300	RC-O90-M12-C90			1.27676	IN-S152	C
IN-D122A	S5300	RC-O11-M12-C16			38.28404	IN-S152	C
Subtotal	C			404.50	504.75		
Total				404.50	504.75		
Total Treatment Train Vol (m3)				909.24

STP Preferred Options

Category A

- MTRU Precip./Filtration System
- HEPA Filter Leaching Sys (HFLS)
- ICPP Debris Treat & Contain. Facility
- Waste Handling & Solidification, Bldg 774
- Waste Rec. & Processing Fac (WRAP I)
- ITP & LW Treatment
- Tmt of Lab Wastes as a 90-day Generator

Category B

- Contact Size Reduction Facility (CSRF)

Category C

- Surface Decon Unit
- Characterization Required
- TRU Waste Certification
- TRU Processing Facility
- CTMP Path F System
- Sorting of Hazardous Debris
- WIPP Option

Figure E-7. Debris, non-thermal treatment process flow.

Figure E-8. Debris, non-thermal treatment process volumes.

* Note: Receive, sort, transfer step also includes characterization

Figure E-9. Debris, non-thermal treatment process, MTRU WIPP treatment train (MWIR 1000-5000).

Table E-3. Debris - non thermal treatment, MTRU WIPP.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AE-W038	X6200	RC-O90-M11-C12		0.93		AE-S806	A
RF-W063	L2900	RC-O11-M12-C17		1.06		RF-S013	A
RF-W089	L1290	RC-O90-M11-C12		11.37		RF-S001	A
RF-W094	L1130	RC-O90-M11-C12		41.69		RF-S001	A
RL-W276	X7210	ST			1.26	RL-S006	A
RL-W277	X7210	RC-O90-M11-C90		0.57		RL-S006	A
RL-W278	S5400	RC-O90-M11-C90		0.42		RL-S006	A
RL-W279	S5400	ST		5.04		RL-S006	A
RL-W281	X6200	RC-O11-M11-C11		0.322		RL-S006	A
RL-W282	S5300	ST		0.322		RL-S006	A
RL-W284	U9999	RC-O90-M11-C90		0.208		RL-S006	A
RL-W285	S5400	RC-O11-M90-C11		1.212		RL-S006	A
RL-W287	S5400	RC-O90-M11-C12		2.514		RL-S006	A
RL-W289	S5300	RC-O90-M11-C12		1.05		RL-S006	A
RL-W290	S5400	RC-O90-M11-C90		3.144		RL-S006	A
RL-W291	S5400	RC-O90-M11-C90		7.136		RL-S006	A
RL-W292	S5400	RC-O90-M11-C12		0.21		RL-S006	A
RL-W293	S5300	RC-O90-M11-C90		1.47		RL-S006	A
RL-W294	S5400	RC-O90-M12-C90		0.626		RL-S006	A
RL-W295	S5400	RC-O90-M90-C12		1.89		RL-S006	A
RL-W296	S5300	RC-O90-M90-C12		2.73		RL-S006	A
RL-W297	S5400	ST		1.68		RL-S006	A
RL-W298	S5400	ST		14.486		RL-S006	A
RL-W299	S5400	RC-O90-M11-C12		0.63		RL-S006	A
RL-W300	S5300	RC-O90-M11-C90		0.42		RL-S006	A
RL-W301	S5400	RC-O90-M11-C90		0.42		RL-S006	A
RL-W302	S5400	RC-O90-M11-C90		0.408		RL-S006	A
RL-W303	S5400	ST		0.208		RL-S006	A
RL-W304	S5400	ST		0.208		RL-S006	A
RL-W305	S5400	RC-O11-M11-C90		3.331		RL-S006	A
RL-W307	S5400	RC-O11-M11-C12		2.04		RL-S006	A
RL-W308	S5400	RC-O11-M90-C90		0.624		RL-S006	A
RL-W311	S5400	RC-O90-M11-C90		2.1		RL-S006	A
RL-W312	S5400	RC-O90-M11-C12		0.42		RL-S006	A
RL-W315	S5400	RC-O90-M11-C11		0.208		RL-S006	A
RL-W317	S5400	RC-O90-M12-C90		2.934		RL-S006	A
RL-W318	S5400	RC-O90-M12-C12		1.874		RL-S006	A

Table E-3. Debris - non thermal treatment, MTRU WIPP.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W319	S5110	RC-O90-M12-C90		7.136		RL-S006	A
RL-W322	S5400	RC-O90-M12-C12		0.626		RL-S006	A
RL-W324	S5400	RC-O90-M90-C12		3.59		RL-S006	A
RL-W325	S5400	RC-O90-M90-C12		0.208		RL-S006	A
RL-W326	X6100	RC-O11-M90-C11		1.874		RL-S006	A
RL-W327	S5400	RT-O90-M12-C90		26.431		RL-S006	A
RL-W329	X6100	RT-O90-M90-C11		2.1		RL-S006	A
RL-W330	S5400	ST		28.041		RL-S006	A
RL-W331	S5400	ST		57.201		RL-S006	A
RL-W332	U9999	ST		0.227		RL-S006	A
RL-W335	S5400	ST		2.508		RL-S006	A
RL-W337	X7210	ST			0.81	RL-S006	A
RL-W338	S5400	RC-O11-M11-C14		0.208		RL-S006	A
RL-W339	X7210	RC-O90-M12-C90		0.21		RL-S006	A
RL-W340	S5300	RC-O90-M90-C12		0.21		RL-S006	A
RL-W341	S5400	RC-O11-M12-C90		1.041		RL-S006	A
RL-W342	S5400	RC-O11-M12-C90		0.625		RL-S006	A
RL-W344	S5300	RC-O11-M90-C90		0.208		RL-S006	A
RL-W345	S5400	ST		2.1		RL-S006	A
RL-W346	S5400	RC-O90-M11-C90		0.208		RL-S006	A
RL-W347	S5400	RC-O90-M12-C90		0.208		RL-S006	A
RL-W348	S5300	RC-O90-M12-C12		0.208		RL-S006	A
RL-W349	X7210	RC-O90-M11-C90		0.208		RL-S006	A
RL-W350	S5400	ST		0.21		RL-S006	A
RL-W421	U9999	RC-O90-M90-C90			0	RL-S006	A
RL-W436	S5119	RC-O11-M11-C12			0	RL-S006	A
RL-W499	X7219	RC-O90-M11-C90		0.208		RL-S006	A
RL-W500	U9999	RC-O11-M90-C90		4.2		RL-S006	A
RL-W501	S5440	ST-O90-M90-C90		1.05		RL-S006	A
RL-W502	S5119	ST-O90-M90-C90		1.05		RL-S006	A
RL-W503	S5900	RC-O90-M11-C90		1.872		RL-S006	A
RL-W504	S5410	RC-O90-M12-C90		0.208		RL-S006	A
RL-W505	S5440	RC-O90-M90-C12		0.42		RL-S006	A
RL-W506	S5440	ST-O90-M90-C90		1.678		RL-S006	A
RL-W507	X7220	RC-O90-M11-C90		0.21		RL-S006	A
RL-W508	S5410	ST-O90-M90-C90		2.316		RL-S006	A
RL-W509	S5440	RC-O90-M11-C90		1.881		RL-S006	A

Table E-3. Debris - non thermal treatment, MTRU WIPP.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W510	S5900	RC-O90-M11-C90		16.708		RL-S006	A
RL-W511	S5440	RC-O90-M11-C12		0.42		RL-S006	A
RL-W512	S5319	RC-O90-M12-C90		0.42		RL-S006	A
RL-W513	U9999	RC-O90-M12-C90		0.208		RL-S006	A
RL-W514	U9999	RC-O90-M12-C12		0.21		RL-S006	A
RL-W518	S5440	RC-O11-M11-C90		0.946		RL-S006	A
RL-W519	S5900	RC-O90-M11-C90		0.208		RL-S006	A
RL-W541	U9999	RC-O90-M90-C90		0		RL-S006	A
Subtotal	A			285.70		2.07	
WV-W024	X7210	RC-O90-M11-C90		0.0761		WV-S802	B
Subtotal	B			0.08			
AE-W039	S3211	RC-O90-M11-C90		0		WP-S001	C
AE-W041	X7211	RC-O90-M11-C90		0.63		WP-S001	C
AE-W042	S5113	RC-O90-M11-C90		0.42		WP-S001	C
IN-W157	S3150	RC-O11-M11-C12		53.248		IN-S505	C
IN-W161	S5123	RC-O11-M90-C90		16.432		IN-S505	C
IN-W164	S3114	RC-O11-M90-C90		0.624		IN-S505	C
IN-W166	S3120	RC-O11-M11-C90		55.12		IN-S505	C
IN-W167	S3150	RC-O11-M90-C90		117.936		IN-S505	C
IN-W169	S5440	RC-O11-M11-C90		18.304		IN-S505	C
IN-W186	S5300	RC-O11-M11-C90		0.624		IN-S505	C
IN-W191	S3121	RC-O11-M12-C12		14.976		IN-S505	C
IN-W197	S5440	RC-O11-M11-C14		19.968		IN-S505	C
IN-W198	S5310	RC-O11-M11-C90		36.816		IN-S505	C
IN-W205	S5300	RC-O11-M11-C90		0.416		IN-S505	C
IN-W206	S5410	RC-O11-M90-C14		35.568		IN-S505	C
IN-W208	S5410	RC-O11-M90-C14		2.496		IN-S505	C
IN-W209	S5410	RC-O11-M90-C14		3.328		IN-S505	C
IN-W211	S5410	RC-O11-M90-C14		211.328		IN-S505	C
IN-W212	S5410	RC-O11-M90-C14		3.328		IN-S505	C
IN-W216	S3121	RC-O11-M12-C12		751.088		IN-S505	C
IN-W218	S3121	RC-O11-M12-C12		453.648		IN-S505	C
IN-W220	S3121	RC-O11-M12-C12		577.824		IN-S505	C
IN-W221	S3113	RC-O11-M90-C12		12.688		IN-S505	C
IN-W222	S3120	RC-O11-M11-C12		41.392		IN-S505	C

Table E-3. Debris - non thermal treatment, MTRU WIPP.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-W230	S5120	RC-O11-M90-C90		9.776		IN-S505	C
IN-W240	S5122	RC-O11-M12-C12		7.696		IN-S505	C
IN-W243	S5122	RC-O11-M11-C12		55.12		IN-S505	C
IN-W247	S3100	RC-O11-M11-C12		69.056		IN-S505	C
IN-W250	S5311	RC-O90-M11-C90		36.4		IN-S505	C
IN-W252	S5311	RC-O11-M11-C90		13.104		IN-S505	C
IN-W265	S5300	RC-O11-M90-C90		9.36		IN-S505	C
IN-W272	S5126	RC-O11-M90-C90		1.872		IN-S505	C
IN-W275	S5126	RC-O11-M90-C90		0.832		IN-S505	C
IN-W276	S5126	RC-O11-M90-C90		139.776		IN-S505	C
IN-W289	S5400	RC-O11-M12-C90		0.208		IN-S505	C
IN-W294	S5420	RC-O11-M11-C90		11.232		IN-S505	C
IN-W296	S5420	RC-O11-M11-C90		80.496		IN-S505	C
IN-W297	S5420	RC-O11-M11-C90		21.008		IN-S505	C
IN-W300	S5420	RC-O11-M11-C90		14.56		IN-S505	C
IN-W309	S3114	RT-O11-M11-C90		152.256		IN-S505	C
IN-W311	S3140	RC-O11-M90-C90		2.288		IN-S505	C
IN-W317	S3150	RC-O11-M11-C90		12.688		IN-S505	C
KA-W016	S5000	RC-O11-M12-C90			0	WP-S001	C
LA-W046	S5112	RC-O11-M11-C90		1472.9336		WP-S001	C
LA-W049	S5490	RC-O11-M11-C90		184.179		WP-S001	C
LA-W050	S5190	RC-O90-M11-C90		211.184		WP-S001	C
LA-W052	S5490	RC-O11-M90-C90		142.2513		WP-S001	C
LB-W101	L2190	SR		0.00001		LB-S701	C
MD-W003	S5311	RC-O90-M11-C90		1.6		WP-S001	C
MD-W018	L2210			0.02		WP-S001	C
MD-W022	X7219			0.6		WP-S001	C
MU-W002	S5440	RC-O90-M11-C90		0.2		WP-S001	C
NT-W001	S5490	RC-O11-M11-C17		610		NT-S801	C
OR-W040	S5400	RC-O90-M12-C90			206.611	OR-S005	C
OR-W044	S5400	RC-O90-M12-C90		74.612		OR-S005	C
OR-W045	S9000	RC-O90-M12-C90		6.773		OR-S005	C
OR-W047	S5400	RC-O90-M12-C90		22.782		OR-S005	C
PA-B015	L1190	RC-O90-M11-C12		0.64		WP-S001	C
PA-W014	L1220	RC-O90-M90-C12		0.32		WP-S001	C
RF-W011	S5112	RC-O11-M11-C12		19.12		RF-S801	C
RF-W012	S5440	RC-O11-M12-C16		155.3		RF-S801	C

Table E-3. Debris - non thermal treatment, MTRU WIPP.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RF-W028	X7219	RC-O90-M11-C90		4.2		WP-S001	C
RF-W029	S5311	RC-O90-M11-C13		26.88		RF-S801	C
RF-W032	S5122	RC-O90-M12-C90		11.59		RF-S801	C
RF-W037	S5119	RC-O90-M11-C90		1.47		RF-S801	C
RF-W041	S5311	RC-O90-M11-C13		27.72		RF-S801	C
RF-W052	S5122	RC-O11-M12-C90		7.35		RF-S801	C
RF-W056	S5123	RC-O90-M90-C13		1.05		RF-S801	C
RF-W057	S5129	RC-O11-M90-C13		0.63		WP-S001	C
RF-W066	S5410	RC-O11-M12-C17		20.18		RF-S801	C
RF-W067	S5410	RC-O11-M90-C15		0.63		RF-S801	C
RF-W090	X6900	RC-O90-M90-C14		0.63		RF-S801	C
RF-W091	L2900	RC-O11-M11-C14		3.32		RF-S801	C
RF-W092	S5330	RT-O11-M90-C90		0.63		RF-S801	C
RF-W096	S5330	RC-O11-M11-C90		2.31		WP-S001	C
Subtotal	C			6077.03	206.61		
Total				6362.82	208.68		
Total Treatment Train Vol (m3)				6571.50

Figure E-10. Debris, non-thermal treatment process, decontamination treatment train.

Table E-4. Debris - non thermal treatment, decontamination.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A066A	S5312	RC-O90-M11-C90	8.1121			IN-S033	A
IN-A106A	S5110	RC-O90-M12-C90		8.2447		IN-S033	A
IN-A108A	S5110	RC-O90-M11-C90		1.199		IN-S033	A
IN-A118A	S5110	RC-O90-M11-C90		37.107		IN-S033	A
IN-A379A	S5400	RC-O90-M12-C90		0.29148		IN-S033	A
IN-B027A	S5400			3.40318		IN-S033	A
IN-B028A	S5110			10.45632		IN-S033	A
IN-B049A	S5420			0.06246		IN-S033	A
IN-B109A	S5420			0.1956636		IN-S033	A
IN-B111A	S5300			3.119545		IN-S033	A
IN-B124A	S5420			0.1433916		IN-S033	A
IN-C110A	S5300	RC-O90-M12-C90			0.127676	IN-S033	A
IN-C122A	S5400	RC-O11-M12-C16			4.785505	IN-S033	A
IN-D109A	S5420	RC-O90-M11-C90			0.0019764	IN-S033	A
IN-D124A	S5420	RC-O90-M12-C90			0.0014484	IN-S033	A
IN-E122A	S5400	RC-O11-M12-C16			4.785505	IN-S033	A
SR-W020	S5420	RC-O11-M12-C90			0	SR-S802	A
SR-W058	S5122	RC-O90-M12-C90			0.1	SR-S803	A
Subtotal	A		8.11	64.22	9.80		
WV-W046	S5119	RC-O90-M11-C90	0.0001			WV-S802	B
Subtotal	B		0.00				
AE-W024	S5119	RC-O90-M11-C90		0.51		AE-S805	C
SA-W910	S5490	RC-O11-M11-C15	29			SA-S812	C
Subtotal	C		29.00	0.51			
Total			37.11	64.73	9.80		
Total Treatment Train Vol (m3)				111.65

Figure E-11. Debris, non-thermal treatment process, HEPA leach treatment train.

Table E-5. Debris - non thermal treatment, HEPA leach.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A024	S5410	RC-O90-M11-C90			2.41756	IN-S030	A
AW-B028	S5410			0.045305		IN-S030	A
IN-A112A	S5410	RC-O11-M12-C16			31.0783	IN-S030	A
IN-A123A	S5410	RC-O11-M12-C16		20.5544		IN-S030	A
IN-A126A	S5410	RC-O11-M12-C16		1.6996		IN-S030	A
Subtotal	A			22.30	33.50		
Total				22.30	33.50		
Total Treatment Train Vol (m3)				55.80

STP Preferred Options

Category A	Category B	Category C
<ul style="list-style-type: none"> • WROC • SCDF • Mobile Reactive Metals Skid • Chemical Stabilization/Solidification • Decontamination/Stabilization 	<ul style="list-style-type: none"> • Envirocare • WROC 	<ul style="list-style-type: none"> • OR Commercial Treatment • CPP 659 • Ohio Option - Stabilization Project • Mobile Macroencapsulation • CTMP Systems • Waste Receiving & Processing Facility (WRAP IIA)

Figure E-12. Debris, stabilization treatment process flow.

Figure E-13. Debris, stabilization, treatment process volumes.

Figure E-14. Debris, stabilization treatment process, encapsulation treatment train.

Table E-6. Debris - stabilization treatment, encapsulation.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A002	X7210	RC-O90-M11-C90	0.519555			IN-S003	A
AW-B001	S5113		0.004164			IN-S003	A
IN-A014A	S5113	RC-O90-M11-C90	0.2082			IN-S003	A
IN-A068A	S5410	RC-O90-M11-C90	7.7569			IN-S003	A
IN-A069A	S5300	RC-O90-M11-C90	0			IN-S003	A
IN-A071A	S5410	RC-O90-M11-C90	3.80583			IN-S003	A
IN-A074A	S5400	RC-O90-M12-C90	0.79116			IN-S130	A
IN-A151A	S5113	RC-O90-M11-C90	0			IN-S003	A
IN-A385A	S5410	RC-O90-M11-C90	0.2549			IN-S003	A
IN-A396A	S5110	RC-O90-M11-C90	1.8123			IN-S003	A
IN-A412A	Z1200		5.434			IN-S303	A
IN-A431	S5460		0.6435			IN-S003	A
IN-B058A	S5113		2.16714			IN-S003	A
IN-B074A	S5400		0.24984			IN-S003	A
IN-B118A	S5113		4.123			IN-S003	A
LA-W916	S5900	RC-O90-M90-C15	6.05			LA-S003	A
SR-W015	S5110	RC-O90-M12-C90	10.7			SR-S808	A
SR-W072	S5420	RC-O11-M12-C90		0		SR-S808	A
WS-W009	S5490	RC-O90-M11-C90	0.2			WS-S807	A
WS-W011	S5319	RC-O11-M90-C90	0.2			WS-S807	A
WS-W048	S5490	RC-O90-M11-C90	0.2			WS-S004	A
WS-W056	S5129	RC-O90-M11-C90	26			WS-S004	A
WS-W057	S5320	RC-O90-M11-C90	321			WS-S808	A
WS-W058	S5490	RC-O90-M12-C90	13.6			WS-S807	A
WS-W059	S5410	RC-O90-M11-C90	560			WS-S808	A
WS-W070	S5119	RC-O90-M11-C90	1040			WS-S808	A
Subtotal	A		2005.72	0.00			
ET-W026	S5122	RC-O90-M12-C90	0.1			IN-S004	B
IN-A411A	S5112		0.0303			IN-S003	B
IN-A437	S5112		0.0303			IN-S003	B
LL-W007	S5123	RC-O90-M11-C90		3.05		IN-S003	B
MU-W001	S5440	RC-O90-M11-C90		1.4		EV-S003	B
NN-W003	S5119	RC-O90-M11-C90	0.08			IN-S003	B
PA-D030	S5112	RT-O90-M11-C90	11.94			EV-S003	B
PA-E020	S5112	RC-O90-M11-C90	2.4			EV-S003	B
PA-E030	S5123	RC-O90-M11-C90	14			EV-S003	B

Table E-6. Debris - stabilization treatment, encapsulation.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-M049	S5124	RC-O11-M11-C11	0.11			EV-S003	B
PX-W021	S5330	RC-O11-M11-C90	46.11			EV-S003	B
PX-W023	S5330	RC-O11-M12-C90	0.95			EV-S003	B
PX-W025	S5119	RC-O90-M12-C90	4.05			EV-S003	B
PX-W027	S5440	RC-O90-M12-C90	6.21			EV-S003	B
PX-W028	S5122	RC-O90-M12-C90	3.5			EV-S003	B
PX-W029	S5490	RC-O90-M12-C90	3.37			EV-S003	B
PX-W044	S5000	RC-O11-M11-C90	0.21			EV-S003	B
RM-W010	S5390	RC-O90-M11-C90	5.64			EV-S003	B
RM-W013	S5123	RC-O90-M11-C90	0			EV-S003	B
RM-W014	S5330	RC-O90-M11-C90	0.23			EV-S003	B
Subtotal	B		98.96	4.45			
AE-W023	S5121	RC-O90-M11-C90		0.26		AE-S804	C
AE-W026	S5113	RC-O90-M11-C90		6.57		AE-S804	C
AE-W027	S5122	RC-O90-M11-C90		0		AE-S804	C
AE-W028	S5122	RC-O90-M11-C90	0			AE-S804	C
AE-W030	S5390	RC-O11-M11-C90		0.37		AE-S804	C
AE-W034	S5330	RC-O90-M11-C90		0.63		AE-S804	C
AW-A037	S5112		0.891			IN-S003	C
IN-A058A	S5110	RC-O90-M11-C90	41.17566			IN-S102	C
KA-W005	S5125	RC-O90-M12-C90	0.187			RL-S007	C
KA-W010	S5490	RC-O11-M12-C90		0.111		RL-S007	C
KK-W002	S5113	RC-O90-M11-C90	0.02			RL-S007	C
KK-W006	S5190	RC-O11-M12-C90	0.64			RL-S007	C
KW-W004	S5490	RC-O90-M12-C90	0			RL-S007	C
LA-W912	S5390	RC-O11-M12-C15		13.82		PX-S803	C
LA-W921	S5119	RC-O90-M11-C90		18.29		PX-S803	C
LA-W922	S5900	RC-O90-M12-C11	6.87			PX-S803	C
MD-W012	S5311	RC-O90-M11-C90		0.0204		PX-S803	C
PH-W007	S5900	RC-O90-M11-C90	0.04			RL-S007	C
PH-W008	S5119	RC-O90-M11-C90	0.9			RL-S007	C
PN-W004	S5119	RC-O90-M11-C90	0.45			RL-S007	C
PN-W005	S5410	RC-O90-M11-C90	0			RL-S007	C
PO-W025	S5330	RC-O90-M12-C90	0.435			DP-S814	C
PO-W046	S5390	RC-O90-M11-C90	10.623			DP-S814	C
PO-W059	S5440	RC-O11-M12-C90	0.656			DP-S814	C

Table E-6. Debris - stabilization treatment, encapsulation.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PO-W073	S5390	RC-O90-M11-C90	3.12			DP-S814	C
PS-W001	S5390	RC-O90-M11-C90	8.49			RL-S007	C
PS-W002	S9000	RC-O90-M11-C90	0.39			RL-S007	C
PS-W017	S5490	RC-O90-M11-C90	6.17			RL-S007	C
RF-W005	S5112	RC-O11-M12-C13		211.75		RF-S019	C
RF-W030	S5311	RC-O90-M11-C90		4.2		RF-S016	C
RF-W031	S5311	RC-O90-M11-C13		0.21		RF-S016	C
RF-W035	S5112	RC-O90-M11-C90		7.39		RF-S016	C
RF-W042	S5119	RC-O90-M12-C90		0.73		RF-S019	C
RF-W043	S5122	RC-O90-M12-C90		1.47		RF-S019	C
RF-W045	S5129	RC-O11-M12-C13		3.99		RF-S019	C
RF-W074	S5410	RC-O11-M90-C11		8.61		RF-S019	C
RF-W075	S5410	RC-O11-M12-C17		7.7		RF-S019	C
RL-W023	S5490	RC-O90-M11-C12	19.629			RL-S007	C
RL-W024	S5420	RC-O90-M11-C90	3.36			RL-S007	C
RL-W025	S5420	RC-O90-M12-C16	2.626			RL-S007	C
RL-W026	S5190	RC-O90-M12-C90	4.728			RL-S007	C
RL-W028	S5420	RC-O90-M90-C14	3.068			RL-S007	C
RL-W030	S5490	RC-O11-M11-C90	12.72			RL-S007	C
RL-W032	S5440	RC-O90-M12-C12	14.279			RL-S007	C
RL-W033	S5490	RC-O11-M90-C17	1.046			RL-S007	C
RL-W036	S5122	RC-O90-M11-C90	0.63			RL-S007	C
RL-W041	S5440	RC-O90-M90-C17	13.187			RL-S007	C
RL-W055	S5490	RC-O11-M90-C11	55.388			RL-S007	C
RL-W056	S5410	RC-O11-M90-C90	58.314			RL-S007	C
RL-W057	S5390	RC-O11-M90-C14	227.314			RL-S007	C
RL-W058	S5440	RC-O11-M11-C11	13.036			RL-S007	C
RL-W059	S5490	RC-O11-M11-C11	6.48			RL-S007	C
RL-W060	S5440	RC-O11-M90-C11	34.01			RL-S007	C
RL-W093	S5490	ST	18.89			RL-S007	C
RL-W095	S5420	ST	119.416			RL-S007	C
RL-W097	S5440	ST	10.584			RL-S007	C
RL-W113	S5490	RC-O11-M11-C90		15		RL-S007	C
RL-W115	S5440	RC-O90-M11-C90	1.24			RL-S007	C
RL-W116	S5440	RC-O11-M90-C11	1.815			RL-S007	C
RL-W117	S5440	RC-O11-M11-C90	0.2			RL-S007	C
RL-W118	S5440	RC-O11-M12-C12	1.05			RL-S007	C

Table E-6. Debris - stabilization treatment, encapsulation.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W126	S5440	RC-O90-M12-C90	0.2			RL-S007	C
RL-W127	S5440	RC-O11-M90-C14	1.041			RL-S007	C
RL-W128	S5440	RC-O11-M11-C11	0.208			RL-S007	C
RL-W129	S5490	RC-O11-M11-C11	0.834			RL-S007	C
RL-W131	S5440	RC-O11-M12-C11	0.2			RL-S007	C
RL-W141	S5410	RC-O90-M11-C90	10.56			RL-S007	C
RL-W142	S5119	RC-O11-M11-C12	12.742			RL-S007	C
RL-W146	S5440	RC-O11-M90-C11	0.418			RL-S007	C
RL-W150	S5420	RC-O90-M12-C90	0.208			RL-S007	C
RL-W151	S5420	RC-O11-M11-C90	0.2			RL-S007	C
RL-W175	S5110	RC-O90-M90-C90	1.249			RL-S007	C
RL-W176	S5300	RC-O11-M90-C11	5.83			RL-S007	C
RL-W186	S5110	RC-O11-M11-C90	121.838			RL-S007	C
RL-W187	S5120	RC-O11-M90-C90	26.561			RL-S007	C
RL-W188	S5125	RC-O11-M90-C90	126.759			RL-S007	C
RL-W189	S5300	RC-O11-M90-C14	1257.531			RL-S007	C
RL-W190	S5400	RC-O11-M90-C12	63.202			RL-S007	C
RL-W199	S5400	RC-O11-M11-C90	0.416			RL-S007	C
RL-W200	S5110	RC-O11-M90-C17	8.252			RL-S007	C
RL-W208	S5110	RC-O90-M11-C12	16.383			RL-S007	C
RL-W209	S5125	RC-O90-M11-C90	0.208			RL-S007	C
RL-W210	S5300	RC-O11-M90-C14	47.185			RL-S007	C
RL-W211	S5400	RC-O11-M90-C14	49.769			RL-S007	C
RL-W226	S5120	ST	98.601			RL-S007	C
RL-W227	S5300	ST	0.208			RL-S007	C
RL-W228	S5400	ST	37.534			RL-S007	C
RL-W232	S5110	RC-O11-M11-C90	8.7			RL-S007	C
RL-W233	S5300	RC-O11-M12-C12	43.5			RL-S007	C
RL-W234	S5110	RC-O90-M11-C90	21.7			RL-S007	C
RL-W463	S5400	RC-O11-M90-C90	0			RL-S007	C
RL-W464	S5110	RC-O11-M11-C90	0			RL-S007	C
RL-W465	S5400	RC-O11-M90-C90	0			RL-S007	C
RL-W542	S5119	RC-O90-M11-C90	0			RL-S007	C
RL-W546	S5119	RC-O90-M11-C90	0			RL-S007	C
RL-W551	S5420	RC-O90-M11-C90	0			RL-S007	C
RL-W552	S5390	RC-O11-M90-C90	0			RL-S007	C
RL-W560	S5119	RC-O11-M11-C90	0			RL-S007	C

Table E-6. Debris - stabilization treatment, encapsulation.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W564	S5420	RC-O11-M11-C90	0			RL-S007	C
RL-W579	S5490	RC-O90-M11-C90	0			RL-S007	C
RL-W582	S5440	RC-O11-M90-C90	0.416			RL-S007	C
RL-W597	S5119	RC-O11-M90-C90	0.416			RL-S007	C
RL-W598	S5119	RC-O90-M11-C90	0.416			RL-S007	C
RL-W599	S5119	RC-O90-M12-C90	0.208			RL-S007	C
RL-W600	S5390	RC-O11-M90-C90	1.457			RL-S007	C
RL-W601	S5390	RC-O90-M11-C90	0.625			RL-S007	C
RL-W602	S5390	RC-O90-M12-C90	1.041			RL-S007	C
RL-W603	S5420	RC-O11-M11-C90	0.208			RL-S007	C
RL-W604	S5420	RC-O11-M12-C16	0.208			RL-S007	C
RL-W605	S5420	RC-O90-M11-C90	0.208			RL-S007	C
RL-W606	S5440	RC-O11-M12-C90	0.208			RL-S007	C
RL-W607	S5900	RC-O11-M11-C90	0.208			RL-S007	C
RL-W608	S5900	RC-O11-M90-C13	0.208			RL-S007	C
RL-W609	S5900	RC-O90-M11-C90	0.208			RL-S007	C
RL-W621	S5440	RC-O90-M12-C90	0.625			RL-S007	C
RL-W636	S5410	ST-O90-M90-C90	1.874			RL-S007	C
RL-W637	S9000	RC-O90-M11-C90	0.416			RL-S007	C
RL-W663	S5119	RC-O11-M90-C90	6.483			RL-S007	C
RL-W664	S5119	RC-O90-M11-C90	11.368			RL-S007	C
RL-W665	S5119	RC-O90-M90-C17	8.41			RL-S007	C
RL-W666	S5129	RC-O11-M11-C90	2.532			RL-S007	C
RL-W667	S5190	RC-O11-M11-C90	0.208			RL-S007	C
RL-W668	S5390	RC-O11-M11-C12	0.208			RL-S007	C
RL-W669	S5390	RC-O11-M11-C90	5.016			RL-S007	C
RL-W670	S5390	RC-O11-M90-C12	0.208			RL-S007	C
RL-W671	S5390	RC-O11-M90-C90	36.201			RL-S007	C
RL-W672	S5390	RC-O90-M11-C90	1.874			RL-S007	C
RL-W673	S5390	RC-O90-M12-C90	0.416			RL-S007	C
RL-W674	S5390	RC-O90-M90-C11		39.301		RL-S007	C
RL-W675	S5390	ST-O90-M90-C90	13.506			RL-S007	C
RL-W676	S5410	RC-O11-M11-C90	0.208			RL-S007	C
RL-W677	S5410	RC-O11-M90-C90	15.635			RL-S007	C
RL-W678	S5410	RC-O90-M11-C90	3.008			RL-S007	C
RL-W679	S5410	ST-O90-M90-C90	1.155			RL-S007	C
RL-W680	S5420	RC-O11-M11-C90	15.536			RL-S007	C

Table E-6. Debris - stabilization treatment, encapsulation.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W681	S5420	RC-O11-M90-C90	46.258			RL-S007	C
RL-W683	S5440	RC-O11-M11-C90	16.426			RL-S007	C
RL-W684	S5440	RC-O11-M90-C90	19.727			RL-S007	C
RL-W685	S5440	RC-O90-M11-C12	0.208			RL-S007	C
RL-W686	S5440	RC-O90-M11-C90	0.625			RL-S007	C
RL-W687	S5440	RC-O90-M12-C12	0.208			RL-S007	C
RL-W688	S5440	RC-O90-M12-C90	0.416			RL-S007	C
RL-W689	S5440	RC-O90-M90-C11		0.208		RL-S007	C
RL-W690	S5440	RC-O90-M90-C12	0.416			RL-S007	C
RL-W691	S5440	ST-O90-M90-C90	12.015			RL-S007	C
RL-W692	S5900	RC-O11-M11-C90	25.525			RL-S007	C
RL-W693	S5900	RC-O11-M90-C90	1.476			RL-S007	C
RL-W694	S5900	RC-O90-M11-C90	0.416			RL-S007	C
RL-W695	S5900	RC-O90-M12-C90	3.123			RL-S007	C
RL-W697	S9000	RC-O90-M11-C90	0.208			RL-S007	C
RL-W722	S5390	RC-O11-M90-C90	2.858			RL-S007	C
RL-W723	S5390	RC-O90-M11-C90	0.322			RL-S007	C
RL-W724	S5410	RC-O90-M11-C90	1.282			RL-S007	C
RL-W725	S5410	ST-O90-M90-C90	2.88			RL-S007	C
RL-W726	S5440	RC-O90-M90-C12	0.208			RL-S007	C
RL-W727	S5900	RC-O11-M90-C90	0.208			RL-S007	C
RL-W754	S5900	RC-O11-M11-C90	100.063			RL-S007	C
RL-W758	S9000	RC	20			RL-S007	C
SA-W909	S5190	RC-O11-M12-C12		6.6		PX-S803	C
SA-W912	S5390	RC-O90-M11-C12		0.9		PX-S803	C
SR-W023	S5113	LD			0.3	SR-S808	C
SR-W062	S5110	RC-O90-M12-C90		6.2		SR-S810	C
Subtotal	C		3051.89	354.33	0.30		
Total			5156.58	358.78	0.30		
Total Treatment Train Vol (m3)				5515.66

Figure E-15. Debris, thermal desorption treatment process flow.

Figure E-16. Debris, thermal desorption treatment process volumes.

Figure E-17. Debris, thermal desorption treatment process, desorption treatment train.

Table E-7. Debris - thermal desorption, desorption.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
LA-W911	S5390	RC-O11-M90-C11	28.38			GJ-S801B	C
LA-W919	S5900	RC-O11-M12-C15		7.71		GJ-S801B	C
RF-W006	S5440	RC-O11-M12-C17		1315.1		RF-S019	C
RF-W024	S5122	RC-O11-M12-C90		34.88		RF-S019	C
RF-W081	S5330	RT-O11-M90-C90		10.6		RF-S019	C
SA-W908	S5390	RC-O11-M90-C11	28			GJ-S801B	C
Subtotal	C		56.38	1368.29			
Total			56.38	1368.29			
Total Treatment Train Vol (m3)				1424.67

Figure E-18. Debris, thermal desorption treatment process, Hg treatment train.

Table E-8. Debris - thermal desorption, mercury treatment.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A038	S5440				0	AE-S807	C
BT-W008	S5420	RC-O90-M12-C90	0			IN-S128	C
IN-A072A	S5410	RC-O90-M12-C90	0.01079			IN-S128	C
KK-W014	S5390	RC-O11-M12-C90			0	IN-S128	C
KK-W015	S5190	RC-O90-M12-C90			0.02	IN-S128	C
PO-W061	S5490	RC-O90-M12-C90	6.986			IN-S128	C
Subtotal	C		7.00	0.02			
Total			7.00	0.02			
Total Treatment Train Vol (m3)				7.02

Figure E-19. Debris, TBD process volumes.

Table E-9. Debris - TBD, additional characterization.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
ET-W002	X7211	RC-O90-M11-C90			0.001	ET-S701	C
ET-W018	S5410	RC-O90-M11-C90	32.6			ET-S701	C
ET-W021	S5490	SR			5.2	ET-S701	C
ET-W029	L1190		0.0005			ET-S701	C
ET-W031	L1110		0.0002			ET-S701	C
GA-W014	S5111	RC-O90-M11-C90	1.04			GA-S701	C
GA-W028	S5410	ST	2.1			GA-S701	C
GA-W031	S5330	RC-O11-M90-C90	0.208			GA-S701	C
GA-W037	S9000	RC-O11-M11-C90	1.04			GA-S701	C
LB-W111	L1190	SR		0.0058		LB-S701	C
LL-W018	S5420	RC-O11-M11-C90		196.5		LL-S701	C
MD-W024	S5440		1			MD-S701	C
PA-C033	S5111	RC-O90-M12-C90	0.63			PA-S701	C
PA-F048	S5125	RC-O11-M90-C90	0.2			PA-S701	C
PA-J001	S5119	RC-O90-M90-C11	0.4			PA-S701	C
PA-L001	S5490	RC-O90-M90-C11	0.4			PA-S701	C
PA-N038	S5490	RT-O11-M90-C90	0.6			PA-S701	C
PA-W021	S5111	RC-O90-M11-C90	459.24			PA-S701	C
RL-W163	L1110	RC-O11-M11-C12		3		RL-S701	C
RL-W164	S5110	RC-O90-M11-C90			1	RL-S701	C
RL-W168	S5100	RC-O90-M11-C90		2.5		RL-S701	C
RL-W169	S5129	RC-O11-M90-C90		1		RL-S701	C
RL-W333	S5400	TS		0.42		RL-S701	C
RL-W481	S5110	RC-O90-M11-C90			0	RL-S701	C
RL-W482	S5300	RC-O11-M90-C90			0	RL-S701	C
RL-W483	S5400	RC-O90-M11-C90			0	RL-S701	C
RL-W498	S5110	RC-O11-M11-C90			0	RL-S701	C
RL-W515	S5420	RT-O90-M12-C90		43.346		RL-S701	C
RL-W516	S5900	TS-O90-M90-C90		0.84		RL-S701	C
RL-W566	S5119	RC-O90-M11-C90			0	RL-S701	C
RL-W571	S5119	RC-O11-M11-C90			0	RL-S701	C
RL-W572	S5490	RC-O11-M11-C90			0	RL-S701	C
RL-W573	S5420	RC-O11-M11-C90			0	RL-S701	C
RL-W574	S5390	RC-O11-M90-C90			0	RL-S701	C
RL-W717	S5190	RC-O11-M11-C90			77.62	RL-S701	C
RL-W718	S5410	RC-O11-M11-C90			6.7	RL-S701	C
RL-W719	S5420	RC-O11-M11-C90			11.62	RL-S701	C

Table E-9. Debris - TBD, additional characterization.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W720	S5420	RC-O11-M90-C90			8.3	RL-S701	C
RL-W721	S5900	RC-O11-M11-C90			8.508	RL-S701	C
RL-W742	S5390	RC-O11-M11-C90			0.208	RL-S701	C
RL-W743	S5440	RC-O11-M11-C90			0.208	RL-S701	C
RL-W744	S5900	RC-O90-M11-C90			5.3	RL-S701	C
RL-W746	S5119	RC-O90-M11-C90			0	RL-S701	C
RL-W747	S5129	RC-O90-M90-C90			0	RL-S701	C
RL-W748	S5390	RC-O90-M90-C90			0	RL-S701	C
RL-W749	S5490	RC-O90-M90-C90			0	RL-S701	C
WV-W028	S5440	RC-O11-M11-C90	0.0788			WV-S701	C
WV-W035	S9000	RC-O11-M90-C90	0.0196			WV-S701	C
WV-W048	S5490	RC-O90-M12-C90	125.46			WV-S702	C
WV-W050	L1290			0.312		WV-S701	C
WV-W051	L1290			0.52		WV-S701	C
WV-W052	S5900			17.755		WV-S701	C
Subtotal	C		625.02	266.20	124.66		
Total			625.02	266.20	124.66		
Total Treatment Train Vol (m3)				1015.88			

Table E-10. Debris - TBD, Contractual privatized treatment.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-A026	S5400	RC-O90-M11-C90		4.7006		IN-S150	D
AW-A027	S5311	RC-O90-M11-C90		0		IN-S150	D
AW-A028	S5320	RC-O90-M11-C90		0.860795		IN-S150	D
AW-A036	S5390			18.3289		IN-S150	D
AW-B038	S5440			0		IN-S150	D
IN-A139A	S5400	RC-O90-M11-C90		12.12		IN-S150	D
IN-A158A	S5440	RC-O11-M11-C90		3060.83705		IN-S150	D
IN-A160A	S5440	RC-O11-M11-C14		1314.13514		IN-S150	D
IN-A161A	S5123	RC-O11-M90-C90		94.95		IN-S150	D
IN-A162A	S5123	RC-O11-M90-C90		183.482		IN-S150	D
IN-A169A	S5440	RC-O11-M11-C90		5703.79		IN-S150	D
IN-A170A	S5440	RC-O11-M11-C90		0.424		IN-S150	D
IN-A171A	S5440	RC-O11-M11-C90		3.594		IN-S150	D
IN-A172A	S5440	RC-O11-M90-C90		165.572		IN-S150	D
IN-A173A	S5440	RC-O11-M90-C90		33.708		IN-S150	D
IN-A183A	S5440	RC-O11-M11-C90		3.816		IN-S150	D
IN-A184A	S5440	RC-O11-M11-C90		55.374		IN-S150	D
IN-A185A	S5440	RC-O11-M11-C90		371.102		IN-S150	D
IN-A186A	S5300	RC-O11-M11-C90		2695.98		IN-S150	D
IN-A189A	S5440	RC-O11-M11-C90		6.148		IN-S150	D
IN-A197A	S5440	RC-O11-M11-C14		701.94		IN-S150	D
IN-A198A	S5310	RC-O11-M11-C90		132.39		IN-S150	D
IN-A199A	S5319	RC-O11-M90-C90		1.272		IN-S150	D
IN-A202A	S5320	RC-O11-M11-C90		109.9		IN-S150	D
IN-A203A	S5440	RC-O90-M12-C90		79.886		IN-S150	D
IN-A204A	S5440	RC-O90-M12-C90		1.908		IN-S150	D
IN-A205A	S5300	RC-O11-M11-C90		0.43		IN-S150	D
IN-A206A	S5410	RC-O11-M90-C14		347.73		IN-S150	D
IN-A207A	S5410	RC-O11-M90-C12		1.484		IN-S150	D
IN-A208A	S5410	RC-O11-M90-C14		22.43		IN-S150	D
IN-A209A	S5410	RC-O11-M90-C14		56.83		IN-S150	D
IN-A210A	S5410	RC-O11-M90-C14		3.392		IN-S150	D
IN-A211A	S5410	RC-O11-M90-C14		248.87		IN-S150	D
IN-A212A	S5410	RC-O11-M90-C14		2509.05		IN-S150	D
IN-A213A	S5410	RC-O90-M12-C14		8.056		IN-S150	D
IN-A214A	S5410	RC-O90-M12-C14		0.636		IN-S150	D
IN-A217A	S5310	RC-O11-M11-C90		349.551776		IN-S150	D

Table E-10. Debris - TBD, Contractual privatized treatment.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A224A	S5320	RC-O11-M11-C90		91.304		IN-S150	D
IN-A225A	S5440	RC-O11-M11-C90		22.2		IN-S150	D
IN-A226A	S5440	RC-O90-M12-C90		9.934		IN-S150	D
IN-A227A	S5440	RC-O11-M11-C90		92.372		IN-S150	D
IN-A230A	S5120	RC-O11-M90-C90		8.46		IN-S150	D
IN-A231A	S5120	RC-O11-M90-C90		12.296		IN-S150	D
IN-A232A	S5410	RC-O11-M90-C14		69.164		IN-S150	D
IN-A233A	S5410	RC-O11-M90-C12		0.212		IN-S150	D
IN-A234A	S5410	RC-O11-M90-C14	15.7092			IN-S150	D
IN-A235A	S5410	RC-O11-M90-C14		240.738		IN-S150	D
IN-A237A	S5410	RC-O11-M90-C14		50.446		IN-S150	D
IN-A238A	S5410	RC-O11-M90-C14		94.744		IN-S150	D
IN-A239A	S5410	RC-O11-M90-C14		873.446		IN-S150	D
IN-A240A	S5122	RC-O11-M12-C12		166.91		IN-S150	D
IN-A241A	S5122	RC-O11-M12-C12		6.35		IN-S150	D
IN-A242A	S5122	RC-O11-M11-C12		93.492		IN-S150	D
IN-A243A	S5122	RC-O11-M11-C12		189.28		IN-S150	D
IN-A250A	S5311	RC-O90-M11-C90		27.41		IN-S150	D
IN-A251A	S5300	RC-O90-M11-C90		2.332		IN-S150	D
IN-A252A	S5311	RC-O11-M11-C90		135.32		IN-S150	D
IN-A253A	S5311	RC-O11-M11-C90		4.3884		IN-S150	D
IN-A254A	S5311	RC-O11-M11-C90		9.36192		IN-S150	D
IN-A255A	S5311	RC-O11-M11-C90		0.954		IN-S150	D
IN-A256A	S5310	RC-O90-M11-C90		25.652		IN-S150	D
IN-A260A	S5300	RC-O90-M11-C90		20.839176		IN-S150	D
IN-A264A	S5420	RC-O11-M90-C90		368.036		IN-S150	D
IN-A265A	S5300	RC-O11-M90-C90		43.79		IN-S150	D
IN-A268A	S5420	RC-O90-M11-C12	3.2763964			IN-S150	D
IN-A269A	S5420	RC-O90-M11-C12		27.489		IN-S150	D
IN-A272A	S5126	RC-O11-M90-C90		0.04		IN-S150	D
IN-A273A	S5126	RC-O11-M90-C90		1.272		IN-S150	D
IN-A274A	S5126	RC-O11-M90-C90		18.444		IN-S150	D
IN-A275A	S5126	RC-O11-M90-C90		5.53		IN-S150	D
IN-A276A	S5126	RC-O11-M90-C90		252		IN-S150	D
IN-A277A	S5420	RC-O90-M11-C90		1064.978		IN-S150	D
IN-A278A	S5420	RC-O90-M11-C90		13.952		IN-S150	D
IN-A279A	S5420	RC-O90-M12-C90		836.88		IN-S150	D

Table E-10. Debris - TBD, Contractual privatized treatment.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A280A	S5420	RC-O90-M12-C90		35.404		IN-S150	D
IN-A281A	S5420	RC-O90-M12-C90		370.89		IN-S150	D
IN-A282A	S5420	RC-O11-M11-C14		2.4168		IN-S150	D
IN-A283A	S5420	RC-O11-M11-C14		0.106		IN-S150	D
IN-A284A	S5420	RC-O90-M11-C90		80.5		IN-S150	D
IN-A285A	S5420	RC-O90-M11-C90		64.904		IN-S150	D
IN-A286A	S5400	RC-O11-M12-C90	0.212			IN-S150	D
IN-A287A	S5420	RC-O90-M11-C90		211.85		IN-S150	D
IN-A288A	S5400	RC-O11-M90-C11		371		IN-S150	D
IN-A289A	S5400	RC-O11-M12-C90		25.57		IN-S150	D
IN-A290A	S5420	RC-O90-M11-C90		38.5		IN-S150	D
IN-A291A	S5420	RC-O11-M90-C11		770.094		IN-S150	D
IN-A292A	S5420	RC-O90-M12-C90		2.756		IN-S150	D
IN-A293A	S5420	RC-O11-M11-C90		162.296258		IN-S150	D
IN-A294A	S5420	RC-O11-M11-C90		426.04		IN-S150	D
IN-A295A	S5420	RC-O11-M11-C90		6654.59383		IN-S150	D
IN-A296A	S5420	RC-O11-M11-C90		5146.16		IN-S150	D
IN-A297A	S5420	RC-O11-M11-C90		4.75		IN-S150	D
IN-A298A	S5420	RC-O11-M11-C90		67.1436		IN-S150	D
IN-A299A	S5420	RC-O11-M11-C90		147.536		IN-S150	D
IN-A300A	S5420	RC-O11-M11-C90		1505.62		IN-S150	D
IN-A302A	S5420	RC-O11-M90-C12		106		IN-S150	D
IN-A303A	S5420	RC-O11-M90-C12		62.328		IN-S150	D
IN-A306A	S5400			4288.53286		IN-S150	D
IN-A307A	S5400	SR		135.317904		IN-S150	D
IN-A308A	S5400			4138.00014		IN-S150	D
IN-A319A	S3211	RC-O90-M90-C11		0.848		IN-S150	D
IN-A321A	S3211	RC-O90-M90-C11		4.24		IN-S150	D
IN-A324A	S5400	SR		27.136		IN-S150	D
IN-A325A	S5400			0.424		IN-S150	D
IN-A326A	S5440	SR		0.212		IN-S150	D
IN-A327A	S5300			4.24		IN-S150	D
IN-A328A	S5300	SR		152.852		IN-S150	D
IN-A329A	S5400			1.272		IN-S150	D
IN-A330A	S5300			7.63		IN-S150	D
IN-A333A	S5400	SR		21		IN-S150	D
IN-A334A	S5400			5.512		IN-S150	D

Table E-10. Debris - TBD, Contractual privatized treatment.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A335A	S5300	SR		14		IN-S150	D
IN-A336A	S5300			4.136		IN-S150	D
IN-A338A	S5400			1.272		IN-S150	D
IN-A343A	S5400	SR		28.53		IN-S150	D
IN-A344A	S5420	SR		4.442		IN-S150	D
IN-A345A	S5420			15.008		IN-S150	D
IN-A350A	S5400			0.212		IN-S150	D
IN-A351A	S5400			1.484		IN-S150	D
IN-A352A	S5400	SR		2843.9694		IN-S150	D
IN-B122A	S5120			112.937918		IN-S150	D
IN-B340A	S5490			0.636		IN-S150	D
RL-W027	S5420	RT-O90-M12-C90	9.61			RL-S803	D
RL-W110	S5390	RT-O11-M90-C90	3.4			RL-S803	D
RL-W125	S5440	RT-O11-M11-C11	1.05			RL-S803	D
RL-W139	S5490	RC-O11-M90-C90	48.9			RL-S803	D
RL-W218	S5300	RT-O11-M11-C90	0.833			RL-S803	D
RL-W220	S5300	RT-O11-M11-C90	1.457			RL-S803	D
RL-W682	S5420	RT-O90-M11-C90	12.1			RL-S803	D
RL-W696	S5900	RT-O90-M11-C90	0.208			RL-S803	D
Subtotal	D		96.76	51255.00			
BT-W012	S5440	RT-O11-M90-C90	1.68			IN-S150	E
BT-W020	S5112	RC-O90-M11-C90		0		IN-S150	E
BT-W030	S5440	RC-O11-M90-C90	0.24			IN-S150	E
KA-W021	S5390	RT-O11-M12-C90		0		IN-S150	E
KA-W022	S5190			0.2		IN-S150	E
KK-W018	S5190			0.26		IN-S150	E
LB-W019	S5440	RT-O11-M12-C11		0.001		IN-S150	E
LL-W003	S5420	RC-O11-M12-C90		13.14		IN-S150	E
LL-W006	S5111	RC-O90-M12-C90		18.95		IN-S150	E
LL-W017	S5490	RC-O90-M12-C90		61.8		IN-S150	E
PS-W007	S5490	RT-O90-M11-C90	30.54			IN-S150	E
PS-W012	S9000	RT-O90-M11-C90	0.16			IN-S150	E
Subtotal	E		32.62	94.35			

Table E-10. Debris - TBD, Contractual privatized treatment.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
Total			129.38	51349.35			
Total Treatment Train Vol (m3)				51478.72			

Table E-11. Debris - TBD, unknown.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-D033	S5122	RC-O90-M12-C90	42.74			PA-S903	A
SR-W063	S5420	LD	0			SR-S801	A
Subtotal	A		42.74				
DP-W144	S5100	RT-O11-M12-C90	46.59			DP-S819	C
DP-W145	S5400	RT-O11-M12-C14	82.697			DP-S814	C
DP-W164	S5100	RC-O11-M12-C90	22.59			DP-S814	C
DP-W165	S5100	RC-O11-M12-C90	13.895			DP-S814	C
DP-W166	S5100	RT-O11-M12-C90		1.034		DP-S820	C
DP-W170	S5400	RT-O11-M12-C11		28.679		DP-S820	C
DP-W171	S5400	RT-O11-M12-C90	61.307			DP-S814	C
DP-W184	S5100	RC-O90-M12-C13	107.946			DP-S814	C
OR-W063	S5100	RC-O90-M12-C90	0.274			DP-S814	C
OR-W064	S5100	RT-O90-M12-C11	0.161			DP-S814	C
OR-W065	S5100	RC-O11-M12-C11	0.018			DP-S814	C
OR-W069	S5400	RT-O11-M12-C11	1.311			DP-S814	C
OR-W070	S5400	RT-O11-M12-C17	1.24			DP-S814	C
OR-W081	S9000	RT-O11-M12-C17	2.637			DP-S814	C
OR-W083	S5100	RC-O90-M12-C90	1.313			DP-S814	C
PA-C013	S5410	RC-O90-M11-C12	1.71			PA-S902	C
PA-E024	S5410	RC-O90-M11-C90	0.81			PA-S902	C
PA-F020	S5122	RC-O90-M12-C90	9.61			PA-S902	C
PA-G030	S5410	RC-O90-M11-C90	1			PA-S902	C
PA-G033	S5490	RC-O90-M12-C90	0.61			PA-S902	C
PA-H030	S5490	RC-O90-M11-C90	0.23			PA-S902	C
PA-H038	S5111	RT-O11-M90-C90	3.06			PA-S902	C
PA-I038	S5122	RC-O11-M90-C90	0.2			PA-S902	C
PO-W004	S5490	RC-O90-M12-C90	24.813			PO-S901	C
PO-W020	S5410	RC-O90-M11-C90	58.107			PO-S901	C
PO-W068	S5490	RC-O90-M11-C90	9.417			PO-S901	C
YP-W004	S9000	RC-O90-M12-C90	16.253			DP-S814	C
YP-W202	S5100	RT-O11-M11-C12	3.333			DP-S814	C
YP-W203	S5100	RT-O90-M12-C16	4.846			DP-S814	C
YP-W204	S5100	RT-O11-M12-C12		1.27		DP-S820	C
YP-W208	S5400	RT-O11-M12-C11		8.391		DP-S820	C
YP-W209	S5400	RT-O11-M12-C17	6.087			DP-S814	C
YP-W220	S9000	RT-O11-M12-C17	39.68			DP-S814	C

Table E-11. Debris - TBD, unknown.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
YP-W222	S5100	RC-O90-M12-C90	2.303			DP-S814	C
Subtotal	C		524.05	39.37			
Total			566.79	39.37			
Total Treatment Train Vol (m3)				606.16			

APPENDIX F

UNIQUE WASTE DETAILED INFORMATION

SUMMARY

Treatment systems were developed on three levels to aid in the development of the MWFA Technical Baseline - Revision 0. Block flow diagrams, process flow diagrams, and treatment trains were generated based on PSTP data, with more detail added at each diagram level. The basic block flow diagram schemes did not change for the MWFA Technical Baseline - Revision 1. However, the process flow diagrams and the treatment trains were reviewed and updated based on current Site Treatment Plan (STP) information. This task involved reviewing the major process steps of each diagram to ensure their accuracy. The facility crosswalk tables associated with each process flow diagram were then updated based on the current STPs. The treatment system data for unique is included in this appendix. Descriptions of the treatment system information contained in Appendix F are given below.

The block flow diagram for unique waste (Figure F-1, F-2, F-3) represents a general, upper level description of the treatment process (lab packs, elemental mercury, lead, beryllium, batteries, reactive metals, explosive/propellants, and compressed gases). In all cases, fundamental block steps associated with each key process treatment step (highlighted blocks) were included. These fundamental steps consisted of back-end handling, front-end handling, pretreatment, and disposal. The following figure (Figure F-4) contains a table listing the total waste volumes in unique by category (Category A, Category B, Category C) and radioactivity (LLW, Alpha, Remote-Handled). Included in this figure is a breakdown of the assigned waste volume to be treated under each key treatment block step.

Process flow diagrams represent the next level of detail in the treatment system development. The unique process flow diagrams (Figures F-5, F-7, F-13, F-15, F-19, F-23, F-27, F-30, F-33) appear after the block flow diagram to provide additional detail to the treatment stages. The appropriate Category A (existing/on-site), Category B (existing/off-site), Category C (proposed/planned), Category D (privatized/on-site), and Category E (privatized/off-site) STP defined facilities were assigned to each of the process flow diagrams. Typically behind each process flow diagram appears a figure (Figures F-6, F-8, F-14, F-16, F-20, F-24, F-28, F-31, F-34) with a listing of the total volume of waste in each category. The waste stream volume calculated for Category C was further broken down into proposed process flows. The Category C waste stream volume breakdown is shown in a pie chart format on the same page as the waste volume table.

Based on STP information and associated documentation including numerous OAT documents, treatment trains (Figures F-6, F-9, F-12, F-17, F-18, F-21, F-22, F-25, F-26, F-29, F-32, F-35) were prepared for each process flow diagram. These treatment trains represent the most detailed description of the technologies associated with each STP. At this point, reference to specific facilities (i.e., IWPF, Mixed Waste Treatment Facility) was removed in order to put this method on a technology-specific basis as opposed to a facility-specific basis. Waste stream inventory tables were generated for each treatment train (Tables F-1 through F-16). The waste stream inventory tables contain the waste streams applicable (or STP assigned) to that treatment train. These tables also categorized the waste stream volume as low level, alpha, or remote handled and identified the treatment facility category (Category A, Category B, Category C, Category D, Category E).

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Figure F-1. Major treatment block flow diagram for X6000 lab packs.

X7000 Elemental Mercury

X7200 Lead & X7300 Beryllium

X7400 Series Batteries

Figure F-2. Major treatment block flow diagram for X7000 elemental mercury, X7200 lead & X7300 beryllium, X7400 batteries.

X7500 Reactive Metals

X7600 Explosives/Propellant

X7700 Compressed Gases

Figure F-3. Major treatment block flow diagram for X7500 reactive metals, X7600 explosives/propellant X7700 compressed gases.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	409.2	113.7	0.0	522.9
Category B	169.6	99.7	25.0	294.3
Category C	796.3	510.3	71.5	817.2
Category D	329.8	0.0	0.0	329.8
Category E	0.4	67.2	0.0	67.6
Total	1705.3	790.9	96.5	2592.7

Figure F-4. Unique waste process volumes.

STP Preferred Options

Category A

- WERF: Incineration - Controlled Air Incinerator

Category B

- TSCA Incinerator
- DSSI Commercial Facility
- WERF: Incineration - Controlled Air Incinerator
- Lab Packs Treatment
- Quadrex Commercial Disposal Facility

Category C

Figure F-5. Lab packs, thermal oxidation, process flow.

Figure F-6. Lab packs, incineration treatment train.

Table F-1. Lab packs - incineration process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A001A	X6400	RC-O90-M90-C11	0.2082			IN-S005	A
IN-A005A	X6100	RC-O11-M90-C11	0.2082			IN-S005	A
IN-A376A	X6300	RC-O11-M12-C14	0.3142			IN-S005	A
IN-B098A	X6100		1.081115			IN-S005	A
Subtotal	A		1.81				
BC-W002	X6100	RC-O11-M11-C11	0.009			DP-S002	B
BN-W001	X6900	RC-O90-M90-C14	1.1			DS-S001	B
KK-W004	X6900	RC-O11-M90-C17	0.01			IN-S005	B
KW-W008	X6900	SR	0			IN-S005	B
LB-W008	X6200	RC-O11-M12-C90	0.00644			IN-S005	B
LL-W001	X6400	RC-O11-M90-C11	5.93			DP-S002	B
MD-W001	X6400	RC-O11-M90-C11		12.6		DS-S001	B
NT-W008	X6400	RC-O90-M90-C11	0.3			QX-S004	B
PA-K006	X6200	RT-O90-M90-C12	0.82			DP-S002	B
PA-N001	X6100	RC-O11-M90-C11	0.31			DP-S002	B
PA-O001	X6100	RT-O90-M90-C11	0.8			DP-S002	B
PA-W043	X6100	RC-O11-M90-C11	0.02			DP-S002	B
PO-W031	X6900	RC-O11-M11-C17	4.033			PO-S806	B
WV-W006	X6100	RC-O11-M90-C90	0.0039			DS-S001	B
Subtotal	B		13.34	12.60			
Total			15.15	12.60			
Total Treatment Train Vol (m3)				27.75

STP Preferred Options

Category A

Category B

Category C

- Bldg 306, Precipitation/
Filtration Unit

- Wet Oxidation System
- Waste Receiving & Processing
Facility (WRAP IIA)

Figure F-7. Lab packs, chemical oxidation process flow.

Figure F-8. Lab packs, chemical oxidation process volumes.

Figure F-9. Lab packs, chemical redox treatment train.

Table F-2. Lab packs - chemical redox process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AE-W011	X6200	RC-O90-M11-C12		2.63		AE-S801	B
AE-W012	X6200	RC-O90-M90-C12		0.99		AE-S801	B
AE-W013	X6200	RC-O11-M90-C90		0		AE-S801	B
Subtotal	B			3.62			
AE-W015	X6100	RC-O11-M90-C11		1.39		AE-S802	C
RL-W629	X6200	RC-O90-M90-C11	3.748			RL-S007	C
RL-W642	X6200	RC-O90-M90-C11	0.416			RL-S007	C
RL-W643	X6200	ST-O90-M90-C90	0.416			RL-S007	C
RL-W706	X6200	RC-O90-M11-C90	0.208			RL-S007	C
RL-W707	X6200	RC-O90-M12-C90	0.208			RL-S007	C
RL-W708	X6200	RC-O90-M90-C11	0.625			RL-S007	C
RL-W709	X6200	RC-O90-M90-C12	0.416			RL-S007	C
RL-W710	X6200	ST-O90-M90-C90	0.416			RL-S007	C
RL-W736	X6200	RC-O90-M11-C12	4.372			RL-S007	C
RL-W737	X6200	RC-O90-M11-C90	0.625			RL-S007	C
RL-W738	X6200	RC-O90-M90-C11	1.249			RL-S007	C
RL-W739	X6200	RC-O90-M90-C14	0.416			RL-S007	C
RL-W740	X6200	ST-O90-M90-C90	0.625			RL-S007	C
Subtotal	C		13.74	1.39			
Total			13.74	5.01			
Total Treatment Train Vol (m3)				18.75

STP Preferred Options

Category A

- WROC/WERF: Stabilization - Portland Cement
- Waste Receiving and Processing Facility (WRAP I)
- Integrated Radioactive Waste Treatment System

Category B

- Envirocare Commercial Facility

Category C

- Oak Ridge Commercial Treatment - Broad Spectrum
- Lab Packs Treatment

Figure F-10. Lab packs, stabilization process flow.

Figure F-11. Lab packs, stabilization process volumes.

X6000 Lab Packs
 X6200 Aqueous Lab Packs
 X6400 Scintillation Cocktails
 X6900 Other Lab Packs

Figure F-12. Lab packs, stabilization treatment train.

Table F-3. Lab packs - stabilization process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-A002A	X6200	RC-O90-M11-C12	0.3218			IN-S004	A
IN-A098A	X6200	RC-O11-M12-C14	0.190785			IN-S004	A
KA-W008	X6900	RC-O11-M12-C17		0.002		RL-S006	A
KK-W012	X6900	RC-O11-M12-C17		0		RL-S006	A
KW-W002	X6900	SR	0			RL-S006	A
WV-W013	X6200	RC-O90-M11-C90	0.0898			WV-S001	A
WV-W030	X6200	RC-O90-M11-C90	0.0045			WV-S001	A
Subtotal	A		0.61	0.00			
BC-W001	X6900	RC-O90-M90-C11	0.006			EV-S003	B
Subtotal	B		0.01				
BN-W003	X6300	RC-O90-M90-C13	0.02			DP-S814	C
PO-W030	X6900	RC-O11-M12-C17	5.949			PO-S806	C
PO-W047	X6900	RC-O11-M12-C17	13.092			PO-S806	C
Subtotal	C		19.06				
Total			19.67	0.00			
Total Treatment Train Vol (m3)				19.68

STP Preferred Options

Category A

- Generator Treatment Plans at ANL/Amalgamation
- Waste Already Meets Treatment Standard
- Amalgamation

Category B

- NSSI Commercial Facility - Incineration

Category C

- Amalgamation
- On-Site Treatability Study
- Ohio Option - Mobile Chemical Treatment Project
- WROC: Hg Retort for High Hg Subcategory Wastes
- Meets LDR Standard and/or Needs Sorting Characterization
- Mobile Amalgamation Process (Bench Scale)
- Waste Receiving and Processing Facility (WRAP IIA)
- Evaluating Treatment Options
- Amalgamation at Purex

Figure F-13. Elemental mercury process flow.

Figure F-14. Elemental mercury process volumes.

Table F-4. Elemental mercury - stabilization process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AW-B013	X7100					0 IN-S153	A
SR-W024	X7100	LD	2.3			SR-S801	A
Subtotal	A		2.30			0.00	
WV-W045	X7100	RC-O90-M12-C90	0.0004			NS-S003	B
Subtotal	B		0.00				
AE-W044	X7100			0.02		AE-S807	C
BN-W007	X7100	RC-O90-M12-C90	1.45			BN-S804	C
LA-W920	X7100	RC-O11-M12-C90	0.5			PI-S801	C
MD-W005	X7100	RC-O90-M12-C90	0			PI-S801	C
PA-I033	X7100	RC-O90-M12-C90	0.47			PA-S701	C
PO-W006	X7100	RC-O90-M12-C90		2.583		IN-S128	C
RL-W037	X7100	RC-O90-M12-C90	1.45			RL-S007	C
RL-W568	X7100	RC-O90-M12-C90				0 RL-S701	C
SA-W906	X7100	RC-O90-M12-C90	0.000097			PI-S801	C
Subtotal	C		3.87	2.60		0.00	
Total			6.17	2.60		0.00	
Total Treatment Train Vol (m3)				8.77

STP Preferred Options

Category A

- ICPP Debris Treat & Contain.
Facility: Water Washing
- Mobile Lead Decontamination
Trailer - LANL
- Macroencapsulation with CSS

Category B

- Envirocare Commercial Facility
- Lead Treatment Prog: Commercial
Decontamination
- Offsite Vendor Treatment
- Contact Size Reduction Facility
(CSRF)

Category C

- Surface Decon Unit
- Ohio Option - Mobile Chemical. Tmt Project
- WROC: Macroencapsulation
- Lead Treatment Program: Commercial
Decontamination
- ICPP-RH Immobilization Facility
- Los Alamos Com. Stab. or Macroencapsulation
- Mobile Macroencapsulation
- CTMP System 3-LLW Misc. Waste
Forms Immobilization
- CTMP System 5-LLW Surface Organic
Contaminant Removal
- Waste Receiving & Processing Fac (WRAP IIA)
- Evaluating Treatment Options
- Encapsulation at Purex
- Macroencapsulation in a Permitted
Containment Building

Figure F-15. Lead, cadmium, beryllium, and other hazardous metals process flow.

Figure F-16. Lead, cadmium, beryllium, and other hazardous metals process volumes.

Figure F-17. Lead cadmium, beryllium, and other hazardous metals, surface decontamination treatment train.

Table F-5. Hazardous metals - surface decontamination process

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
IN-B071A	X7210			1.63107		IN-S033	A
LA-W930	X7219	RC-O90-M11-C90		64.06		LA-S001	A
MD-W004	X7211	RC-O90-M11-C90		5.64		LA-S001	A
Subtotal	A			71.33			
IN-C111A	X7210	RC-O90-M11-C90			24.95636	IN-S104	B
IN-E028A	X7210	RC-O90-M11-C90	130.704			IN-S104	B
Subtotal	B		130.70		24.96		
AE-W033	X7212	RC-O90-M11-C90		12.8		AE-S805	C
AE-W035	X7219	RC-O90-M11-C90		12.3		AE-S805	C
BT-W019	X7219	RC-O90-M11-C90	2.73			IN-S104	C
IN-A003A	X7210	RC-O90-M11-C90	0.02727			IN-S104	C
IN-A401A	X7210	RC-O90-M11-C90	0			IN-S104	C
IN-B084A	X7210		3.5957			IN-S104	C
IN-B153A	X7210		24.014			IN-S104	C
IN-B402A	X7210		0			IN-S104	C
IN-B404A	X7210		0			IN-S104	C
IN-C028A	X7210	RC-O90-M11-C90	43.13232			IN-S104	C
RF-W020	X7300	RC-O11-M11-C90		3.36		RF-S019	C
Subtotal	C		73.50	28.46			
Total			204.20	99.79	24.96		
Total Treatment Train Vol (m3)				328.95			

X7220 Cadmium
X7290 Other Hazardous Metals
X7210 Elemental Lead
X7211 Non-Activated Lead
X7212 Activated Lead
X7219 Other Lead

Figure F-18. Lead cadmium, beryllium, and other hazardous metals, macroencapsulation treatment train.

Table F-6. Hazardous metals - macroencapsulation process

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
WS-W041	X7219	RC-O90-M11-C90	25.8			WS-S808	A
Subtotal	A		25.80				
BC-W003	X7219	RC-O90-M11-C90	0.007			EV-S003	B
BN-W006	X7219	RC-O90-M11-C90	0.45			EV-S003	B
ET-W028	X7219		0.0001			EV-S003	B
IN-F028A	X7210		16.99152			EV-S003	B
PA-J030	X7211	RC-O90-M11-C90	0.8			EV-S003	B
PA-K030	X7219	RC-O90-M11-C90	3.47			EV-S003	B
PX-W030	X7211	RC-O90-M11-C90	2.38			EV-S003	B
SR-W013	X7211	RC-O90-M11-C90		83.5		SR-S804	B
WV-W002	X7210	RC-O90-M11-C90	1.2608			WV-S802	B
Subtotal	B		25.36	83.50			
FM-W290	X7211	RC-O90-M11-C90	1.2			FM-S801	C
FM-W295	X7211	RC-O90-M11-C90	0.6			FM-S801	C
FM-W314	X7211	RC-O90-M11-C90	0.2			FM-S801	C
GA-W007	X7211	RC-O90-M11-C90	0.208			RL-S007	C
GA-W013	X7211	RC-O90-M11-C90	0			RL-S007	C
IN-A028A	X7210	RC-O90-M11-C90	27.44784			IN-S003	C
IN-A077A	X7210	RC-O90-M11-C90	0.0303			IN-S003	C
IN-A084A	X7210	RC-O90-M11-C90	3.5957			IN-S003	C
IN-A105A	X7210	RC-O90-M11-C90	0.0189			IN-S003	C
IN-A111A	X7210	RC-O90-M11-C90			9.358635	IN-S003	C
IN-A153A	X7210	RC-O90-M11-C90	24.014			IN-S003	C
IN-A402A	X7210	RC-O90-M11-C90	0			IN-S003	C
IN-A404A	X7210	RC-O90-M11-C90	0			IN-S003	C
IN-A416	X7210		0.3964			IN-S003	C
IN-B003A	X7210		0.00303			IN-S003	C
IN-B110A	X7210		0.383028			IN-S003	C
IN-B401A	X7210		0			IN-S003	C
IN-C027A	X7210	RC-O90-M11-C90	0.077345			IN-S003	C
IN-D028A	X7210	RC-O90-M11-C90	32.676			IN-S003	C
IN-D111A	X7210	RC-O90-M11-C90			3.40314	IN-S003	C
IN-E111A	X7210	RC-O90-M11-C90			15.88132	IN-S152	C
KA-W011	X7219	RC-O90-M11-C90		0.125		RL-S007	C
KK-W010	X7219	RC-O90-M11-C90	0			RL-S007	C

Table F-6. Hazardous metals - macroencapsulation process

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
KW-W007	X7219	RC-O90-M11-C90	0.25			RL-S007	C
LA-W903	X7219	RC-O90-M11-C90	0.74			LA-S812	C
LB-W005	X7210	RC-O90-M11-C90	0.82			IN-S003	C
PH-W006	X7211	RC-O90-M11-C90	0.08			RL-S007	C
PN-W001	X7219	RC-O90-M11-C90	0.142			RL-S007	C
PS-W013	X7212	RC-O90-M11-C90	0.2			RL-S007	C
RF-W023	X7219	RC-O90-M11-C12		37.02		RF-S016	C
RL-W035	X7219	RC-O90-M11-C16	165.743			RL-S007	C
RL-W062	X7219	RC-O11-M11-C90	2.659			RL-S007	C
RL-W152	X7219	RC-O11-M11-C90	1.112			RL-S007	C
RL-W165	X7211	RC-O90-M11-C90				1 RL-S701	C
RL-W485	X7219	RC-O90-M11-C90				0 RL-S701	C
RL-W562	X7219	RC-O90-M11-C90	0			RL-S007	C
RL-W611	X7219	RC-O90-M11-C90	3.539			RL-S007	C
RL-W625	X7219	RC-O90-M11-C90	0.208			RL-S007	C
RL-W639	X7290	RC-O90-M11-C90	0.208			RL-S007	C
RL-W644	X7219	RC-O90-M11-C90	0.625			RL-S007	C
RL-W711	X7219	RC-O11-M11-C90	8.716			RL-S007	C
RL-W712	X7219	RC-O90-M11-C90	4.58			RL-S007	C
RL-W713	X7290	RC-O90-M11-C90	0.416			RL-S007	C
RL-W741	X7219	RC-O90-M11-C90	6.549			RL-S007	C
RL-W750	X7290	RC-O90-M11-C90				0 RL-S701	C
RL-W755	X7290	RC-O11-M11-C90	4.943			RL-S007	C
SA-W904	X7219	RC-O90-M11-C90		0.04		PX-S803	C
SR-W069	X7210	RC-O90-M11-C90		74.1		SR-S810	C
Subtotal	C		292.38	111.29		29.64	
Total			343.54	194.79		29.64	
Total Treatment Train Vol (m3)				567.97

STP Preferred Options

Category A

- Show no rad contamination, then recycle/dispose/treat as hazardous
- Macroencapsulation with CSS
- Contact Size Reduction Facility (CSRF)

Category B

Category C

- Oak Ridge Commercial Treatment - Broad Spectrum
- Ohio Option - Mobile Chemical Treatment Project
- Mobile Sort/Survey/Char/Decon.
- Commercial Offsite Recycling Facility(s)
- Sort/Survey/Char./Decon.
- Waste Receiving & Processing Facility (WRAP IIA)
- Evaluating Treatment Options

Figure F-19. Batteries process flow.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	8.8	0.0	0.0	8.8
Category B	0.0	0.0	0.0	0.0
Category C	41.6	0.0	0.0	41.6
Category D	0.0	0.0	0.0	0.0
Category E	0.0	0.0	0.0	0.0
Total	50.4	0.0	0.0	50.4

Figure F-20. Batteries process volumes.

Figure F-21. Batteries, liquid/solid separation treatment train.

Table F-7. Batteries - liquid/solid separation process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-A004	X7410	RC-O90-M11-C12	1.84			PA-S903	A
WV-W015	X7410	RC-O90-M11-C12	0.1993			WV-S802	A
Subtotal	A		2.04				
FM-W303	X7410	RC-O90-M11-C12	0			FM-S801	C
MD-W007	X7410	RC-O90-M11-C90		0		GJ-S804	C
RL-W034	X7410	RC-O90-M11-C12	1.238			RL-S007	C
Subtotal	C		1.24	0.00			
Total			3.28	0.00			
Total Treatment Train Vol (m3)				3.28			

X7420 Cadmium Batteries
 X7430 Mercury Batteries
 X7490 Other Batteries

Figure F-22. Batteries, macroencapsulation treatment train.

Table F-8. Batteries - macroencapsulation process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-B004	X7420	RC-O90-M11-C12	0.4			PA-S903	A
PA-C004	X7430	RC-O90-M12-C12	2.76			PA-S903	A
PA-D004	X7490	RC-O90-M11-C17	0.35			PA-S903	A
WS-W023	X7410	RC-O90-M11-C90	3.3			WS-S808	A
Subtotal	A		6.81				
DP-W177	X7400	RC-O90-M12-C17	17.742			DP-S814	C
FM-W293	X7420	RC-O90-M11-C90	0.2			FM-S801	C
FM-W294	X7430	RC-O90-M12-C90	0.6			FM-S801	C
OR-W076	X7400	RC-O90-M12-C17	1.249			DP-S814	C
PO-W033	X7490	RC-O90-M12-C12	14.682			PO-S901	C
PX-W035	X7490	RC-O90-M12-C12	0.05			PX-S804	C
RL-W091	X7420	RC-O90-M11-C12	0.21			RL-S007	C
RL-W147	X7430	RC-O90-M12-C12	0.2			RL-S007	C
RL-W549	X7490	RC-O90-M11-C12	0			RL-S007	C
RL-W567	X7490	RC-O90-M11-C12			0	RL-S701	C
RL-W714	X7490	RC-O90-M12-C90	0.208			RL-S007	C
YP-W215	X7400	RC-O11-M12-C16	5.189			DP-S814	C
Subtotal	C		40.33			0.00	
Total			47.14			0.00	
Total Treatment Train Vol (m3)				47.14

Category A Facilities

- Alkali Metal Passivation Booth (AMPB)
- Sodium Process Facility
- Deactivation followed by Stabilization

Category C Facilities

- Wet Oxidation System
- Remote Treatment Facility (RTF)
- Mobile Reactive Metals Skid
- Ohio Option - Stabilization Project
- Commercial Offsite Deactivation of Reactive Metals
- Waste Receiving & Processing Facility (WRAP IIA)
- Treatability Study: Deactivate Water Reactives
- TS: Chemically Deactivate Reactive Pyrophoric Metals
- Mobile Packed Bed Reactor/Silent Discharge Plasma Treat

Figure F-23. Reactive metals process flow.

Figure F-24. Reactive metals process volumes.

X7500 Reactive Metals

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Figure F-25. Reactive metals, deactivation treatment train..

Table F-9. Reactive metals - deactivation process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
AE-W043	X7510	RC-O90-M90-C13		0.34		AE-S001	A
AW-A025	X7510	RC-O90-M90-C15	343.2033			AW-S037	A
IN-A042A	X7510	RC-O90-M12-C11	0.2461			AW-S037	A
WS-W012	X7510	RC-O90-M11-C13	0.2			WS-S803	A
WS-W013	X7590	RC-O90-M90-C13	3.4			WS-S803	A
Subtotal	A		347.05	0.34			
AE-W045	X7590			0.01		AE-S802	C
AW-A006	X7520	RC-O90-M90-C15			1.3248	AW-S007	C
AW-A007	X7520	RC-O90-M90-C15			39.962	AW-S007	C
AW-A008	X7520	RC-O90-M90-C15			0.5667	AW-S007	C
FM-W083	X7510	RC-O90-M90-C13	0.2			OH-S001	C
FM-W209	X7510	RC-O90-M90-C11	0.2			OH-S001	C
LA-W923	X7590	RC-O90-M11-C15	0.2			SA-S810	C
PO-W074	X7590	RC-O90-M90-C13	0.624			PO-S904	C
RL-W715	X7590	RC-O90-M90-C17	5.43			RL-S007	C
SA-A901	S5190	RC-O90-M11-C13	2.4			SA-S806	C
SA-W902	S5190	RC-O90-M11-C13	0.03			SA-S805	C
SA-W903	X7590	RC-O90-M11-C15	0.02			SA-S806	C
SR-W034	X7500	RC-O90-M90-C13	0.9			LA-S003	C
Subtotal	C		10.00	0.01	41.85		
Total			357.05	0.35	41.85		
Total Treatment Train Vol (m3)				399.26			

X7600 Explosives/Propellants

Figure F-26. Explosives/propellants, incineration treatment train.

Table F-10. Explosives/propellants - incineration process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-P001	X7600	RC-O90-M90-C11	0.01			DP-S002	B
Subtotal	B		0.01				
SA-W913	S9000	RC-O90-M90-C11	0.01			SA-S805	C
Subtotal	C		0.01				
Total			0.02				
Total Treatment Train Vol (m3)				0.02

Category B Facilities

- **Cyanide Treatment Facility,
Building 9201-5N**

Figure F-27. Explosives/propellants, chemical deactivation process flow.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	0.0	0.0	0.0	0.0
Category B	0.2	0.0	0.0	0.2
Category C	0.0	0.0	0.0	0.0
Category D	0.0	0.0	0.0	0.0
Category E	0.0	0.0	0.0	0.0
Total	0.2	0.0	0.0	0.2

Figure F-28. Explosives/propellants, chemical deactivation process volumes.

X7600 Explosives/Propellants

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Figure F-29. Explosives/propellants, cyanide destruction treatment train.

Table F-11. Explosives/propellants - cyanide oxidation deactivation.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PA-I048	X7600	RC-O90-M90-C13	0.2			YP-S003	B
Subtotal	B		0.20				
Total			0.20				
Total Treatment Train Vol (m3)				0.20

Figure F-30. Compressed gases/aerosols, thermal oxidation process flow.

	LLW m ³	Alpha m ³	Remote Handled m ³	Total
Category A	0.0	0.0	0.0	0.0
Category B	0.0	0.0	0.0	0.0
Category C	8.2	0.0	0.0	8.2
Category D	0.0	0.0	0.0	0.0
Category E	0.0	0.0	0.0	0.0
Total	8.2	0.0	0.0	8.2

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Figure F-31. Compressed gases/aerosols, thermal oxidation process volumes.

Figure F-32. Compressed gases/aerosols, incineration treatment trains.

Table F-12. Compressed gases - incineration process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
PO-W067	X7700	RC-O11-M11-C11	7.981			PO-S805	C
PO-W070	X7700	RC-O90-M90-C13	0.208			PO-S803	C
PX-W038	X7700	RC-O11-M90-C14	0.02			PX-S804	C
Subtotal	C		8.21				
Total			8.21				
Total Treatment Train Vol (m3)				8.21

STP Preferred Options

Category A

Category B

Category C

-
- Ohio Option - Mobile Chem. Tmt Project
 - Compressed Gases
 - Mobile Packed Bed Reactor/Silent Discharge Plasma Treat

Figure F-33. Compressed gases/aerosols, chemical redox process flow.

Figure F-34. Compressed gases/aerosols, chemical redox process volumes.

X7700 Compressed Gases

Figure F-35. Compressed gases/aerosols, chemical oxidation treatment train.

Table F-13. Compressed gases - chemical oxidation process.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
DP-W180	X7700	RC-O11-M11-C17		4.942		OR-S804	C
FM-W302	X7700	RC-O90-M90-C13	0.2			FM-S801	C
FM-W376	X7700	RC-O11-M11-C11	0.2			FM-S801	C
FM-W466	X7700		0.2			FM-S801	C
LA-W917	X7700	RC-O11-M90-C14	0.35			SA-S810	C
LA-W918	X7700	RC-O90-M90-C11	0.08			SA-S810	C
OR-W079	X7700	RC-O90-M90-C15		0.001		OR-S804	C
YP-W218	X7700	RC-O11-M11-C11		0.901		OR-S804	C
Subtotal	C		1.03	5.84			
Total			1.03	5.84			
Total Treatment Train Vol (m3)				6.87

Figure F-36. Unique wastes, TBD/Unknown process volumes.

Table F-14. Unique waste - unknown treatment process

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
DP-W181	U9999	RT-O11-M90-C11	3.854			DP-S814	C
DP-W182	U9999	RT-O11-M12-C17	41.443			DP-S814	C
DP-W183	U9999	RT-O11-M12-C17	0.043			DP-S814	C
GA-W034	L9000	SR	0.06			GA-S701	C
GA-W038	L9000	RC-O11-M90-C90	0.008			GA-S701	C
GA-W039	L9000	RC-O90-M90-C12	0.001			GA-S701	C
LA-W924	U9999	RC-O90-M11-C13		40.16		LA-S701	C
LA-W925	U9999	RC-O11-M12-C90		18.3		LA-S701	C
LA-W927	U9999	RC-O90-M90-C15	1.34			LA-S701	C
LA-W928	U9999	SR		268.17		LA-S701	C
LA-W929	U9999	RC-O11-M12-C17	14.24			GJ-S804	C
MD-W014	U9999	SR		1		GJ-S804	C
OR-W080	U9999	RT-O11-M12-C17	0.076			DP-S814	C
OR-W082	L9000	RC-O11-M12-C17	3.142			DP-S814	C
PA-F024	U9999	RC-O90-M11-C90		1.32		PA-S001	C
PA-J006	U9999	RC-O90-M90-C12	0.37			PA-S701	C
PA-M001	U9999	RC-O90-M11-C11	0.72			PA-S701	C
PO-W082	U9999		0.736			PO-S701	C
RL-W195	U9999	RC-O90-M12-C90	0.416			RL-S007	C
RL-W214	U9999	RC-O90-M11-C90	0.416			RL-S007	C
RL-W229	U9999	ST	0.208			RL-S007	C
RL-W622	U9999	RC-O90-M12-C90	0.208			RL-S007	C
RL-W700	U9999	ST-O90-M90-C90	0.208			RL-S007	C
RL-W728	U9999	RC-O90-M11-C90	2.29			RL-S007	C
RL-W729	U9999	RC-O90-M12-C90	4.2			RL-S007	C
RL-W730	U9999	ST-O90-M90-C90	0.208			RL-S007	C
WV-W037	U9999	RC-O90-M12-C90	0.026			WV-S701	C
YP-W219	U9999	RC-O11-M12-C90	0.028			DP-S814	C
YP-W221	L9000	RT-O11-M12-C17	21.587			DP-S814	C
Subtotal	C		95.83	328.95			
RL-W193	U9999	RC-O11-M11-C11	0.416			RL-S803	D
RL-W194	U9999	RC-O11-M90-C90	12.571			RL-S803	D
RL-W212	U9999	RC-O11-M11-C14	0.416			RL-S803	D
RL-W213	U9999	RC-O11-M90-C11	4.189			RL-S803	D
RL-W583	U9999	RC-O11-M90-C90	0.625			RL-S803	D
RL-W610	U9999	RC-O11-M90-C90	1.041			RL-S803	D

Table F-14. Unique waste - unknown treatment process

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W698	U9999		0.625			RL-S803	D
RL-W699	U9999	RC-O11-M90-C90	32.11			RL-S803	D
Subtotal	D		51.99				
Total			147.82	328.95			
Total Treatment Train Vol (m3)				476.77			

Table F-15. Unique waste - treatment process to be determined (TBD).

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
DP-W172	X6000	RT-O11-M12-C14	14.567			DP-S814	C
DP-W173	X6000	RT-O11-M12-C17	17.395			DP-S814	C
DP-W174	X7100	RC-O11-M12-C90	2.798			DP-S814	C
DP-W175	X7200	RC-O90-M12-C90	91.152			DP-S814	C
DP-W176	X7300	RC-O90-M11-C15	0.16			DP-S814	C
DP-W178	X7500	RC-O90-M90-C15	0.08			DP-S814	C
ET-W024	X7520	RC-O90-M11-C17	0.0001			ET-S702	C
LA-W926	X7700	RC-O11-M12-C11	1.25			LA-S701	C
LA-W931	X7219	RC-O90-M11-C90		11.12		GJ-S804	C
LB-W013	X7590	SR		0		LB-S702	C
LL-W011	X7510	RC-O90-M90-C15	1.21			LL-S801	C
LL-W027	X7520	RC-O90-M90-C13	4.41			LL-S702	C
MD-W010	X6300	RC-O90-M11-C90		0.06		GJ-S804	C
MD-W011	X6900	RC-O90-M90-C14		0.08		GJ-S804	C
NT-W020	X7210	RC-O90-M11-C90		2.377		NT-S703	C
OR-W001	X6000	RT-O11-M11-C14		2.589		OR-S805	C
OR-W003	X6000	RC-O11-M90-C14		15.569		OR-S805	C
OR-W071	X6000	RT-O11-M12-C14	1.185			DP-S814	C
OR-W072	X6000	RT-O11-M12-C17	5.925			DP-S814	C
OR-W073	X7100	RC-O90-M12-C90	0.697			DP-S814	C
OR-W074	X7200	RC-O90-M12-C11	1.391			DP-S814	C
OR-W075	X7300	RC-O90-M11-C13	0.004			DP-S814	C
OR-W077	X7500	RC-O90-M11-C15	0.632			DP-S814	C
PA-A051	X7700	RC-O90-M90-C15	14.94			PA-S903	C
PA-B051	X7700	RC-O11-M90-C15	0.2			PA-S903	C
PA-C018	X6300	RC-O90-M90-C13	0.2			PA-S701	C
PA-C052	X7900	RC-O11-M11-C90	26.23			PA-S903	C
PA-G024	X6900	RT-O90-M11-C90	1.24			PA-S701	C
PA-H033	X6900	RC-O90-M12-C90	0.4			PA-S701	C
PA-H048	X6900	RT-O11-M90-C90	0.52			PA-S701	C
PA-I030	X6900	RT-O90-M11-C90	1.2			PA-S701	C
PA-M006	X6900	RC-O90-M90-C12	1.54			PA-S701	C
PA-O038	X6900	RT-O11-M12-C90	0.31			PA-S701	C
PA-Q001	X7700	RC-O90-M90-C15	0.22			PA-S903	C
PA-Q049	X6900	RT-O11-M12-C90	3.07			PA-S701	C
RL-W179	X7210	RC-O90-M11-C90	17.072			RL-S007	C
RL-W192	X7210	RC-O11-M90-C90	0.208			RL-S007	C

Table F-15. Unique waste - treatment process to be determined (TBD).

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W217	X7210	RC-O90-M11-C12	6.454			RL-S007	C
RL-W235	X7210	RC-O90-M11-C90	16			RL-S007	C
RL-W550	X7600	RC-O90-M90-C13	0			RL-S007	C
RL-W558	X7600	RC-O90-M90-C13	0			RL-S007	C
RL-W569	X6100	RC-O11-M90-C90			0	RL-S701	C
YP-W210	X6000	RC-O11-M90-C17	0.045			DP-S814	C
YP-W211	X6000	RC-O90-M12-C12	0.145			DP-S814	C
YP-W212	X7100	RC-O90-M12-C11	1.239			DP-S814	C
YP-W213	X7200	RC-O90-M11-C90	2.183			DP-S814	C
YP-W216	X7500	RC-O11-M12-C17	0.827			DP-S814	C
Subtotal	C		237.10	31.80	0.00		
IN-A007A	X6200	RC-O11-M11-C14	0.2082			IN-S150	D
IN-A392A	X7100	RC-O90-M12-C90	0			IN-S150	D
RL-W017	X6100	RC-O90-M90-C11	0.42			RL-S803	D
RL-W039	X6100	RT-O90-M90-C11	11.34			RL-S803	D
RL-W040	X6100	RT-O90-M90-C11	22.05			RL-S803	D
RL-W042	X6900	RC-O11-M11-C17	7.309			RL-S803	D
RL-W043	X6900	RC-O11-M11-C14	12.246			RL-S803	D
RL-W044	X6900	RC-O90-M12-C14	0.68			RL-S803	D
RL-W045	X6900	RT-O90-M11-C90	0.21			RL-S803	D
RL-W046	X6100	RC-O11-M90-C11	11.292			RL-S803	D
RL-W063	X6900	RC-O11-M11-C17	3.508			RL-S803	D
RL-W064	X6900	RC-O11-M11-C17	36.588			RL-S803	D
RL-W065	X6900	RC-O11-M90-C11	29.891			RL-S803	D
RL-W066	X6900	RC-O11-M90-C11	9.681			RL-S803	D
RL-W067	X6100	RC-O11-M90-C90	0.21			RL-S803	D
RL-W092	X6100	ST	0.03			RL-S803	D
RL-W099	X6200	ST	0.63			RL-S803	D
RL-W100	X6900	ST	33.765			RL-S803	D
RL-W130	X6900	RC-O11-M90-C15	2.851			RL-S803	D
RL-W132	X6900	RC-O90-M12-C12	1.626			RL-S803	D
RL-W144	X6900	RC-O11-M12-C90	0.208			RL-S803	D
RL-W177	X6100	RC-O11-M90-C14	40.007			RL-S803	D
RL-W178	X6900	RC-O90-M12-C12	2.266			RL-S803	D
RL-W191	X6900	RC-O11-M11-C14	0.416			RL-S803	D
RL-W215	X6100	RC-O11-M11-C14	17.489			RL-S803	D

Table F-15. Unique waste - treatment process to be determined (TBD).

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W216	X6900	RC-O90-M90-C12	6.871			RL-S803	D
RL-W221	X6100	RT-O11-M90-C90	0.416			RL-S803	D
RL-W223	X6900	ST	8.536			RL-S803	D
RL-W230	X6900	ST	2.915			RL-S803	D
RL-W547	X6100	RC-O11-M90-C90	0			RL-S803	D
RL-W553	X6100	RC-O11-M90-C90	0			RL-S803	D
RL-W584	X6100		0.208			RL-S803	D
RL-W585	X6100	RC-O11-M90-C11	0.208			RL-S803	D
RL-W586	X6100	RC-O11-M90-C90	0.416			RL-S803	D
RL-W623	X6100		0.416			RL-S803	D
RL-W624	X6100	RC-O11-M90-C90	2.29			RL-S803	D
RL-W627	X6100	RC-O11-M90-C11	0.208			RL-S803	D
RL-W628	X6100	RC-O11-M90-C14	2.498			RL-S803	D
RL-W638	X6100		1.666			RL-S803	D
RL-W641	X6100	RC-O11-M90-C90	0.208			RL-S803	D
RL-W701	X6100		0.416			RL-S803	D
RL-W702	X6100		0.416			RL-S803	D
RL-W703	X6100		0.208			RL-S803	D
RL-W704	X6100	RC-O11-M90-C11	2.082			RL-S803	D
RL-W705	X6100	RC-O11-M90-C90	0.208			RL-S803	D
RL-W731	X6100		0.208			RL-S803	D
RL-W732	X6100		0.208			RL-S803	D
RL-W733	X6100	RC-O11-M90-C11	0.416			RL-S803	D
RL-W734	X6100	RC-O11-M90-C12	0.833			RL-S803	D
RL-W735	X6100	RC-O11-M90-C90	1.041			RL-S803	D
Subtotal	D		277.81				
KA-W001	X6900	RC-O11-M90-C17		0.014		IN-S150	E
KA-W020	X7100	RC-O90-M12-C90		0.029		IN-S150	E
KK-W016	X7100	RC-O90-M12-C90		0		IN-S150	E
LB-W006	X7100	RC-O90-M12-C90		0		IN-S150	E
LB-W018	X6200	RC-O11-M12-C90		0.00153		IN-S150	E
LL-W021	X6900	RC-O90-M11-C12		0.8		IN-S150	E
LL-W024	X7100	RC-O90-M12-C90	0.2			IN-S150	E
RF-W083	X6900	RC-O11-M12-C17		57.73		IN-S150	E
RF-W085	X6900	RC-O11-M12-C17		6.41		IN-S150	E
RF-W086	X6900	RC-O11-M11-C17		2.08		IN-S150	E

Table F-15. Unique waste - treatment process to be determined (TBD).

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
SR-W014	X7100	RC-O90-M12-C90	0.18			IN-S150	E
SR-W068	X7100	RC-O90-M12-C90		0.1		IN-S150	E
Subtotal	E		0.38	67.16			
Total			515.29	98.96		0.00	
Total Treatment Train Vol (m3)				614.25			

Table F-16. Unique wastes. Meet LDR.

Waste Stream	MPC Code	CPC Code	LLW (m3)	Alpha (m3)	RH (m3)	Targeted TRT	Cat (A,B,C)
RL-W756	Z1200	RC-O11-M11-C90	22.77			RL-S901	A
RL-W757	Z1200	RC-O11-M11-C12		42		RL-S901	A
Subtotal	A		22.77	42.00			
Total			22.77	42.00			
Total Treatment Train Vol (m3)				64.77

APPENDIX G

DETAILED PRIORITIZATION PROCESS

DETAILED PRIORITIZATION PROCESS

SUMMARY

The prioritization criteria for process flowsheets and for technical deficiencies are included in this appendix. Details on the various criteria and subcriteria for both prioritizations are also given. A description of how the final prioritized, integrated list of technology deficiencies was developed, is included at the end of this appendix.

PROCESS FLOWSHEET PRIORITIZATION

The 17 process flowsheets contained in the technical baseline for FY-1996 were re-examined based on updated waste stream data and individual site input to ten year plans. Based on this analysis, two flowsheets were removed and one was added, to yield a final list of 16 flowsheets as given in Appendix E1.56. The criteria used to prioritize the flowsheets have changed based on experience from the 1996 technical baseline development process and input from the Community Leaders Network. The revised criteria are presented below.

Criteria

The criteria used in the 1996 prioritization of process flowsheets were reviewed with input from the Community Leaders Network. Three criteria were eliminated.

1. Cost Reduction - First, the weighting assigned previously (4%) was too small to have any impact on the final scores, and second, the level of information cost available on any of the flowsheets is insufficient to make a meaningful evaluation.
2. Compliance Commitment - The scores for all process flowsheets were the same, so this criteria was not a discriminator and there was no impact on the final scores.
3. Risk to the Environment, Safety, and Health Posed by the Process - This criteria evaluates the type of process used by a site, which is not the responsibility of the MWFA, so this criteria is not appropriate.

The three remaining criteria are shown in Table G-1, with the relative weights as assigned by the Waste Type Managers. Note that the User Impact criterion is further broken down into three subcriteria. As can be seen from Table G-1, none of the criteria dominate the scoring.

Table G-1. Mixed waste treatment flowsheet prioritization criteria

Criteria	Relative weight %
User Impact	40
Volume of Waste to be Treated	17
Number of End Users	11
Number of Waste Streams	12
Risk to the Environment, Safety, and Health Posed by the Waste Storage	30
Time to Availability	30

Scoring

The methodology for prioritizing the flowsheets did not change from the 1996 Technical Baseline, although relative weights and scales of merit were modified. Again, only inventory data for the waste streams identified in the "C" category were used in calculating the scale of merit for the quantitative criterion (User Impact). The scales of merit used for the qualitative criteria (Risk to the Environment, Safety, and Health Posed by the Waste Storage and Time to Availability) were based on a consensus of the WTM's with technical input from the TRT.

The scale of merit for all criteria in this prioritization ranged from 1 to 5, so a flowsheet with very high user impact could contribute up to 5×0.4 , or 2 points to the overall score with a perfect overall score being 5. The merit awarded to each criterion was evaluated on a scale unique to that criterion (Table G-2). Details on the scale of merit for each criterion are provided below. Quantification was desirable, but when considering risk, and what constitutes a meaningful technology gap, an absolute measure was not always possible. Significant was meant to convey a sense of practicality, e.g. significant radioactive contamination for a stored waste is at a level recognized to require special operating procedures to control the dose to personnel, rather than simply detectable and therefore regulated. Distinguishable was used only for technical deficiencies, to indicate separable problems. It was the responsibility of the WTM's to reach consensus as to whether differences were significant or distinguishable.

Table G-2. Scale of merit for process flow diagram prioritization criteria

Criterion	1	2	3	4	5
Impact					
Volume of Waste Treated	1 stream	1%	5%	10%	15%
Number of End Users	1	2	5	7	10
Number of Waste Streams	1	10%	20%	30%	40%
Risk to the Environment, Safety, and Health Posed by the Waste Storage	Minimum risk to ES&H, i.e. solids in safe storage		Toxic or high rad (>5mR) liquids and solids		Highest risk to ES&H, i.e. gases corrosives reactives
Time to Availability	5 years	4 years	3 years	2 years	1 years

The score for each criterion was calculated by multiplying the scale of merit score by the relative weight of that criteria (shown in Figure G-1). Summing all of the criteria scores for each process flowsheet resulted in a total score for each flowsheet. The overall score could range from 0 to 5 for a process flow diagram, with a higher score meaning a higher priority (5 being the highest priority).

Criteria Descriptions

Descriptions of each primary and secondary (if applicable) criterion are given below.

1. User Impact (40% of process flowsheet priority).

Only Inventory data for the waste streams identified in the "C" category, were used in assigning the scale of merit for the user impact criteria. This allowed the emphasis to be placed on unavailable treatment capacity. It was assumed that category "A", "B", "C", and "D" waste streams, those identified for treatment in existing facilities, did not have technology deficiencies associated with that treatment since they are currently operating. The secondary criteria that make up the impact criteria are given below.

- Volume of Waste Treated (17% of total flowsheet priority).

The scale of merit for this criterion was based on the percentage of the entire DOE mixed waste inventory (Category C listed wastes) that could be treated through the candidate flowsheet. Obviously, the more flexible a process is, and the more waste a process can eliminate, the more potential progress could be made under the FFCA. Though there may be significant merit to a niche process that can only treat a relatively small, but problematic waste stream, the merit for that process was awarded elsewhere through other criterion. A score of 1 applied to any flowsheet covering only a single waste stream. A score of 2 was awarded for a flowsheet applicable to 1% of the inventory (3000m³) to recognize some important niche technologies that may simplify the design of large facilities by eliminating some problematic wastes. A score of 3 was given for flowsheets applicable to 5%, 4 for 10% and a maximum of 5 points for treating 15% of the inventory.

- Number of End Users (11% of total flowsheet priority).

A flowsheet had to have at least one site program manager proponent to receive support, which gave a merit score of 1 point. A maximum of 5 points correlated to 10 users, or about 20% of the potential market (48 sites) if the flowsheet were used across the complex. This scale was deliberately parallel to the waste volume scale, assigning equal merit to the many small sites with site-specific problems.

- Number of Waste Streams (12% of total flowsheet priority).

The merit for number of waste streams fitting any flowsheet was again similar to waste volume and number of customers. A flowsheet had to be applicable to at least one waste stream to receive 1 point, and a maximum of 5 points was awarded for processing 40% of the total waste stream list compiled from the Site Treatment Plans. This scale was also similar to the waste volume scale, assigning merit to the many small waste streams critical to many site-specific programs.

2. Risk to the Environment, Safety, and Health Posed by the Waste Storage (30% of total flowsheet priority).

This criterion was specifically developed to address problematic wastes, not necessarily large in volume or number, but critical to the success of programs at specific sites. This area was essential

to prioritization of the flowsheets to treat the "Unique Wastes" category that included many of the streams that have been stored the longest because they are difficult to treat. Progress on some of these wastes is important to some of the stakeholder and state interests because it displays a commitment on the part of the DOE to accept liability for all of its wastes, not just the large volume or simple-to-treat waste streams. Waste solids in RCRA compliant storage, with no extenuating safety factors merited the minimum value of 1. A merit of three was assigned to solids or liquids exhibiting chemical toxicity or some significant radioactivity (5mR at container surface), because they could be inadvertently spilled causing unwarranted personnel exposure or environmental consequences. A maximum value of 5 was applied to compressed gases and corrosive or reactive liquids under the assumption that they will eventually leak if not treated in a timely manner.

3. Time to Availability (30% of process flow diagram priority).

This criteria was based on the estimated time to implement the process flow and was meant to evaluate the expected time to fill the gaps so the flowsheet could be used. Many concepts have never come to fruition because the one remaining problem could not be solved. Conversely, a flowsheet with three or more simple gaps may need several successful research projects to be implemented, but the problems may not be difficult, requiring only adaptation of available technology. A merit of 5 was given to a flowsheet that could be made useable in one year, possibly requiring only a planned demonstration in the coming year. Merit dropped to 3 for three years, and 1 for five or more years, the limit of DOE budget planning.

DEFICIENCY PRIORITIZATION

The technology deficiency (i.e. gap or need) criteria form the basis for setting the next level of prioritization: to allow allocation of resources to solving the most critical problems preventing implementation of flowsheets first. In 1996, a list of technology for each process flowsheet were identified by the WTMs and TRT derived from: (a) site needs identified during site visits by the MWFA, (b) specific EM-50 customer (EM-30/40 and 60) requests, and (c) an engineering analysis of both the process flow diagrams as well as their associated treatment trains. For 1997, that list of deficiencies was revisited to determine if any of the deficiencies had been solved, or if new deficiencies have been identified. A significant input for new deficiencies was received from the Site Technology Coordination Group at each DOE site. This analysis yielded a final list of 24 technical deficiencies, which were ranked, in a manner similar to the flowsheets, but independently, using a separate set of weights and scales of merit.

The criteria for evaluating the technology deficiencies were deliberately similar to those described above for flowsheets, with modifications where necessary to better define the priorities in technology improvement. The primary criteria (and relative weights) used in the deficiency prioritization are shown in Table G-3, and are discussed below.

Table G-3. Mixed waste treatment technology deficiencies prioritization criteria.

Criteria	Relative Weight %
User Impact	30
Environmental, Safety, and Health	15

Critical Path Deficiency	15
Maturity	15
DOE Commitments	15
Functional Requirements	10

Scoring

Criteria weights and merit for technology deficiencies were assigned in the same manner as described above for prioritizing the process flow diagrams. The scores for deficiency criteria ranged from 1 to 5 for the scales of merit as shown in Table G-4.

Table G-4. Scale of Merit for Deficiency Prioritization Criteria

Criterion	1	2	3	4	5
User Impact					
Number of Flowsheets	1		5		10
Number of Gaps in Flowsheet	5		3		1
Environmental, Safety, and Health	ALARA		Marginal improvement to existing standards		Essential to OSHA or DOE Compliance
Critical Path Deficiency	5 years		3 years		1 year
Maturity	Transition Stage 1	Transition Stage 2	Transition Stage 3	Transition Stage 4	Transition Stage 5
Compliance Commitments	Planned Initiatives		Ten Year Plan, DNFSB Line Item		Written Order or Permit
Functional Requirements	Conceptual		Evolving		Documented Quantified

Criteria Description

Descriptions of each criterion and subcriterion, where applicable, are given below.

1. User Impact (30% of technology deficiency prioritization).

Again, only inventory data for the waste streams identified in the "C" category, were used in assigning the scale of merit for the user impact criteria. This allowed the emphasis to be placed

on unavailable treatment capacity. The subcriteria that make up the user impact criterion are given below.

- Number of Flowsheets (20% of technology deficiency prioritization).

Volume of waste, number of waste streams, and number of customers, were all captured in the initial prioritization of flowsheets, because they were a function of the total system used. Technology deficiencies derived from the highest priority flowsheets were then evaluated for the number of flowsheets they affected. At least one flowsheet had to be made useable or be significantly enhanced by successfully addressing a deficiency. A maximum of 5 points was awarded to a deficiency affecting 10 flowsheets, and an intermediate value of 3 was given for affecting 5 flowsheets.

- Number of gaps in process flow diagram (10% of technology deficiency prioritization).

As described above in the process flow diagram criteria, the number of gaps in a flowsheet was an indication of how readily it could be implemented. If the deficiency being evaluated was the only problem keeping a flowsheet from practical implementation, its solution was more important to progress in waste treatment than if additional problems had to also be solved to make the flowsheet a reality. This criterion allowed merit to be awarded to working on a single deficiency that would enable rapid deployment of treatment systems, that would not otherwise receive priority. Thus, a merit rating of 5 was awarded for a sole deficiency. The merit dropped to 3 if another deficiency in the same flowsheet existed, and a merit of only 1 was awarded if two or more additional deficiencies affected the same flowsheet.

2. Environmental, Safety, and Health (15% of technology deficiency prioritization).

This criterion addresses the broad range of ES&H impacts associated with processing mixed waste. A high score is awarded to technologies that significantly mitigate ES&H concerns—either releases to the environment or impacts on worker and/or public health or safety. A score of 5 is awarded if the resolution of the technology deficiency is essential to compliance with either a DOE or OSHA safety standard or an EPA or state emissions limit. If resolution of the deficiency would improve an already acceptable performance, the rating drops to 3. Finally, those deficiencies whose resolution would have no effect or would solely enhance the benchmark for compliance with either safety or environmental concerns, is awarded a score of 1.

3. Critical Path Deficiency (15% of technology deficiency prioritization).

While some technology development can be done in parallel with the main thrusts of the program, some deficiencies are believed to be on the critical path for progress under the FFCA, i.e. delays in finding a solution result in essentially a day for day delay in meeting commitments. A merit of 5 was given to a deficiency on the critical path with a window of one year or less to be resolved. If three years are available, the merit decreased to 3, and if five or more years are available, the merit was 1.

3. Maturity (15% of technology deficiency prioritization).

The maturity of the technology development related to a particular technical deficiency is based on the relevant technology gate. A score of 1 was awarded to technology gate 1 (basic research), a score of 3 was awarded to technology gate 3 (exploratory development), and a score of 5 was awarded to technology gate 5 (engineering development).

4. Compliance Commitments (15% of technology deficiency prioritization).

This criterion was identical to that described above for process flow diagrams, but narrowed to focus on development to address a specific deficiency rather than entire treatment systems. Again, the scale of merit was subject to interpretation, but was meant to prioritize resources in the most fair and strategic manner to deliver the most value to the taxpayer and assist DOE-EM in fulfilling its responsibilities. The high end of the scale starts with the commitments made in good faith to host states and regulatory bodies to work on specific areas of interest. A merit of 5 was given to any deficiency which, if resolved, would directly satisfy a documented condition in a signed consent order or permit. Internal drivers rated a value of 3, including: directions given by the DNFSB, commitments derived from the Ten Year Plans or DOE Orders, and needs supporting planned line items or privatization initiatives. A value of 1 was assigned to initiatives the DOE sponsors, above and beyond its legal and assigned, mission-driven responsibilities, such as demonstrations for outside groups or in support of site strategic plans.

5. Functional Requirements (10% of technology deficiency prioritization).

Many of the requirements the DOE is tasked to comply with have yet to be fully developed, such as de minimis radioactivity in recycled metals. Without these requirements quantified and documented, research may continue for years one step away from satisfactory conclusion. Deficiencies which must satisfy definitive requirements, which are set and standardized, such as primary drinking water standards and TCLP limits, received a merit of 5. Evolving criteria or proposed regulations, such as recycle limits received no more than 3. Conceptual requirements, such as expected limits of detection needed for characterizing TRU elements in large containers of debris prior to thermal processing, merited a 1 for this criterion.

INTEGRATED PRIORITIZATION

Using the scores of the individual deficiencies and the flowsheets as determined above, a final prioritized, integrated list of technology deficiencies was developed. The intent was to ensure that high priority deficiencies that address the highest priority flowsheets reach the top of the reprioritized list. This final prioritization was determined by multiplying the score for each deficiency by the sum of the scores for all the flowsheets to which that deficiency applies. This method of integrating the two prioritization processes can be represented by the mathematical formula: (Final Deficiency Score) = (Original Deficiency Score) $\times$ Σ (Flowsheet Scores).

 

APPENDIX H

STCG NEEDS DATA

STCG Needs data

Summary

During early 1997, technology development needs were generated by each of the Site Technology Coordination Groups (STCG). STCG needs were received from the sites in many forms, and levels of detail. Upon receiving the needs data, a review process was used to identify which were consistent with the DOE-HQ defined scope for the MWFA. In a number of cases, MWFA staff contacted sites to obtain clarification on their needs. Mixed waste needs were then evaluated in relation to the MWFA list of deficiencies. In general, the responses to the site needs can be grouped into three categories: 1) the need is addressed by funded activities, 2) the need, based on the information available, appeared to be other than a technology development need and/or therefore outside of the MWFA scope, or 3) the MWFA is aware of the general need, and studies are being conducted to identify what technical deficiency exists. The STCG needs were then reviewed during the technical baseline development process

Table 1 identifies each site need that is being addressed by the MWFA. For each need, the site provided description is listed, followed by a MWFA specific response. If a need links to a MWFA deficiency, the deficiency is identified. Table 2 identifies the TDRD and TTP(s) associated with each deficiency. For each TTP a scope of work description, planned FY-97 activities, FY 97 Funding level, and MWFA contacts have been provided.

 

TABLES

H-1	Mixed Waste Focus Area Responses to Site Needs.....	H-7
H-2	Mixed Waste Focus Area Deficiency Report.....	H-35

TABLE 1. Mixed Waste Focus Area Responses to Site Needs

Need ID.	AL AL-07-01-06-MW	PBS #	AL/LANL/WWM
STCG Need:	Cost-effective Treatment for Low-Level Mixed Waste		
Description:	Development of technology to treat wastes at point of generation.		
MWFA Response:	The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.		
Need ID.	AL AL-07-01-07-MW	PBS #	AL/LANL/WWM
STCG Need:	Treatment Of Mixed Waste		
Description:	Mobile treatment for mixed waste contaminated with mercury.		
MWFA Response:	The MWFA has established the Mercury Work Group, which is developing and demonstrating treatment technologies for mercury amalgamation, stabilization, and separation/removal. At present, representatives from ORNL, SRS, RFETS, and INEL are participating on the HgWG. The HgWG is managed by Tom Conley, ORNL and the MWFA Waste Type Manager is Ron Nakaoka. If data specific to the Albuquerque mercury waste needs to be provided to the HgWG, please contact Tom Conley at 423-574-6792, e-mail tbc@ornl.gov, or Ron Nakaoka, LANL at 505-665-5971, e-mail rkn@lanl.gov. This need has also been linked to the Mercury filter deficiency.		
Need ID.	AL AL-07-01-08-MW	PBS #	AL/LANL/WWM
STCG Need:	Remediation of Compressed Gas Cylinders		
Description:	Treatment and disposal of radioactively contaminated gas cylinders.		
MWFA Response:	The MWFA has funded a quick win at LANL to complete development of a gas recontainerization skid for deployment at ORNL. Upon completion of the necessary treatment campaigns at ORNL, this unit could most likely be relocated to LANL for deployment. If the waste streams in this need can not be processed in this unit, please provide the technical justification to the MWFA for action.		
Need ID.	AL AL-07-01-09-MW	PBS #	AL/LANL/WWM
STCG Need:	Mixed Waste Treatment		
Description:	Mixed waste treatment - water reactive compounds.		
MWFA Response:	This need is being addressed by activities the MWFA is funding under the quick win program.		
Need ID.	AL AL-07-01-10-MW	PBS #	AL/LANL/WWM
STCG Need:	Proper Treatment of Certain Low-Level Mixed Waste Streams		
Description:	Development of new technologies for treatment of low-level mixed waste.		
MWFA Response:	The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.		

Need ID:	AL AL-07-01-11-MW	PBS #	AL/LANL/WM
STCG Need:	Waste Sorting and Characterization		
Description:	Develop more effective methods to sort, survey and decontaminate mixed waste.		
MWFA Response:	This need has been linked with three deficiencies from the MWFA Technical Baseline: Characterization, Material Handling, and Sort and Segregate. A document is being generated which evaluates existing Material Handling and Sort and Segregate technologies. This document can then be used by the sites to identify technologies for which they have a need. If areas are identified that require technology development/enhancement to satisfy a need, requirements will be generated by the site and the MWFA. The MWFA will coordinate work with the RTDP to meet the site need. A table has been attached that identifies the TTP(s) associated with each of these deficiencies. Technology Development activities associated with Characterization, using NDE/NDA techniques, is currently funded through the MWFA and CMST. Attached are the TDRDs and TTPs associated with the Characterization deficiency.		

Need ID:	AL AL-07-01-14-MW	PBS #	AL/LANL/WM
STCG Need:	Appropriate Characterization of TRU Waste Now Stored in Fiberglass Reinforced Plywood Boxes for Waste Isolation Pilot Project (WIPP)		
Description:	Sorting, segregation, and decontamination of TRU bulk waste in order to reduce quantities to low-level waste.		
MWFA Response:	This need has been linked with three deficiencies from the MWFA Technical Baseline: Characterization, Material Handling, and Sort and Segregate. TDRDs have been generated to define system requirements. A table has been attached that identifies the TDRDs and TTPs currently associated with this deficiency.		

Need ID:	AL AL-07-02-01-MW	PBS #	AL/SNL/WM
STCG Need:	Treatment of Classified Inorganic Debris with Toxicity Characterization Leaching Procedure (TCLP) Metals		
Description:	Capability to render classified mixed waste debris non-classified.		
MWFA Response:	MWFA is not aware of any technology development associated with this need.		

Need ID:	AL AL-07-02-05-MW	PBS #	AL/SNL/WM
STCG Need:	Characterization of Excess Legacy Material - Weapons Component Testing		
Description:	Identification of radionuclides and RCRA constituents in excess legacy material associated with weapons component testing.		
MWFA Response:	MWFA is not aware of any technology development associated with this need.		

Need ID:	AL AL-07-02-06-MW	PBS #	AL/SNL/WM
STCG Need:	Characterization of Excess Legacy Material - Reactor Experiments		
Description:	Identification of radionuclides and RCRA constituents in excess legacy material associated with reactor experiments.		
MWFA Response:	MWFA is not aware of any technology development associated with this need.		

Need ID:	AL AL-07-02-07-MW	PBS #	AL/SNL/WM
STCG Need:	Hot Cell or Similar Device for Remote-Handled Mixed Waste		
Description:	A hot cell in a Resource Conservation and Recovery Act (RCRA) permitted facility.		
MWFA Response:	MWFA is not aware of any technology development associated with this need.		

Need ID:	AL AL-07-02-08-MW	PBS #	AL/SNL/WM
STCG Need:	Remote Handling And Viewing Capability		
Description:	Risk of unknowns and classified nature pose unique remediation problems		
MWFA Response:	This need has been linked with the Material Handling and Sorting/Segregation deficiencies of the MWFA Technical Baseline. TDRDs have been generated to define system requirements. A table has been attached that identifies the TDRDs and TTPs currently associated with this deficiency.		

Need ID:	AL AL-07-06-01-MW	PBS #	AL/PTX/WM
STCG Need:	Advanced Methods For Destruction Of 1,3,5-Triamino-2,4,6-Trinitrobenzene (TATB) High Explosive.		
Description:	Enduring Stockpile Program weapon systems are designed and assembled using TATB high explosive (HE). Pantex Plants ongoing mission to maintain, evaluate, and dismantle the weapons systems will result in the generation of TATB waste.		
MWFA Response:	The MWFA has funded a quick win (TTP AL06MW66) that is demonstrating a Base Hydrolysis process at Pantex. This system has been successfully tested on HMX, RDX, and PETN explosives and is being permitted at Pantex. If further testing is required on TATB, more detail should be provided to the MWFA in a proposal.		

Need ID:	AL AL-07-06-02-MW	PBS #	AL/PTX/WM
STCG Need:	Biological Treatment of Spent Solvents		
Description:	Pantex Plant waste inventories are comprised, in part, of spent organic solvents. Some of the spent solvents may contain low-level radioactive contaminants. A method is needed to decompose the solvents so that the wastes meet the requirements of the land disposal restriction (LDR) treatment standards.		
MWFA Response:	This need may be addressed by activities the MWFA is funding under the quick win program.		

Need ID:	AL AL-07-06-03-MW	PBS #	AL/PTX/WM
STCG Need:	Plasma Fired Demilitarization and Sanitization of Classified Weapon Components and Volume Reduction of Mixed Wastes		
Description:	Develop a robust technology that can treat low-level and mixed waste and can also demilitarize and sanitize classified radioactive contaminated weapon components that can contain embedded HE, minimizing life cycle costs of managing materials. The process must operate efficiently with minimal hand labor and produce residuals in a form that can be recycled or managed in a cost-effective manner.		
MWFA Response:	The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.		

Need ID. BN CH-0009

PBS # CH-ANLEWM

STCG Need: Treatment of PCB-Contaminated Low Level Radioactive Waste

Description: Argonne National Laboratory - East (ANL-E) is currently storing 270 55-gallon drums of low level radioactive waste that is contaminated with polychlorinated biphenyls (PCBs) at concentrations slightly above 50 parts per million (ppm). The waste is dried sludge from the site's laboratory wastewater treatment plant. This waste is regulated under the Toxic Substances Control Act (TSCA) and cannot be disposed as low level radioactive waste (at Hanford) unless the concentration of PCBs in the waste is reduced to below 1 ppm. The waste has already been in storage for more than one year, which is a violation of the TSCA waste storage regulations. Currently, the Environmental Protection Agency (EPA) is not taking enforcement action regarding the storage violation. However, there is no guarantee that this situation will continue.

MWFA Response: The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed. Contact Vince Maio at (208) 526-3696, if early data is required.

Need ID.	CA CAO-2	PBS #
STCG Need:	WIPP Disposal Phase Certification and Experimental Program	
Description:	Support WIPP operation, by maintaining compliance and enhancing WIPP and national TRU system operations.	
MWFA Response:	This need has been linked with the Characterization deficiency of the MWFA Technical Baseline. A TDRD has been generated which addresses characterization needs. A table has been attached that identifies the TDRDs and TTP(s) currently addressing this deficiency.	
Need ID.	CA CAO-3	PBS #
STCG Need:	WIPP Transportation	
Description:	Emergency response training, establishing and opening transportation corridors, CH and RH waste packaging initiatives.	
MWFA Response:	This need has been linked with the TRU Transportation deficiency of the MWFA Technical Baseline. A TDRD has been generated which incorporates RCRA analysis needs. A table has been attached that identifies the TDRDs and TTP(s) currently addressing this deficiency.	
Need ID.	CA CAO-4	PBS #
STCG Need:	WIPP TRU Waste Sites Integration and Preparation	
Description:	TRU integration activities and programs which are directed by the CAO federal workforce in project CAO-5. Specifically integrated activities to improve the envelope of performance for transportation system and treated TRU waste acceptance	
MWFA Response:	This need has been linked with Characterization and TRU Transportation deficiencies of the MWFA Technical Baseline. A TDRD has been generated which incorporates RCRA analysis needs. A table has been attached that identifies the TDRDs and TTP(s) currently addressing this deficiency.	

Need ID.	FM OH-F002	PBS #	OH-FN-7 Fernald 7- Silos
STCG Need:	Real-time Personnel Monitor for Alpha Contamination		
Description:	Personnel Monitor for Alpha Contamination		
MWFA Response:			
Need ID.	FM OH-F005	PBS #	OH-FN-7 Fernald 7 - Silos
STCG Need:	Film cooler design (MWFA9)		
Description:	Design of an appropriate film cooler device that will cool offgas from vitrification melters effectively while preventing deposition of particulate inside the device. Many designs are currently being used with various success levels at other facilities. It is imperative that the gasses be cooled appropriately prior to entering the remainder of the offgas system. Optimum use of cooling air will reduce the quantity of offgas that needs to be treated. The deposition of material in the film cooler system is unacceptable since it contributes to the pressure drop of the system and can create a radiation exposure hazard that can be avoided. This study will entail a literature search as well as discussions with operational vitrification facilities. Experimental work on a small scale may be involved.		
MWFA Response:	There are currently two efforts underway within the DOE complex to baseline off-gas pollution control equipment. The first effort was initiated through by Carl Cooley to support the MWFA, it will be completed June, 1997. The second study was initiated by the Technical Resource Team and will be completed in June, 1997. Technology development requirements will be generated, based on the results of these studies. Additional work on various film cooler designs have been conducted by PNNL on the for HLW program. Mike Elliot at (509) 376-9858 may be able to provide useful information.		
Need ID.	FM OH-F006	PBS #	OH-FN-7 Fernald 7 - Silos
STCG Need:	Pilot Radon Removal Testing (MWFA10)		
Description:	Offgas from the Vitrification facility will contain Radon and effective removal is necessary to comply with Regulatory requirements. Currently the limited testing of the radon removal has been at a laboratory scale with closely controlled experiments. The results of these experiments should be tested and verified at a pilot level before costly implementation of full scale systems.		
MWFA Response:	The MWFA, in communication with Dennis Cook of Fernald, recognizes the problems with Radon release that will occur during vitrification and soil contents removed. However, the problems appear unique enough to Fernald to not warrant specific development funds. It appears that development is at or near the demonstration stage. As such, the MWFA recommends Fernald see Quick Win MWFA funds in FY-97 to support pilot-scale efforts. The MWFA would then support pilot-scale work involving the zeolites, since carbon bed technologies appear commercially available. The MWFA also recommends that Fernald personnel re-establish contact with ANL-E researchers who have proposed an oil-based system for radon control. Earlier this year, this system was proposed by ANL-E as a Quick Win project to the focus area, but was not rewarded, since FM expressed little interest as an end-user.		
Need ID.	FM OH-F008	PBS #	OH-FN-10 Fernald 10 - Mixed Waste
STCG Need:	Tri-Mixed waste treatment demonstration (Rapid Commercialization Initiative) (MWFA12)		
Description:	This waste must be treated by a non-thermal technology for disposal. As no proven technology exists, an RCI demonstration was arranged. The final phase implementation project is actually a scale-up to full scale of the currently funded demonstration phase, which is a proof-of-process. There is no data on the Atrue@ cost of treatment using the Terra-Kleen process and the demonstration will not provide Atrue@ cost. In the scale-up, we will be able to collect operational and cost data that the rest of the DOE complex will need for decision making processes at their own sites. Also, there is no operational data available for the treatment of specific mixed wastes, such as the FEMP sludges, debris, and heavy clay soils that will be processed in this project. The magnitude of FEMP's waste stream is 170 cubic meters. Completion results in eliminating this waste stream from the FEMP.		
MWFA Response:	The MWFA has funded a quick win (TTP OH16MW67) that is demonstrating and evaluating the Terra-Kleen solvent extraction process for treatment of the Fernald tri-mixed waste inventory. Successful demonstration will lead to a commercial contract that will treat the entire remaining inventory at Fernald.		

Need ID. FM OH-F011

PBS # OH-FN-7 Fernald
7 - Silos

STCG Need: Remote controlled vehicle based manipulator (MWFA4)

Description: Robot to perform secondary cleanup operations

MWFA Response: This need has been linked with deficiency Material Handling of the MWFA Technical Baseline. This may also be addressed through the Tanks Focus Area. The MWFA will work with the RTDP and Tanks Focus Area to ensure that technology development issues are identified and addressed. A table has been attached that identifies the TTP(s) currently associated with this deficiency.

Need ID. FM OH-F013

PBS # OH-FN-8 Fernald
8 - Nuclear
Materials

STCG Need: Thorium Hydroxide & Thorium Oxide Treatment Technology, including remote handling equipment, material mixing and feed system, stabilization process, and off-gas treatment and monitoring systems (MWFA 6, 7, 8)

Description: To stabilize 1750 drums of thorium waste streams to meet TCLP for barium and other contaminants to meet LDR for disposal. Material is a high alpha radiation source and requires remote handling of containers pre-, during, and post-treatment. Proposed processes include ceramic technology based treatment system that needs off-gas treatment/monitoring.

MWFA Response: There are currently two efforts underway within the DOE complex to baseline off-gas pollution control equipment. The first effort was initiated through by Carl Cooley to support the MWFA, it will be completed June, 1997. The second study was initiated by the Technical Resource Team and will be completed in June, 1997. Technology development requirements will be generated, based on the results of these studies. Additional work on thorium in off-gas has been conducted by PNNL on the for HLW program. Mike Elliot at (509) 376-9858 may be able to provide useful information.

Need ID.	IN ID-3.1.06	PBS #	ID-WM-07, ID-WM-09
STCG Need:	Develop an Alternative Nuclear Assay Method		
Description:	Need to develop alternative radioassay system(s), methods, or approaches for TRU waste assay that will meet the data quality objectives identified in the TRU Waste Characterization Quality Assurance Program Plan (QAPP). Current EM funded radioassay development and existing commercial capabilities need to be demonstrated to QAPP requirements. A method/approach that will be more cost effective in achieving throughput rates of 5,000 drums/year for untreated wastes is desirable. Improved nuclear assay methods are needed to meet the milestones identified in the INEL Site Treatment Plan and the Consent Order made a part of the Batt Settlement Agreement.		
MWFA Response:	This need has been linked to the MWFA Technical Baseline deficiency Characterization. Technology development activities are currently funded to support both non-destructive assay and non-destructive examination of wastes. The TDRDs and TTP task summaries associated with the Characterization deficiency have been attached for your information.		
Need ID.	IN ID-3.1.14	PBS #	ID-WM-09
STCG Need:	Need to Develop Waste Form Standards		
Description:	Need "final waste form performance standards, a performance model, and data" to qualify the proposed treatment technology, address potential licensing and permitting issues, and to prove treated product performance characteristics to support treated waste handling system improvements and out-year planning (storage, shipment, disposal, etc.). EM-30 funding is presently insufficient to address this need.		
MWFA Response:	The MWFA has established the Waste Form Initiative that is addressing disposal problems for the entire mixed waste inventory, with specific focus on those waste streams that can not meet the existing WACs for the available or proposed disposal facilities. The EM-30 Disposal Work Group has identified Hanford, NTS, and Envirocare as the preferred disposal facilities for DOE mixed waste. Consequently, if INEL treatment processes may pose potential disposal problems for the final waste form, this information should be provided to the MWFA for inclusion in ongoing analyses being performed under the WFI.		
Need ID.	IN ID-3.1.22	PBS #	
STCG Need:	Develop a Cradle-to-Grave Waste Data Management System		
Description:	Need a data management system (DMS) to support cradle-to-grave management of all wastes exam/characterization/certification data in accordance with the Quality Assurance Program Plan (QAPP) and Waste Isolation Pilot Project (WIPP) waste acceptance criteria (WAC) requirements. DMS should support automated waste segregation decisions; identify storage location, tracking capability, and in-process data entry; eliminate human factor concerns for entering data; and support decision making on container integrity results. Basic technology needed to engineer and implement this system is available. Additional need exists to improve the system developed and to provide Internet access.		
MWFA Response:	MWFA is not aware of any technology development associated with this need.		
Need ID.	IN ID-3.1.26	PBS #	ID-WM-09
STCG Need:	Develop Mobile Waste Container Assay, Characterization, Venting and Gas Analysis Equipment		
Description:	Need to develop a mobile system for assay and characterization, the venting and gas sampling/analysis equipment to characterize waste boxes/containers/drums in the field must be part of this system. The configuration should be flexible to allow access to vaults and similar hard-to-reach areas at various sites. The system must be able to obtain sufficient data for shipment of waste to treatment centers. This need exists to comply with the 10-year plans for other sites that intend to ship waste to the INEL's proposed AMWTF. EM-30 funding is presently insufficient to meet DOE-HQ's 10-Year Plan schedule.		
MWFA Response:	The Carlsbad Office has identified several studies to define RH-TRU NDE/NDA technology needs. The MWFA is working with the DOE-CAO to identify technology development requirements associated with this need. For further information please contact Mike Brown - DOE-CAO at 505-234-7976 or Whitney St. Michel at 208-526-3206.		
Need ID.	IN ID-3.1.29	PBS #	ID-WM-09
STCG Need:	DOT Approved Box Transport		
Description:	Need to develop a U.S. Department of Transportation (DOT)-approved box transport system for mixed transuranic (MTRU) waste boxes. The required design, development, and DOT testing must be completed as part of the scope of this effort and allow shipping of untreated waste to a treatment center. This need exists to comply with the 10-year plans for other sites that intend to ship waste to the INEL's proposed Advance Mixed Waste Treatment Facility (AMWTF).		
MWFA Response:	This need appears to be outside of the MWFA scope since it does not appear to be associated with technology development work but rather certification of a transport system. If the site has further need to address this issue please notify the MWFA.		

Need ID.	IN ID-3.2.12	PBS #	ID-WM-07
STCG Need:	Develop Real-Time RCRA Analysis Methods		
Description:	Opportunity to develop real-time, in-line analytical capabilities to more rapidly and cost effectively perform RCRA analysis (VOCs, SVOCs, metals, PCBs) on sampled sludge waste in accordance with quality assurance program plan (QAPP) requirements. Some work is under way employing x-ray diffraction, and additional possible methods include fiber optics and laser spectroscopy.		
MWFA Response:	This need has been linked with the Characterization and the VOC/SVOC deficiencies of the MWFA Technical Baseline. A TDRD has been generated which incorporates RCRA analysis needs. A table has been attached that identifies the TDRDs and TTP(s) currently associated with this deficiency.		
Need ID.	IN ID-3.2.13	PBS #	ID-WM-07, ID-WM-09
STCG Need:	Develop Non-Intrusive RCRA Analysis of Drums (3.2.13)		
Description:	Opportunity to develop an improved non-intrusive RCRA analysis method for VOCs, SVOCs, metals, and PCBs in debris waste.		
MWFA Response:	This need has been linked with the Characterization and the VOC/SVOC deficiencies of the MWFA Technical Baseline. A TDRD has been generated which incorporates RCRA analysis needs. A table has been attached that identifies the TDRDs and TTP(s) currently addressing this deficiency.		
Need ID.	IN ID-3.2.15	PBS #	ID-WM-05, ID-WM-09
STCG Need:	Develop Advanced Air Pollution Control Methods for Thermal Treatment Units		
Description:	Opportunity to develop advanced air pollution control methods that improve control of emissions (e.g., volatilized metals, radionuclides, dioxins, particulates, acid gases) below future potential limits and achieve ALARA. High temperature thermal treatment processing most likely system.		
MWFA Response:	There are currently two efforts underway within the DOE complex to baseline off-gas pollution control equipment. The first effort was initiated through by Carl Cooley to support the MWFA, it will be completed June, 1997. The second study was initiated by the Technical Resource Team and will be completed in June, 1997. Technology development requirements will be generated, based on the results of these studies.		
Need ID.	IN ID-3.2.16	PBS #	ID-WM-09
STCG Need:	Improved Melter Reliability		
Description:	Opportunity to improve treatment processes by increasing reliability and maintainability of melter system components (e.g., torch life, hearth life, electrode life) with limited life expectancy.		
MWFA Response:	Work, in support of plasma based melters, is being done on torch life extension. For further information contact Whitney St.Michel (208) 526-3206.		
Need ID.	IN ID-3.2.17	PBS #	ID-WM-09
STCG Need:	Need Methods to Validate Radionuclide Partitioning		
Description:	Opportunity to develop data and analytical models and control devices to validate and improve process control relationships for partitioning of radionuclides and toxic metals in thermal treatment systems.		
MWFA Response:	There are currently two efforts underway within the DOE complex to baseline off-gas pollution control equipment. The first effort was initiated through by Carl Cooley to support the MWFA, it will be completed June, 1997. The second study was initiated by the Technical Resource Team and will be completed in June, 1997. Technology development requirements will be generated, based on the results of these studies.		

Need ID.	IN ID-3.2.18	PBS # ID-WM-09
STCG Need:	Need Methods to Remove Particulates from Thermal Treatment Unit Off-Gas	
Description:	Opportunity to develop hot offgas filter capability to separate entrained non-volatile radionuclides from volatilized solid condensable particulate off-gases.	
MWFA Response:	The MWFA recognizes that high-temperature particulate filters poses a deficiency. MWFA continues to support WETO's testing of available filters in these applications. The MWFA recommends that the WETO developers be contacted and funded development work be leveraged. A detailed HEPA filter study was completed in FY-96 by LLNL's Werner Bergman. Technology development efforts were not identified through this effort and the deficiency associated with HEPA filter improvements is being removed from the MWFA baseline. Please review the document (Requirements for a Cleanable Steel HEPA Filter Derived From a Systems Analysis, June 1996) and if existing technology does not meet site needs, contact MWFA with development requirements. The MWFA recognizes that high-temperature particulate filters poses a deficiency. MWFA continues to support WETO's testing of available filters in these applications. The MWFA recommends that the WETO developers be contacted and funded development work be leveraged.	
Need ID.	IN ID-3.2.19	PBS # ID-WM-09
STCG Need:	Robust Secondary Combustion	
Description:	Opportunity to develop a robust process secondary reaction chamber for completing combustion and destruction of offgas VOCs and organic particulates, which must be highly tolerant to incoming process material variations and be able to minimize offgas volume.	
MWFA Response:	This need appears to be outside of the MWFA scope due to the award of the Advance Mixed Waste Treatment Project contract. It is the understanding of the MWFA that this need will be addressed by BNFL. However the MWFA is funding tests on a low-flow secondary reaction chamber at WETO by Dan Battleson (436) 494-7287. If the site has further need to address this issue please notify the MWFA.	
Need ID.	IN ID-3.2.20	PBS # ID-WM-09
STCG Need:	Develop On-Line Product Characterization Methods for Thermal Treatment	
Description:	Opportunity to develop rapid, on-line post assay/characterization methods for treated final waste forms to conduct product material acceptance monitoring more cost effectively and to ensure that QAPP requirements are met.	
MWFA Response:	Additional information must be obtained from the site. Currently there does not appear to be technology development associated with this need. Please contact Whitney St. Michel at 526-3206 and she will work with your site to generate technology development requirements.	
Need ID.	IN ID-3.2.23	PBS # ID-WM-07
STCG Need:	Develop In Situ Hydrogen and VOC Reduction	
Description:	Opportunity to develop an in situ hydrogen and VOC filter or catalytic filter to ensure relief from the limit on the shipment of untreated waste drums.	
MWFA Response:	This need is common among all sites with TRU/MTRU wastes. The MWFA has been working with the TRUPACT-II Gas Generation Interface Working Group (IWG) to identify needs associated with the transportation of mixed wastes. MWFA programs are currently being funded to address the TRUPACT-II shipping limits. Although these programs do not address filters, they will affect the shipping limits restrictions. Attached are the TTPs currently funded through the MWFA.	
Need ID.	IN ID-3.2.27	PBS # ID-WM-09
STCG Need:	Develop an Improved Waste Transfer Box	
Description:	Opportunity to develop a reusable transfer container to support retrieval at and transfer of waste containers from the Transuranic Storage Area (TSA) to the INEL's proposed AMWTF.	
MWFA Response:	This need appears to be associated with implementation of an existing technology rather than development work. At this time, the MWFA does not plan to fund work in this area. If the site has further need to address this issue please notify the MWFA.	
Need ID.	IN ID-3.2.28	PBS # ID-WM-07, ID-WM-09
STCG Need:	Develop Cost-effective Transport System for Treated TRU	
Description:	Opportunity to develop an improved, more cost effective transport system than TRUPACT II for treated waste residue shipments to WIPP. Performance properties of treated materials can allow for more cost effective transport.	
MWFA Response:	This need appears to be outside of the MWFA scope since it does not appear to be associated with technology development work but rather certification of a transport system. If the site has further need to address this issue please notify the MWFA.	

Need ID.	IN ID-3.2.30	PBS #	ID-WM-09
STCG Need:	Develop Improved Solid Waste Feed Preparation		
Description:	Opportunity to develop an improved automated and remote waste feed preparation system and solid waste mixer and extruder feeder system for installation onto a top ?? as the vertically fed, high temperature carbon arc furnace (i.e., the DC arc melter being developed by Pacific Northwest Laboratory at Hanford). This system is necessary to remotely condition heterogeneous waste streams such as metals, combustibles, sludges, concrete, cloth, paper, and plastics.		
MWFA Response:	This need appears to be outside of the MWFA scope for two reasons: 1) due to the award of the Advance Mixed Waste Treatment Project contract, it is the understanding of the MWFA that this opportunity will be addressed by BNFL, and 2) this need appears to be associated with implementation of an existing technology rather than development work. If the site has further need to address this issue please notify the MWFA.		
Need ID.	IN ID-3.2.31	PBS #	ID-WM-09
STCG Need:	Develop an Improved Remote Melter Tapping Mechanism		
Description:	Opportunity to develop an improved automated and remote melter tapping mechanism to separate and remove the slag and metal secondary streams from high temperature furnaces. This capability provides for cost effective and safer handling of the waste residuals generated during treatment processes.		
MWFA Response:	This need appears to be outside of the MWFA scope due to the award of the Advance Mixed Waste Treatment Project contract. It is the understanding of the MWFA that this need will be addressed by BNFL. If the site has further need to address this issue please notify the MWFA.		
Need ID.	IN ID-3.2.32	PBS #	ID-WM-05, ID-WM-09
STCG Need:	Develop a Thermal Treatment Unit Offgas CEM Monitors		
Description:	Opportunity to develop continuous emission monitor (CEM) systems for off-gases, toxic metals, dioxins, radionuclides, and thermal treatment processes. CEM performance must exceed anticipated EPA contaminant emission standards.		
MWFA Response:	This need has been linked to Mercury, Alpha, Heavy Metal, and VOC/SCOC Monitor deficiencies. The associated TDRDs will be reviewed with your input to ensure that your need is being addressed. Tables have been attached that identify the TDRD and TTP(s) currently associated with these deficiencies.		
Need ID.	IN ID-3.2.33	PBS #	ID-WM-05, ID-WM-09
STCG Need:	EPA MACT will eventually require, opportunity will become need.		
Description:	Opportunity to develop a polishing capability to remove dioxins, Hg, toxic metals, NOx, SOx and hazardous hydrocarbons from offgas at low temperatures.		
MWFA Response:	There are currently two efforts underway within the DOE complex to baseline off-gas pollution control equipment. The first effort was initiated through by Carl Cooley to support the MWFA, it will be completed June, 1997. The second study was initiated by the Technical Resource Team and will be completed in June, 1997. Technology development requirements will be generated, based on the results of these studies.		
Need ID.	IN ID-6.1.14	PBS #	ID-ER-06
STCG Need:	Stabilization of Secondary Waste from Thermal Treatment		
Description:	The Pit 9 demonstration process will produce scrubber blowdown water that currently has no waste disposition option identified. The scrubber blowdown water will contain high concentrations of salt and potentially contains oxidized actinide series radionuclides, and oxidized metal particulates; organic constituents are not expected. Currently, there is no identified disposition for the scrubber blowdown waste water. A method, process, or system needs to be developed that will address this specific waste stream. Wastewater characterization data and volume projections are unavailable at this time but the design basis will be available by January 1, 1997. Similar high salt content waste waters are likely to be generated from other thermal treatment processes; therefore, the need identified herein is not unique to the Pit 9 process.		
MWFA Response:	This need has been linked with deficiencies Salt and Ash Stabilization of the MWFA Technical Baseline. A TDRD has been generated for these deficiencies. Tables have been attached that identify the TDRD and TTP(s) currently associated with these deficiencies.		

Need ID. NT NV0008

PBS # NV360

STCG Need: Cotter Concentrate Preparation for Processing

Description: The Cotter Concentrate is currently being stored in 55-gallon drums, which need to be monitored and inspected, involving labor cost and potential worker exposure, treatment and disposal. The material is regulated by the state and by a consent order for an approach for packaging and otherwise preparing the Cotter Concentrate, a mixed waste, for off-site uranium recovery and tailings disposal. Background. The Cotter Concentrate is spent uranium ore that has been stored at the NTS as strategic material. Recently, it was reclassified as a waste material. It is a mixed waste because of the presence of selenium and its corrosive characteristic. The baseline plan is to treat the material within the next two years for off-site disposal. Ongoing/approved program. The Cotter Concentrate treatment and off-site disposal is consistent with the Ten-Year Plan. Magnitude of Problem. The Cotter Concentrate is presently being stored in 1,236 55-gallon drums. The drums are constantly monitored to assure their integrity. Processing and final disposition.

MWFA Response: The MWFA has funded a quick win (TTP NV06MW61) that is focused at addressing this need. If additional needs exist relative to this need beyond those being addressed by the quick win project, please notify the MWFA.

Need ID. NT NV0009

PBS # NV360

STCG Need: Removal of Lead from Soil

Description: Technology is needed to separate particulate lead, lead oxide, and other lead minerals from the soil matrix. The lead was used for shielding weapons test and as a result may be contaminated with radiation. In order to reduce the disposal volume, separation of the lead from the soil is required.

MWFA Response: This need has been linked with the Sort and Segregate deficiency from the MWFA Technical Baseline. The MWFA will work with the RTDP to identify technology development requirements associated with this need. A table has been attached that identifies the TTP(s) currently associated with this deficiency.

Need ID. NT NV0010

PBS # NV360

STCG Need: Long-Term Stability of Micro-Encapsulation of Lead and Other Mixed Waste

Description: Technology is needed to encapsulate lead and mixed waste and to ensure its stability for long periods of time. The specific need is to determine whether macroencapsulation is the appropriate cost effective and safe long-term treatment technology for these two waste forms.

MWFA Response: The MWFA established a Cooperative Agreement with Envirocare of Utah to transfer polymer macroencapsulation, a DOE developed technology, to the private sector for full deployment. NTS shipped almost 11,000 lbs of mixed waste lead and debris to Envirocare for treatment and disposal under this Cooperative Agreement. If technology deficiencies exist for certain NTS waste streams relative to macroencapsulation, please provide the appropriate information to the MWFA for evaluation. The MWFA has recently begun efforts to establish a working group to address development of standards for macroencapsulated waste forms. A letter requesting participation from the DOE complex will be transmitted before the first of February. Please provide a point of contact to the MWFA to ensure involvement by NTS on this work group.

Need ID. NT NV0016

PBS # NV350

STCG Need: Operational Process Analysis for Mixed TRU Waste

Description: An integrated systems analysis approach is required that involves various analytical and materials processing that leads to a waste form that is acceptable to the disposal facility. Currently certification of Mixed TRU waste involves package radiography, visual inspection, analytical sampling, headspace gas sampling, radio assay, and packaging. The problem is complicated by irregular shape and oversize packaging with complicated geometries. There lacks an integrated system that will account for certification of all existing TRU and Mixed TRU waste forms. This allows the Mixed TRU waste to be subjected to adverse and potentially costly regulatory actions. The magnitude of the problem includes 1,650 drums of Mixed TRU, 300 drums of classified TRU and Mixed TRU, and 58 non-standard size boxes of classification unknown waste. The non-standard packages need additional size reduction for acceptance.

MWFA Response: MWFA is not aware of any technology development associated with this need.

Need ID. OK 2

PBS # OAK-16

STCG Need: Treatment and Disposal of Tritiated Mixed Waste of High Specific Activity

Description: There is currently no disposal route for tritiated mixed waste of high specific activity. Hanford cannot take the waste because it is not in the waste treatment plan. Nevada is only taking defense waste and WIPP will only accept transuranic waste. As concerns regarding land burial and potential environmental releases mount, it is essential to develop processes for ensuring that contaminated materials may be disposed in an environmentally benign manner.

This same problem exists on a larger scale in the pharmaceutical industry where isotopes such as tritium and carbon-14 are regularly used in research and drug development projects, and process solvents are contaminated. On a smaller scale, academic institutions conducting life science and biomedical research invariably produce mixed waste.

MWFA Response: The MWFA has funded a quick win (OK16MW31) to demonstrate a catalytic chemical oxidation for highly tritiated mixed waste streams at LBNL. In addition, a de-listing petition will be pursued based on the treatment efficiency to allow management of the treatment process residuals as LLW. The MWFA verified that this need is being addressed.

Need ID. OK 21

PBS # OAK-21

STCG Need: Mobile Non-Destructive Assay for Waste Boxes

Description: There are currently no assay systems, mobile or fixed, that can properly assay the isotopic inventory of transuranic waste contained in waste boxes.

MWFA Response: This need has been captured under the Characterization deficiency from the MWFA Technical Baseline. The MWFA and sites are requested to review the TDRDs to ensure that the site needs will be met. A table has been attached that identifies the TDRDs and TTP(s) currently associated with the Characterization deficiency.

Need ID. OK 23

PBS # OAK-22

STCG Need: Destruction of Mixed Chlorinated Solvents

Description: Through various machining and degreasing operations at Lawrence Livermore Laboratory, chlorosolvents are generated --primarily perchloroethylene (PCE) and methylchloroform (MCM). The targeted waste stream consists of 1900 gallons of neat solvents. This waste stream is difficult to treat and has no incineration alternative at this site. The waste stream is described in DOE/OAK Site Treatment Plan as LL-W008 and has U and Th contamination (both <10uCi).

MWFA Response: The MWFA has funded a quick win (OK23MW35) for demonstration of a direct chemical oxidation (DCO) for treatment of chlorosolvent mixed wastes, specifically LL-W008, as identified in this need. If additional needs exist relative to this need beyond those being addressed by the quick win project, please notify the MWFA.

Need ID.	OR hg-1	PBS #	OR38102 MLLWT
STCG Need:	Hg Removal from Thermal Gas Streams		
Description:	Mercury removal from gas streams from thermal treatment of mercury-bearing waste. Methods for mercury removal are sought which could be integrated with current treatment facilities with minimal upgrade cost. When integrated, the effluent must meet discharge levels for mercury under the new Maximum Achievable Control Technology (MACT) standards.		
MWFA Response:	Work is currently being funded through the MWFA on a Hg filter. A table has been attached that identifies the TDRD and TTP(s) currently associated with this deficiency.		
Need ID.	OR hg-2	PBS #	OR38102
STCG Need:	Pre-treat for Thermal		
Description:	Mercury removal from inorganic prior to thermal treatment of mercury-bearing waste. Pretreatment methods for mercury removal are sought which could be integrated with current treatment facilities with minimal upgrade cost. When integrated, the effluent must meet discharge levels for mercury under the new Maximum Achievable Control Technology (MACT) Standards.		
MWFA Response:	The MWFA has established the Mercury Work Group, which is developing and demonstrating treatment technologies for mercury amalgamation, stabilization, and separation/removal. At present, representatives from ORNL, SRS, RFETS, and INEL are participating on the HgWG. The HgWG is managed by Tom Conley, ORNL and the MWFA Waste Type Manager is Ron Nakaoka. If data specific to these OR mercury waste needs should be provided to the HgWG, please contact Tom Conley at 423-574-6792, e-mail tbc@ornl.gov, or Ron Nakaoka, LANL at 505-665-5971, e-mail rkn@lanl.gov.		
Need ID.	OR hg-5	PBS #	OR38102
STCG Need:	Trace Metal		
Description:	Mercury removal/polishing to achieve low mercury concentration in discharged water. The NPDES permits require that treatment to parts per trillion levels (milligrams/L) may be needed in the future. Currently methods are not available to remove to or analyze these low concentrations.		
MWFA Response:	This need has been linked with Trace Metal Removal deficiency of the MWFA Technical Baseline. A TDRD has been generated for this deficiency. Specific requirements for OR are needed to identify TD in the TDRD. A table has been attached that identifies the TDRD and TTP(s) currently associated with this deficiency.		
Need ID.	OR hg-6	PBS #	OR38102
STCG Need:	Hg Monitor		
Description:	Methods are sought for real-time monitoring of mercury in gases from thermal treatment system. The solution must operate at temperatures in the range of 90 deg C or higher in real time.		
MWFA Response:	This need has been linked to the Mercury Monitoring deficiency in the MWFA technical baseline. Attached is a report which lists TTP task summary being funded in the area. A table has been attached that identifies the TDRD and TTP(s) currently associated with this deficiency.		
Need ID.	OR hg-7	PBS #	OR42101 EFPCRA
STCG Need:	Remove Hg from Metals in Porous		
Description:	Methods are sought that can remove mercury from 1. metals (e.g., nickel, aluminum, copper, and iron), and 2. porous surfaces (e.g., concrete and clay tiles). Metals must be cleaned to allow for recycle of metal. Porous surfaces must be cleaned not to pose human hazards.		
MWFA Response:	The MWFA has established the Mercury Work Group, which is developing and demonstrating treatment technologies for mercury amalgamation, stabilization, and separation/removal. At present, representatives from ORNL, SRS, RFETS, and INEL are participating on the HgWG. The HgWG is managed by Tom Conley, ORNL and the MWFA Waste Type Manager is Ron Nakaoka. If data specific to these ORNL mercury waste needs should be provided to the HgWG, please contact Tom Conley at 423-574-6792, e-mail tbc@ornl.gov, or Ron Nakaoka, LANL at 505-665-5971, e-mail rkn@lanl.gov.		

Need ID:	OR WM-1	PBS #	OR38101 MLLWS
STCG Need:	Oak Ridge Sites Technique to Analyze Very Low Levels of Radioactivity in Discarded Chemicals		
Description:	A technique is needed to detect the amount of low-level radioactivity in chemicals being discarded from laboratories.		
MWFA Response:	The technology development required to solve this need is not clear. Please contact Whitney St. Michel at 526-3206 to discuss development requirements.		
Need ID:	OR WM-10	PBS #	OR38102
STCG Need:	Trace metal removal from liquid		
Description:	Efficient processes to meet proposed National Pollution Discharge Elimination System (NPDES) permit requirements for Cd, Pb, and Aq are needed. The ORNL Non-radiological Wastewater Treatment Plant currently does not meet the proposed NPDES limits of 0.001 mg/L Cd, 0.003 mg/L Pb, and 0.004 mg/L Aq. Efficient processes to treat wastewater to within these limits without generating large volumes of secondary waste are needed. Proposed National Pollution Discharge Elimination System (NPDES) Permit requirements for Cd, Pb, Aq, and other heavy metals are becoming more stringent.		
MWFA Response:	This need has been linked with the Trace Metal Removal deficiency of the MWFA Technical Baseline. A TDRD has been generated for this deficiency. Specific requirements for OR are needed to identify TD in the TDRD. A table has been attached that identifies the TDRD and TTP(s) currently associated with this deficiency.		
Need ID:	OR WM-13	PBS #	OR38102
STCG Need:	Hg		
Description:	Systems capable of continuous measurement of total, elemental, and speciated gaseous mercury effluent from DOE waste treatment units are needed. Mercury is difficult to monitor because of the many forms it takes in gaseous emissions. Mercury can be emitted as elemental mercury or other speciated compounds such as mercuric chloride, dimethyl mercury, and methyl mercuric chloride. Current technologies primarily change air pollution into a solid and liquid waste problem. Mercury is not eliminated from the biosystem, and additional volumes of contaminated waste are produced. Current technologies also do not control the range of mercury species produced in thermal remediation processes. DOE desires to remediate facilities and equipment contaminated with mercury. One of the greatest challenges for gaining approval for waste treatment processes is convincing the public and regulators that effluent from treatment processes will be within regulatory limits and not pose a health concern to the public. Convincing is made much easier when monitoring techniques are continuous and real-time. Continuous real-time monitoring provides assurance that the effluent is always within regulatory limits and can also be used for on-line process control to optimize operations.		
MWFA Response:	This need was linked to Mercury Monitoring and Mercury Filters deficiencies in the MWFA Technical Baseline. We will be reviewing the TTP Task summaries and the TDRD to ensure your need is being addressed. Tables have been attached that identify the TDRD and TTP(s) currently associated with these deficiencies.		
Need ID:	OR WM-14	PBS #	OR38105,OR38106
STCG Need:	Long term effect waste form		
Description:	Long-term mechanisms by which waste forms release their toxic constituents need to be modeled and understood. The capacity of a waste form to resist leaching or dispersion in the environment is related to its physical and chemical stability over time. The ability to predict the physical and chemical integrity of a solidified waste form requires testing to relate chemical aging and contaminant transport mechanisms. This needed testing will then provide the mechanisms by which waste forms release their toxic constituents over time. DOE desires to treat waste and remove toxic constituents from the environment for a very long time. In order to accomplish this goal, DOE has established requirements for disposal of low-level radioactive waste and mixed waste. These requirements include off-site radionuclide dose rates which are fixed over time. Because leaching is the first pathway by which contaminants reenter the biosystem, future off-site radionuclide dose rates are predicted through performance assessments for a given waste treatment facility. The assessments are conducted using leach rates for the species involved. The results obtained are then used to determine the radionuclides that can be processed in the given waste treatment facility. Intruder scenarios are also developed to speculate on exposure pathways and estimate public risk.		
MWFA Response:	No regulatory requirements currently exist that mandate modeling long term mechanisms by which waste forms release toxic constituents. More information is required for the MWFA to adequately evaluate this need to determine what action, if any, is appropriate. (Check with Dave Hutchins for additional data.)		

Need ID.	OR WM-15	PBS #	OR38102
STCG Need:	Adjust lithium level in WW		
Description:	A method to adjust lithium to allowable levels in aqueous solutions is needed. Lithium in aqueous solutions, at the right levels, causes toxicity with the indicator organism Ceriodaphnia. WETF effluent is considered a mixed waste. DOE processes are required to meet all environmental requirements when discharging effluent. Not all process effluent containing lithium meet environmental requirements.		
MWFA Response:	Per conversations between Dave Hutchins, DOE-OR and the site, there is no technology development required to address this need.		
Need ID.	OR WM-17	PBS #	OR38101, OR38102, OR38104, OR38105
STCG Need:	Char for TRU, mobile char, NDE		
Description:	Characterization capabilities for site specific waste are needed. Characterization capabilities for transuranic waste are needed. Transportable characterization capabilities for radioactive waste are needed. A comprehensive non-destructive testing (NDT) program to characterize low-level radioactive waste is needed. Transuranic waste characterization to meet the Waste Isolation Pilot Plant waste acceptance criteria is needed. Operations such as the Toxic Substance Control Act (TSCA) incinerator require better characterization of feed to properly treat waste. In addition, improved characterization capabilities may greatly decrease the amounts of waste presently characterized as transuranic or contact-handled transuranic because of inefficient and slow characterization technologies. B-25 Boxes are difficult to characterize non-destructively. Collecting and characterizing samples of heterogeneous materials with existing technologies is time consuming and costly. Data derived from samples is suspect because of assumptions made in sampling techniques. Truly representative samples are difficult to obtain. The private sector cannot currently meet all characterization needs for Oak Ridge waste. In the past, NDT for nuclear material accountability was successfully used. Currently however, comprehensive NDT, non-destructive assaying (NDA), and non-destructive examination (NDE) techniques do not exist for effective waste characterization. (Info packet lists a long description of current Oak Ridge Reservation NDA Capabilities.)		
MWFA Response:	This need has been linked with the Characterization deficiency from the MWFA Technical Baseline. A TDRD has been generated which incorporates these needs. A table has been attached that identifies the TDRDs and TTP(s) currently associated with this deficiency. Please review the TDRDs to ensure that your needs are being addressed.		
Need ID.	OR WM-18	PBS #	OR38105
STCG Need:	Method of Stabilization ash/sludge/salt for disposal		
Description:	There is a need to perform a study and determine the best way to dispose of cake, ash, and slag containing 30% moisture. The study needs to be comprehensive and include an in-depth economic analysis.		
MWFA Response:	This need has been linked with the Salt and Ash Stabilization deficiencies of the MWFA Technical Baseline. TDRDs have been completed and will be forwarded to the site for review. Several technologies are currently being funded that may meet the site need. Tables have been attached that identify the TDRD and TTP(s) currently associated with these deficiencies.		
Need ID.	OR WM-19	PBS #	OR38104, OR38106
STCG Need:	LLW Ash Stab		
Description:	A permanent disposal method or long-term storage method for solid radioactive waste and inorganic low-level waste ash is needed. Solid radioactive waste and inorganic low-level (LLW) ash are in temporary storage. The Department of Energy (DOE) desires to meet all environmental regulations while cleaning up radioactive waste.		
MWFA Response:	An ash stabilization demonstration scheduled to be held at WERF should address this need.		

Need ID. OR WM-2

PBS # OR38102,
OR38105,
OR38108

STCG Need: Characterize MW

Description: A critical need exists to establish first a baseline and then a method to systematically evaluate waste treatment processes. The baseline and method are needed to compare waste treatment processes which are improved or employ new technologies. Waste treatment processes are continuously being improved or making use of new technologies. Currently no baseline exists with which to compare the results of these processes. Currently no method exists to systematically evaluate these processes. Oak Ridge developed a tool to analyze performance for the Mixed Waste Focus Area. The FLOW model developed analyzes performance, calculates risk, and calculates the cost of alternative processes. This model relies on field testing, unlike the Advanced System for Process Engineering (ASPEN), which uses thermodynamic code at the molecular level. The FLOW model is used to select, screen, and compare technologies and to identify data needs. In the Site Treatment Plan for the five DOE Oak Ridge Operations Sites, Oak Ridge was to receive mixed waste from Portsmouth for treatment in the TSCA Incinerator. The State of Tennessee required review of this plan. FLOW was utilized to evaluate the incineration process proposed in the plan. It is anticipated that regulators will continue to request waste treatment process evaluations, as broad ranges of mixed waste streams continue to be generated by Waste Management, Environmental Restoration, and Facility Transition and Management Programs throughout the DOE complex. FLOW can serve as part of the baseline and systematic evaluation method needed to make decisions and rapidly analyze the applicability of a waste treatment process. Criteria for the evaluation method need to include, as a minimum cost, regulatory acceptance, public acceptance, worker and public risk, operability, reliability, maintainability, and stage of technology development.

MWFA Response: Though systems analysis of waste treatment processes is critical to selection of cost-effective, applicable technologies, this type of evaluation would be premature for most of the technologies funded by the MWFA. Specific studies managed by Carl Cooley, DOE-HQ EM-50, have yielded some insight, but have been limited by the amount of cost and performance data available from developers. Needs submitted by EM-30 have included this technology specific data but have not suggested that the MWFA support models such as FLOW.

Need ID. OR WM-22

PBS # OR38102

STCG Need: Chemical oxidation

Description: A chemical oxidation treatment method is needed for 11,185 kg of mixed waste.

MWFA Response: It is not clear what the magnitude of the need is. Additional information on this need is required. Dave Hutchins, DOE-OR, who represents the MWFA as a Waste Type Manager is working with the site to clarify need.

Need ID. OR WM-4

PBS # OR38102

STCG Need: Chelated nickel

Description: A more efficient process for removing chelated nickel from biodenitrification effluent is needed. Currently activated carbon is used to remove chelated nickel from biodenitrification effluent. This treatment is effective but inefficient and it produces large volumes of secondary waste. The effluent from biodenitrification contains sodium bicarbonate and traces of other salts.

MWFA Response: The MWFA recognizes that trace metal removal may be a deficiency in the complex. However, based on conversation with the site, the MWFA believes that this need will be removed from the Site needs list. Apparently the site operators have implemented a more effective head-end process to remove nickel. There is a high probability that technology is currently available (e.g. ion exchange) through the private sector, and that a reduction in plating operations at the site has reduced nickel waste.

Need ID. OR WM-5

PBS # OR38102

STCG Need: Wastewater MFP removal

Description: Improved methods are needed for removing radionuclides such as Cs, Sr, Tc, and Co from aqueous wastes without generating large quantities of secondary waste.

MWFA Response: This need has been linked with Fission Product Removal deficiency of the MWFA Technical Baseline. TDRDs have been generated for these deficiencies. Specific requirements for OR are needed to identify TD in the TDRDs. A table has been attached that identifies the TDRD and TTP(s) currently associated with this deficiency.

Need ID. OR WM-6

PBS # OR38102

STCG Need: Removal of sodium nitrate

Description: An efficient process to remove and destroy sodium nitrate ions in LLW is needed. Currently ORNL is storing wastes containing radionuclides. These LLW wastes needed to be removed and properly processed.

MWFA Response: This need has been linked with the Salt Stabilization and Nitrate Destruction deficiencies of the MWFA Technical Baseline. A TDRD has been generated for this deficiency. Specific requirements for OR are needed to identify further requirements in the TDRD. Tables have been attached that identify the TDRD and TTP(s) currently associated with these deficiencies.

Need ID. OR WM-7

PBS # OR38102

STCG Need: Eliminate Hg in Mixed Waste

Description: A process to remove mercury from mixed waste and eliminate it from the biosystem. Low temperature treatment methods are needed. New processes need to convert hazardous organics and organic matrices into nontoxic gaseous products and inorganic salts while minimizing the volume of secondary generated waste. It is DOE's desire to eliminate large inventories of mixed waste stored throughout the complex. Mercury contamination is evident in some of these wastes, which include solid process residue, debris, storm-sewer sediments and soils. The removal of mercury is an essential step in eliminating these wastes. Thermal desorption is the best available technology as demonstrated by the Environmental Protection Agency (EPA). This technology is not applicable to all mercury contaminated waste, and removal of mercury prior to thermal treatment is required. Some thermal treatment processes such as the TSCA Incinerator, vitrification, plasma, and catalytic extraction require control of mercury vapor. The EPA is required to establish emission control standards for mercury and its compounds resulting from thermal reaction in incinerators, kilns, fossil fuel combustors, and advanced generation systems. Mercury emissions are of particular concern because they accumulate in the biosystem and are difficult to capture. Current technologies primarily change air pollution to solid or liquid waste problems. Mercury is not eliminated from the biosystem, and additional volumes of waste are produced. In addition, current processes are not effective in controlling the range of mercury species found in emissions streams. Low temperature treatment methods need to be developed to alleviate stakeholder concerns regarding emissions and to simplify permitting. The new processes need to convert hazardous organics and organic matrices into nontoxic gaseous products and inorganic salts while minimizing the volume of secondary generated waste.

MWFA Response: The MWFA has established the Mercury Work Group, which is developing and demonstrating treatment technologies for mercury amalgamation, stabilization, and separation/removal. At present, representatives from ORNL, SRS, RFETS, and INEL are participating on the HgWG. The HgWG is managed by Tom Conley, ORNL and the MWFA Waste Type Manager is Ron Nakaoka. If data specific to this ORNL mercury waste need should be provided to the HgWG, please contact Tom Conley at 423-574-6792, e-mail tbc@ornl.gov, or Ron Nakaoka, LANL at 505-665-5971, e-mail rkn@lanl.gov.

Need ID. OR WM-9

PBS # OR38101,
OR38104

STCG Need: Internal Drum Pressure

Description: There is need to determine the internal pressure of drums and containers using non-intrusive pressure sensing techniques. These drums and containers contain transuranic, low-level, and mixed waste. Current methods for determining pressure include visual checking (which is unreliable) and drilling a hole (which is slow, expensive, and hazardous to workers). During drilling, workers are close to the old corroded pressurized drums and the gases which are vents. Techniques and requirements to protect inadvertent intruders who enter waste disposal site premises hundreds of years from now are also needed. Current regulations require that all drums containing waste be opened and inspected. In the DOE complex there are over 3,000 inactive waste sites where waste is contained in 55 gallon drums and other containers. Procedures require that container internal pressure be determined first before the drums are opened and waste inspected.

MWFA Response: The sites were contacted in FY-96 to determine if they could identify a technology deficiency associated with internal drum pressure. No deficiencies could be identified therefore it was removed from the FY-97 Technical Baseline deficiency list. Most sites felt that current safety management practices, i.e., safety procedures, met this need. If the site has further need to address this issue please contact the MWFA.

Need ID. RF RF-ER01

PBS # RF-01

STCG Need: Excavation of Buried Drums Containing Unoxidized Depleted Uranium Chips

Description: The Site requires methods to safely excavate, manage, and disposition 84 to 125 drums of buried, unoxidized, depleted uranium chips (approx. 25,000 kg) over-packed in graphite, from Trench T-1. These drums were buried in 1954 and their condition is unknown. Unoxidized uranium chips are pyrophoric and represent a significant safety concern for personnel involved in remediation of Trench T-1. Other materials such as metal turnings, residue from a distillation process, and cemented cyanide wastes were disposed of in this trench as well. Contaminants including acetone, toluene, bis(2-ethylhexyl)phthalate, arsenic, and cadmium have been detected in the trench. Because no documentation exists as to the actual contents of the drums the method of treatment for disposal cannot be determined until they are exhumed and characterized.

MWFA Response: Based on additional information obtained from the site, it appears that treatment options for the retrieved waste currently exist or are known. The problem is in the retrieval of the waste due to the pyrophoric nature of the unoxidized uranium chips. This need was tied to the MWFA deficiency "material handling". Currently, no technology development is funded in this area through the MWFA. A program has been initiated by the MWFA to evaluate materials handling technologies related to sorting and segregating.

The Robotics Technology Development Program (RTDP) Crosscut Area focuses primarily on materials handling issues. The MWFA will work with the RTDP, the Subsurface Contaminants Focus Area, and your site to define technology development requirements for your need.

Need ID. RF RF-SNM-1

PBS # RF-02

STCG Need: JUSTIFICATION FOR INCREASED DRUM WATTAGE LIMITS THROUGH VALIDATION OF HYDROGEN OFF-GAS

Description: Provide the technical basis to reduce the volume of waste for transport to WIPP and to minimize the post-processing mortgage costs for on-site storage of residues. The need is for an approved increase in the drum wattage limit through a technical justification based on actual measurement and validation of hydrogen equilibrium gas generation rates. The current WIPP hydrogen off-gas specification limits are based on conservative assumption regarding drum contents and therefore prohibit volume reduction efforts at Rocky Flats.

Hydrogen generation equilibrium rate data may be used to petition for higher wattage limits, particularly for combustible residues. A ten-fold increase in wattage limit, up to 200 gm/drum, (which is justified based on data generated to date) would have the same effect on waste minimization as would actinide separation but with less cost, no schedule impact, and a higher probability of success.

MWFA Response: This need is common among all sites with TRU/MTRU wastes. The MWFA has been working with the TRUPACT-II Gas Generation Interface Working Group (IWG) to identify needs associated with the transportation of mixed wastes. MWFA programs are currently being funded to address the TRUPACT-II shipping limits. Although these programs do not address filters, they will affect the shipping limits restrictions. Attached are the TTPs currently funded through the MWFA.

Need ID. RF RF-SNM-3

PBS # RF-08, RF-09, RF-10

STCG Need: CHARACTERIZE RESIDUE TREATMENT PROCESSES

Description: Methods are needed for characterizing residue processes at the time of stabilization or repackaging to allow certification of the product for interim safe storage or WIPP disposal. Development of and adherence to process quality specifications would eliminate the need for future drum sampling and qualification of the product. Process certification data should be tracked and maintained with each drum so it is useful and available for certifying the drum at the time of shipping. Program costs will be reduced by minimizing drum-by-drum certification methods. Availability of a process support laboratory is also desirable to ensure waste product quality specifications and troubleshoot stabilization processes.

MWFA Response: There appears to be several items included in this need. Primarily, RF-SNM-3 identifies programmatic needs, i.e. drum tracking, certification requirements of the site. One technology development need was identified by the MWFA: characterization of the waste (treated or untreated), particularly the plutonium isotopic distribution. Several activities associated with NDE/NDA are being funded through the MWFA and the Characterization, Monitoring and Sensor Technology (CMST) Crosscut Area under the Characterization deficiency. Attached is table listing the associated TDRDs and the TTPs funded in FY-97.

Need ID.	RF RF-SNM-4	PBS #	RF-08, RF-09, RF-10
STCG Need:	RESIDUE PROCESSING TECHNOLOGIES		
Description:	Technology solutions are needed to support the re-baselining of the residue program to meet recently established plutonium content/drum restrictions, i.e. Safeguard Termination Limits (STLs), for transuranic waste drums destined for Waste Isolation Pilot Plant (WIPP) disposal. Ideally, broadly applicable technologies will be available whose product will be compliant with both Defense Nuclear Facility Safety Board (DNFSB) 94-1 stabilization requirements and STLs. Nuclear material handling and processing shall be minimized for safety compliance. Re-baselining is expected to require processes not currently in the residue stabilization work scope. Off-Site processing is desired where feasible but transportation restrictions apply to some untreated residues which would preclude off-Site shipment and processing.		
	Candidate technologies are listed under Technology Alternatives. The selected technologies may require feasibility testing or process adaptation to verify performance and develop specific optimized operating parameters and product quality parameters.		
MWFA Response:	The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed. The Plutonium Focus Area may also be funding development of treatment systems that could be included in your treatment options list.		
Need ID.	RF RF-SNM05	PBS #	RF-07, RF-08, RF-12
STCG Need:	Mobile Assay and Hazard Evaluation for Residues		
Description:	There is a need for improved non-intrusive methods to enable characterization of the current inventory of residue materials. A self-contained mobile analysis system is needed to determine distribution of actinides within the drum, free liquids, and detect an interior package breach of containment. Accurate, rapid, non-intrusive assay methods are needed to readily identify hazards or potential hazards so that high risk drums could be appropriately prioritized for expedited treatment or repackaging. Precisely detecting the location of drum "hot" spots will facilitate drum movement while remaining in compliance with criticality safety. The system should operate independently from the host building utilities and safety systems.		
MWFA Response:	A demonstration of commercially available NDE/NDA technologies will be conducted in FY-97. CMST and the MWFA are developing the test plan for the demonstration. A report will be generated, and forwarded to the sites, with a summary of the results.		
Need ID.	RF RF-SNM10	PBS #	RF-02
STCG Need:	Methods to Reduce the Volume of Waste for Transport to WIPP		
Description:	Improved treatment methods are needed to reduce the volume of waste such that fewer drums are shipped to WIPP and to concurrently minimize the post-processing mortgage costs for on site storage of stabilized waste. Methods must be compliant with WIPP waste certification criteria and Safeguards Termination Limits.		
MWFA Response:	The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.		
Need ID.	RF RF-SNM11	PBS #	RF-07, RF-08, RF-12
STCG Need:	RCRA Characterization in Pu Residue		
Description:	Improved methods to provide confirmation of RCRA hazards in plutonium residues.		
MWFA Response:	This need has been linked with the Characterization deficiency from the MWFA Technical Baseline. A TDRD has been generated for the NDE of RCRA materials. A table has been attached that identifies the TDRDs and TTP(s) currently associated with characterization of wastes.		
Need ID.	RF RF-WM03	PBS #	RF-02
STCG Need:	CERTIFIED PROCESS FOR TRU/TRM HYDROGEN GAS GENERATION MEASUREMENT		
Description:	There is a need to establish a hydrogen gas generation measurement process for TRU/TRM waste contained in 55-gallon drums. Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC) required that hydrogen gas generation in TRU/TRM waste sent to WIPP for disposal be below a certain limit. There is no certified technique approved by WIPP for this measurement at this time although there is a working group addressing the problem. This is a DOE complex-wide need.		
MWFA Response:	It does not appear that technology development is required to meet this need. The process for certification of a site for shipping waste to WIPP is a site management decision. The MWFA is funding activities that are focused on gas generation limits within the TRUPACT-II. Please contact the MWFA with any comments or questions.		

Need ID. RF RF-WM04

PBS # RF-02

STCG Need: IMPROVED SENSITIVITY FOR PLUTONIUM ASSAY INSTRUMENTATION

Description: Improved methods are needed for accurate non-destructive assay of low-level wastes to classify and segregate wastes for shipment to off-Site disposal facilities. Improved sensitivity down to 1 nCi/g is needed in order to meet applicable disposal site waste acceptance criteria and increase off-Site disposal options. The upper acceptance limit at Envirocare is 1 nCi/g while other commercial disposal sites have upper acceptance limits of 10 nCi/g. Provide accurate non-destructive assay technology for low-level wastes between 1 and 100 nCi/g.

MWFA Response: This need has been linked with the characterization deficiency of the MWFA Technical Baseline. A TDRD has been generated to define system requirements. A table has been attached that identifies the TDRDs and TTP(s) currently associated with this deficiency.

Need ID. RF RF-WM07

PBS # RF-02

STCG Need: NON-DESTRUCTIVE ASSAY (NDA) FOR DRUM HEADSPACE

Description: A non-destructive technique to analyze the head space of drummed waste is needed that will not destroy the integrity of the drum filter. Conversely, a filter is needed that can be punctured by a sampling needle that will maintain its integrity after being punctured (such as a septum). After sampling the headspace of a waste drum with the current technique, the filter must be replaced. This is a costly process as each filter costs approximately \$25 and the labor required to replace the filters is an issue from both cost and exposure to ionizing radiation.

MWFA Response: There does not appear to be technology development required to meet this need. Additional information is requested by the site for use in defining technology development requirements. Please contact the MWFA to discuss this need.

Need ID. RF RF-WM10

PBS # RF-02

STCG Need: TRANSPORTABLE OR MOBILE WASTE CHARACTERIZATION CAPABILITIES

Description: A transportable waste characterization system that includes capabilities for head space analysis, core sampling, sorting and segregating of drum wastes in a glove box, non-destructive assay (NDA), real-time radiography (RTR), and perhaps tomography is needed to meet characterization needs for low-level and transuranic waste. This capability will minimize drum movement between buildings, allow building-independent operation of characterization processes, and maintain Site characterization capabilities throughout the process of Site deconstruction and demolition activities.

Current Site capabilities in this area are insufficient to meet schedule requirements in the 10-year plan. For TRU and TRM waste, additional NDA capability will be needed in the future to meet shipping schedules when WIPP opens to receive waste. Sampling of drummed waste is currently performed in the size reduction vault where drum venting operations are also performed. Both operations cannot occur concurrently causing scheduling conflicts. In addition, the capability for obtaining representative samples of heterogeneous waste to analyze for hazardous constituents does not currently exist.

There are over 7,000 m3 of TRU and TRM waste and in excess of 14,000 m3 of LL and LLM waste in storage at the Site. While not all of this waste will require full characterization, representative sampling and analysis is required on a significant portion of the waste.

MWFA Response: A demonstration of commercially available NDE/NDA technologies will be conducted in FY-97. CMST and the MWFA are developing the test plan for the demonstration. A report will be generated, and forwarded to the sites, with a summary of the results.

Need ID. RF RF-WM11

PBS # RF-02

STCG Need: TECHNICAL JUSTIFICATION FOR MANAGEMENT OF LOW LEVEL WASTE DIFFERENTLY FROM LOW LEVEL MIXED WASTE.

Description: Provide a technical justification and a method to manage low level wastes in a significantly more cost effective manner than low level mixed wastes, while providing adequate safety and environmental protection. This would allow low level waste collection, certification, and storage methods to be less stringent than for low level mixed wastes. In addition, this would facilitate the Site's plan for bulk shipment by rail of low level waste for commercial disposal. Managing the low level wastes differently from their generation to disposal would reduce costs. For example, collecting low level waste in bins instead of drums could lead to significant cost savings in packaging, interim storage, transportation, and disposal.

MWFA Response: This need, as stated appears to be outside of the MWFA scope for two reasons: 1) the need addresses LLW, not mixed waste, and 2) the need is programmatic and specific to onsite management practices. If additional data relative to this need could be provided that would define a technology development deficiency, the MWFA will review this information to determine the appropriate action, if any.

Need ID.	RL RL-MW01	PBS #	RLMW03 Solid Waste
STCG Need:	Processing/Treatment of RH-LLMW Large Sized Waste		
Description:	Develop/Identify/Demonstrate treatment technologies, including encapsulation, that reduce treatment cost and the need for characterization of RH-LLMW large-sized waste. If technology can be selected (developed) that requires less characterization, it may lower the costs of management of these wastes. Incremental costs in treatment could potentially save overall system costs. Encapsulation may be one of these technologies.		
MWFA Response:	The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.		
Need ID.	RL RL-MW010	PBS #	
STCG Need:	Fast, Effective Surveying of Transportation Packages		
Description:	Develop and demonstrate technologies that would decrease the time to survey waste packages. It is the objective of this need to develop safer and more rapid methods of surveying transportation packages for radiological release and reuse.		
MWFA Response:	MWFA is not aware of any technology development associated with this need.		
Need ID.	RL RL-MW011	PBS #	
STCG Need:	Cost-Effective Storage Techniques for RH-LLMW and RH-TRU		
Description:	Identify storage configurations for remote-handled waste which do not require shielded containers during storage, or if shielded containers are used identify cost-effective methods for large-scale storage. Determine cost-effectiveness of alternative storage methods for remote-handled wastes or immediate treatment and disposal.		
MWFA Response:	MWFA is not aware of any technology development associated with this need.		
Need ID.	RL RL-MW02	PBS #	RLMW03 Solid Waste
STCG Need:	Cost-Effective Characterization/Verification Technologies for MLLW Treated by Commercial Vendor		
Description:	Develop alternative MLLW characterization/verification sampling techniques (using NDE/NDA methodologies) and statistical sampling methods, including methods that do not require opening of the containers. These sampling methods are for Hanford's characterization of MLLW prior to shipment to the off-site vendor, as well as shipment of treated waste back to Hanford to assure that the vendor has achieved the contract specifications for waste treatment. Items of major interest will be radionuclide content, and waste form content and hazardous characteristics. The current baseline is to open, sample, and characterize a predetermined sample population.		
MWFA Response:	This need has been linked with the Characterization deficiency of the MWFA Technical Baseline. TDRDs have been generated to define system requirements. A table has been attached that identifies the TDRDs and TTPs currently associated with this deficiency.		
Need ID.	RL RL-MW03	PBS #	RLMW03 Solid Waste
STCG Need:	Volume Reduction Techniques for RH-LLMW		
Description:	Develop RH-LLMW volume reduction technologies. One method to reduce the volume of wastes would be to use volume reduction techniques such as compaction, metal melting, or shredding to reduce the large void volume anticipated to be present with the long length equipment removed from Hanford's underground waste tanks, debris and other waste. Develop a robust size reduction capability able to handle remote-handled LLMW items over a wide range of sizes, shapes, weights, materials of construction and types and levels of contamination. Metal melting techniques may also facilitate recycling of some metals.		
MWFA Response:	This need has been linked with the Material Handling deficiency of the MWFA Technical Baseline. The MWFA will work with the RTDP to identify and address material handling TD requirements to meet this need. A table has been attached that identifies the TTP(s) currently associated with this deficiency. In addition, the MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.		

Need ID.	RL RL-MW04	PBS #	
STCG Need:	Volume Reduction Techniques for RH-TRU		
Description:	Develop RH-TRU volume reduction technologies. One method to reduce the volume of wastes would be to use volume reduction techniques such as compaction, metal melting, or shredding to reduce the large void volume anticipated to be present with the failed and long length equipment. Develop a robust size reduction capability able to handle remote-handled TRU items over a wide range of sizes, shapes, weights, materials of construction and types and levels of contamination. Metal melting techniques may also facilitate recycling of some metals.		
MWFA Response:	This need has been linked with the Material Handling deficiency of the MWFA Technical Baseline. TDRDs have been generated to define system requirements. A table has been attached that identifies the TDRDs and TTPs currently associated with this deficiency.		
Need ID.	RL RL-MW05	PBS #	RLMW03 Solid Waste
STCG Need:	Segregation of RH-TRU Waste from TWRS Tanks into TRU and Non-TRU (long-length equipment)		
Description:	In addition to volume reduction methods, the segregation of items or parts of items may make it possible to concentrate the volume of the RH-TRU fraction, leaving some proportion of RH-LLMW and/or CH-LLMW. Total processing cost could be reduced accordingly because the cost of processing RH or CH-LLMW is significantly less than RH-TRU processing. In addition, reducing RH-TRU from TWRS tanks will reduce the likelihood that the total volume of RH-TRU waste from Hanford may approach the RH capacity at WIPP. Also, certain materials that are segregated from TWRS tanks may be candidates for recycling and/or reuse.		
MWFA Response:	This need has been linked with two deficiencies from the MWFA Technical Baseline: Material Handling and Sort and Segregate. The MWFA will work with the RTDP to identify and address material handling and sort and segregate TD requirements to meet the site needs. A table have been attached that identifies the TTP(s) currently associated with these deficiencies.		
Need ID.	RL RL-MW06	PBS #	RLMW03 Solid Waste
STCG Need:	Segregation of RH-TRU Waste (other than long-length equipment) into TRU and Non-TRU		
Description:	In addition to volume reduction methods, the segregation of items or parts of items may make it possible to concentrate the volume of the RH-TRU fraction, leaving some proportion of RH-LLMW and/or CH-LLMW. Total processing cost could be reduced accordingly because the cost of processing RH or CH-LLMW is significantly less than RH-TRU processing. In addition, reducing RH-TRU will reduce the likelihood that the total volume of RH-TRU waste from Hanford (including long-length equipment) may approach the RH capacity at WIPP. Also, certain segregated materials may be candidates for recycling and/or reuse.		
MWFA Response:	This need has been linked with two deficiencies from the MWFA Technical Baseline: Material Handling and Sort and Segregate. The MWFA will work with the RTDP to identify and address material handling and sort and segregate TD requirements to meet the site needs. A table have been attached that identifies the TTP(s) currently associated with these deficiencies.		
Need ID.	RL RL-MW07	PBS #	RLMW03 Solid Waste
STCG Need:	Decontamination of RH-TRU Waste		
Description:	Another approach to the reduction of the volume of RH-TRU materials is to decontaminate the items and concentrate the TRU materials into a much smaller volume. A starting point is to identify decontamination techniques to reduce the volume of waste that ultimately would be considered remote-handled TRU waste. Decontamination techniques focusing on removal of radionuclides could possibly allow RH-TRU waste to be disposed at WIPP as contact-handled TRU or re-categorized as non-TRU waste. In addition, some decontaminated materials may be recycled and/or reused.		
MWFA Response:	Much of this need may already be addressed by the D&D Focus Area. The MWFA will contact D&D to ensure this need is tracked.		
Need ID.	RL RL-MW08	PBS #	RLMW03 Solid Waste
STCG Need:	Treatment of Organic Contaminated RH Waste		
Description:	Develop technologies to treat RH organic wastes. Low cost remote thermal or non-thermal treatment methods will be needed to process the wastes to meet the intent of land disposal restrictions (LDR).		
MWFA Response:	The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.		

Need ID. RL RL-MW09

PBS # RLMW03 Solid
Waste

STCG Need: Treatment of TRU Waste Contaminated with PCBs and Ignitables

Description: Develop a technology to that can destroy PCB's and remove the ignitable characteristics, in a facility that can safely handle waste that contains transuranic nuclides.

MWFA Response: The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.

Need ID. SR SR-1001

PBS # SR-SW-02

STCG Need: Transuranic Waste Transportation System Expansion

Description: A large portion of the SRS Transuranic (TRU) Waste inventory contains high activity transuranic isotopes (Pu-238). This waste is currently stored in 55-gallon drums, large bulk containers, and multiple size concrete casks. A majority of the waste stored in 55-gallon drums is in an acceptable form for WIPP disposal. However the material cannot be shipped to WIPP because radiolysis of organic materials in the presence of Pu-238 results in hydrogen gas generation levels that exceed the limits placed upon the existing approved transportation system (TRUPACT II). In addition, the other container types require expensive volume and size reduction to meet the size constraints of the TRUPACT II for shipment to WIPP.

A need exists to modify existing or design new transportation capabilities that allow for SRS to ship this waste in its existing configurations without performing extensive repackaging, size reduction, and/or treatment. This need can be satisfied by providing a transportation system that has limits equal to or less restrictive than the WIPP facility limits.

MWFA Response: This need is common among all sites with TRU/MTRU wastes. The MWFA has been working with the TRUPACT-II Gas Generation Interface Working Group (IWG) to identify needs associated with the transportation of mixed wastes. MWFA programs are currently being funded to address the TRUPACT-II shipping limits. Attached are the TTPs currently funded through the MWFA.

Need ID. SR SR-1002

PBS # SR-SW-03

STCG Need: Immobilize VOC/HOC/Rad constituents in soils

Description: Cost effective treatment of hazardous constituents and disposal of large volumes of MW soils forecasted to be generated from the D&D and ER activities. Soils may contain a wide range of hazardous constituents including organics, solvents, heavy metals and semi-volatiles, as well as a wide range of radionuclides including tritium, alpha and beta-gamma emitters. WMEIS identified sorting of the soils to separate the contaminated soil from the uncontaminated fraction, and vitrification of the contaminated soils to treat the organic hazardous constituents and to immobilize the inorganic hazardous and the radioactive constituents as preferred treatment.

MWFA Response: The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.

Need ID. SR SR-1003

PBS # SR-SW-03

STCG Need: Improvements to Physical, Chemical, and Radionuclide Quantification of Solid Waste.

Description: The Savannah River Site produces and stores Mixed Low Level, and Transuranic Wastes contained in 55-gallon drums, carbon steel boxes and various sized stainless steel containers. The waste in these containers needs to be characterized both for RCRA constituents and for radionuclide constituents to ensure the safe storage, treatment and disposal of these wastes in accordance with regulatory requirements.

Additionally, the treatment, storage and disposal facilities require characterization information to verify generator certification and characterization of newly generated waste in accordance with receipt inspection procedures and facility permit requirements.

Characterization is needed to satisfy a wide range of waste streams with different requirements. All mixed wastes must be characterized for RCRA metals, volatiles and semi-volatiles at the minimum limits set forth in regulations. Additionally, the identity and amount of radionuclides present in the waste must be determined to ensure facilities are operated within their designed and evaluated safety envelope.

Characterization requirements vary from waste stream to waste stream. For example some wastes are considered remote handled or have high radiation fields and will therefore require characterization to be completed at some distance from the actual waste containers. Other wastes are low activity or have low radiation fields and are more amenable to portable or hand-held instrumentation. Due to ALARA, chemical exposure or other OSHA or industrial hygiene issues, characterization of some waste may require non-intrusive characterization while other less hazardous wastes may allow for intrusive characterization. Non-intrusive characterization may also be required due to the physical form or packaging that some wastes arrive in at the treatment, storage and disposal facilities. Many wastes are heterogeneous and have a mixture of both RCRA hazardous constituents and radionuclides in various forms and matrices.

MWFA Response: This need has been linked with the Characterization deficiency of the MWFA Technical Baseline. TDRDs have been generated which incorporates these needs. NDE/NDA of boxes will be addressed in out-year activities. A table has been attached that identifies the TDRDs and TTPs currently associated with this deficiency.

Need ID. SR SR-1004

PBS # SR-SW-01

STCG Need: Demonstration of Continuous Emissions Monitors for Measurement of Hazardous Compound Concentrations in Incinerator Stack Gas.

Description: Currently, the DOE complex operates 3 mixed waste thermal treatment facilities, the TSCA incinerator at Oak Ridge, the Waste Experimental Reduction Facility (WERF) at INEL, and Consolidated Incineration Facility (CIF) at Savannah River. In addition to these operating facilities, there are proposals to construct new advanced mixed waste thermal treatment facilities to handle the vast assortment of waste currently stored throughout the DOE complex. These technologies would not only be utilized at DOE mixed waste treatment facilities, but they would be applicable to commercial hazardous waste incinerators, cement kilns burning hazardous waste, and other boilers and industrial furnaces processing hazardous waste.

Continuous emissions monitoring (CEM) of these thermal processes is desirable for several reasons: verification of emission compliance, enabling responsive process control, and increasing public confidence in incineration process safety and technology credibility. Pollutants of particular interest include trace metals and organic compounds resulting from incomplete destruction of wastes. Continuously monitoring these species would permit real-time hazardous compound emissions measurement and realistic assessment of human risk associated with the atmospheric release of these compounds resulting from the operation of the waste processing facilities. The EPA office of Solid Waste (OSW) has proposed new regulations requiring the use of CEMs for several hazardous species. However, current CEM technologies have not been shown to successfully measure the pollutants of interest at the very low concentrations expected in the stack gas of these facilities. Therefore, demonstration testing of these monitors is needed to identify technologies that could be utilized for continuous emissions measurements of these hazardous compounds.

MWFA Response: Several monitoring technologies have demonstrated in FY-96 and will be demonstrated in FY-97. The development and demonstration of CEM's by the MWFA is accomplished through a CEM group consisting of MWFA members, waste type managers, and CEM experts in the complex and industry. This CEM group determines the type of monitors to be developed and the extent of development. To date some VOC, heavy metal, and mercury monitors have been tested. Two alpha monitors are being demonstrated this year. The MWFA recommends that SRS/CIF personnel contact the MWFA lead for CEM (Steve Priebe (208) 526-0898) and ensure that the group's effort and plans address their needs.

Need ID. SR SR-1005

PBS # SR-SW-03

STCG Need: Development of techniques for representative sampling of Heterogeneous Wastes.

Description: Wastes such as job control materials, soil, Environmental Restoration and Decontamination and Decommissioning materials vary widely in size and composition. These wastes require both RCRA and radiological characterization. Both a methodology and equipment that are time and cost efficient for taking representative samples of these heterogeneous waste are needed.

MWFA Response: Methodologies addressing this need were documented in a report titled Characterizing Heterogeneous Wastes: Methods & Recommendations EPA/600/R-92/-033. Please contact the MWFA and a copy of the meeting report can be sent out. For further information contact Mike Connolly, (208) 526-0238.

Need ID. SR SR-1006

PBS # SR-SW-03

STCG Need: Large-scale Treatment of DWPF Mercury (STP waste stream SR-W061).

Description: No large-scale process currently exists to amalgamate mercury in quantities greater than 10-20 ml. At SRS it is expected that approximately 50-60 gallons will require treatment annually. In addition, there are indications, however, that the DWPF mercury may have the potential to contain contaminants that will interfere with, or prevent, successful amalgamation. The triple distillation of mercury, that is part of the DWPF process, is being investigated by SRTC to identify and eliminate the contaminants that could interfere with amalgamation.

MWFA Response: The MWFA has established the Mercury Work Group, which is developing and demonstrating treatment technologies for mercury amalgamation, stabilization, and separation/removal. At present, representatives from ORNL, SRS, RFETS, and INEL are participating on the HgWG. The HgWG is managed by Tom Conley, ORNL and the MWFA Waste Type Manager is Ron Nakaoka. If data specific to these SRS mercury waste needs should be provided to the HgWG, please contact Tom Conley at 423-574-6792, e-mail tbc@ornl.gov, or Ron Nakaoka, LANL at 505-665-5971, e-mail rkn@lanl.gov.

Need ID. SR SR-1007

PBS # SR-SW-02

STCG Need: Treatment of High Activity TRU (Pu238) Waste for Destruction of Organic Constituents

Description: Treatment facilities/systems are needed to destroy organic constituents, treat, immobilize, and volume reduce the High Activity TRU to meet the WIPP Waste Acceptance Criteria (WIPP/WAC).

MWFA Response: The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.

Need ID. SR SR-1008

PBS # SR-SW-03

STCG Need: Reduce Conservatism contained in performance assessments, allowing increased Shallow Land Disposal of Low Level and low level mixed radioactive waste thereby reducing mortgage costs.

Description: Performance Assessment (PA) results for the Savannah River Site's (SRS) E Area Vaults (EAV) provide significant constraint on the ability to dispose of radionuclides. PA development necessarily invokes utilization of hundreds of parameters to model waste form and site characterization. Where actual test data does not exist, conservative assumptions are used in model development thus driving PA results to exclude disposal options for many waste forms. Refinement or elimination of these conservative assumptions is needed to demonstrate compliant disposal of these waste forms. Some concepts for reducing conservatism have been identified in the EAV PA but not pursued due to funding constraints. Elimination or reduction of the constraints (conservatism) would allow increased use of shallow land burial thereby allowing more economical forms of disposal.

MWFA Response: The MWFA has established the Waste Form Initiative that is addressing disposal problems for the entire mixed waste inventory, with specific focus on those waste streams that can not meet the existing WACs for the available or proposed disposal facilities. The EM-30 Disposal Work Group has identified Hanford, NTS, and Envirocare as the preferred disposal facilities for DOE mixed waste. Consequently, SRS EM-30 commitment to construction of a mixed waste disposal facility at SRS would need to be demonstrated for the MWFA WFI to justify activities related to this need.

Need ID. SR SR-1009

PBS # SR-SW-04

STCG Need: Technology Development for Treatment Or Repackaging of Spent Deionizer Resins to Meet Performance Assessment Requirements for Disposal at SRS

Description: Technology to treat/immobilize spent deionizer resins and other long lived waste to meet the performance assessment requirements of current disposal facilities is needed. Waste is in long term storage since no known technology has been developed to treat this waste to meet disposal criteria established in the E Area Vault (EAV) Performance Assessment (PA). Some concepts for treatment and repackaging have been identified but not pursued due to funding constraints. Some options include a Canadian technology for stripping C-14, repackaging to immobilize C-14, and stabilization.

MWFA Response: The MWFA is currently compiling a list of treatment technologies that have been developed/supported with MWFA funds. This list will contain an overview of the treatment technology and contact names. This information will be sent to your site as soon as it is completed.

TABLE 2. Mixed Waste Focus Area Deficiency Report

Deficiency : Characterization

TDRD Title : Nondestructive Assay of Hazardous Material in Waste Containers

TTP # ID74MW77

Task RCRA NDE/NDA

97 Funding (K) 40

Scope Description Work scope for FY-97 is to help define the RCRA characterization capabilities for a thermal treatment facility (the Plasma Hearth Process in this case) and develop the technologies for performing this characterization. It is hoped that one system can perform all of the RCRA monitoring, but multiple systems may be necessary. The FY-97 portion of this activity is only to complete the testing defined in FY-96, after which the project will be redirected to the Characterization, Monitoring and Sensors Technology cross-cut focus area for funding and work direction.

Planned Activities Planned activities for FY-97 include identifying commercial vendors with on-line assay systems with the potential for measuring RCRA constituents at the levels required by RCRA, developing a set of surrogate containerized samples simulating waste, developing a set of criteria for evaluating the blind assays performed on these surrogates by the commercial participants, and requesting the participants to perform an elemental assay on the blind surrogates.

MWFA Contacts: WTM: Mike Connolly (208) 526-0238
POC: Whitney St. Michel (208) 526-3206

Deficiency : Characterization**TDRD Title : Nondestructive Assay of Radioactive Material in Waste Containers****TTP #** AL16MW51**Task** Task A-Improved TRU Waste Assay:CTEN**97 Funding (K)** 737**Scope Description**

Improved transuranic (TRU) and low-level waste assay accuracy is needed to meet increasingly stringent shipping and disposal regulations. Conventional waste assay methods can give rise to very large errors, an order of magnitude or more, depending on the waste form and TRU isotope distribution. The largest potential source of error in the DDT/PAN neutron-based assay device (one of the most widely used waste assay instruments) is caused by self-shielding in "lumps" of fissile material. In another recent evaluation, conducted by INEL scientists, 30-40% of real waste drums were determined to have obvious self-shielding problems; on the basis of a 1000-drum examination, it was estimated that the true fissile content was 200% higher, on average, than the active assay value obtained with their DDT/PAN instrument. Currently available gamma-ray-based waste assay instruments have measurement errors of similar magnitude.

To improve assay accuracy, work under this TTP focuses on developing an instrument that will assay waste in 55- and 83-gal drums. This will incorporate several new developments that provide matrix and TRU isotope distribution information and mitigate the self-shielding problem in many types of wastes: the combined thermal/epithermal neutron (CTEN) interrogation device. The CTEN device interrogates with thermal neutrons (as in the widely used DDT/PAN instruments) and, uniquely, with epithermal neutrons, which can result in more accurate assays of "lumps" of fissile material. We will also incorporate a capability to correct results for waste matrix inhomogeneities and non-uniform fissile distributions that will provide more accurate results even in those waste drums in which self-shielding is not a problem.

Planned Activities

In FY-97, the characterization and development of the CTEN instrument will be complete. Algorithms will be incorporated into quality assured software, written by a CRADA partner, Canberra Industries, and the software will be installed in the CTEN instrument. Late in FY-97 the instrument will be demonstrated at Los Alamos on known complex wide waste streams.

MWFA Contacts:

WTM: Mike Connolly (208) 526-0238

POC: Whitney St. Michel (208) 526-3206

TTP # AL16MW51**Task** Task B-NDA Support of the TRU Waste Dept's Performance Demo Plan**97 Funding (K)** 691**Scope Description**

The purpose of this task is to fabricate NDA Standards for the Transuranic Waste Characterization Nondestructive Assay Performance Demonstration Program. This program allows evaluation of the NDA measurement systems determination of the TRU content of TRU waste items. The fabrication task includes obtaining and characterizing plutonium, americium, and uranium materials, blending these materials with an inert matrix material, supplying stainless steel containers, adding the blended matrix material to stainless steel cylinders; welding endcaps on the containers; checking the containers for leaks, and packaging and shipping the containers to eight DOE receiving sites. The certification of these standards includes rigorous quality assurance documentation, traceability to National Certified or Reference Materials, and detailed records and reports.

Planned Activities

Phase 2 - Fabrication of the 115 WRMs will require the following work activities: securing the feed material from existing LANL inventories, preparation of the nuclear material (NM) feed material via calcining, screening, particle size determination or adjustment; characterizing the NM by assay, isotopic ratio, ICP-MS, emission spectroscopic, and radiochemistry methods, establishing blending parameters, blending, fabricating stainless steel containers, loading blended materials, welding, leak testing, NDA verification measurements, packing and shipping. All these activities will include formal QA producing comprehensive records.

Phase 3 - Fabrication of the 56 WRMs will require the following work activities: securing the feed material from existing LANL inventories, preparation of the nuclear material (NM) feed material via calcining, screening, particle size determination or adjustment; characterizing the NM by assay, isotopic ratio, ICP-MS, emission spectroscopic, and radiochemistry methods, establishing blending parameters, blending, acceptance inspection of zircalloy containers, loading blended materials, welding, leak testing, NDA verification measurements, packing and shipping. All these activities will include formal QA producing comprehensive records.

MWFA Contacts:

WTM: Mike Connolly (208) 526-0238

POC: Whitney St. Michel (208) 526-3206

Deficiency : Characterization

TDRD Title : Nondestructive Assay of Radioactive Material in Waste Containers

TTP # ID06MW51

Task Task A-Non-Destructive Containerized TRU Waste Exam/Assay

97 Funding (K) 800

Scope Description

The purpose of this project is to continue development of the Waste Assay Measurement Integration System (WAMIS). WAMIS is comprised of two major components: a data integration component and a data access/visualization component. WAMIS will integrate data from various existing NDA/NDE instruments such as x-ray, gamma, and neutron systems to achieve improved measurement interpretations and results for use in the waste certification process. The long term goals of WAMIS are:

Develop the fundamental components of an intelligent system that processes data from several sources, including NDA/NDE measurements and historical information, to demonstrate an improvement over individual measurement interpretations when satisfying the requirements of the QAPP or other governing documents.

Unify several of the independent NDA/NDE hardware systems with existing data bases and supporting information on waste containers by adding the critical information integration component.

Extract useful tools from the fields of expert systems, artificial intelligence, neural networks, probability, and fuzzy logic that are applicable to waste characterization.

Combine these tools with conventional processing techniques to create a suite of processes that may be optimally used.

Develop the expert systems approach for intelligent processing of NDA/NDE data and supporting information.

Apply the techniques developed to waste container characterization and other waste remediation problems such as retrieved buried waste characterization.

Develop methods to compute and reduce the uncertainty associated with advanced interpretation techniques.

A peer review committee established by several focus areas and technology crosscut programs met in January 1996 to review much of the active NDE/NDA work being funded by EM-50. To facilitate the handling and integration of data from different methods, the panel recommended a standard data format be developed. Use of this standard format will allow direct integration/ fusion of information from disparate sources and encourage the most effective use of the broad spectrum of measurements and results. WAMIS is the logical choice for a project to develop these standards. Thus, the data standards task was added in accordance with the recommendation.

Planned Activities

Data Access and Visualization - User Interfaces

The WAMIS user interface software was developed to the point of demonstration. Code was developed and implemented on a PC under Microsoft Windows. The demonstration software allows the user to query a (virtual) data base containing information/data from several measurements on several real waste drums. The user logs into the program and steps through a sequence of menus that allows him/her to view real time radiography video sessions and assay results from neutron and gamma ray measurements as well as logistical and historical information on selected drums. It is yet to be decided if the PC-Windows platform is the best choice for the user interface and efforts will continue in FY-97 to establish the optimum platform and the software design. A preliminary software design specification based on the PC version of the code will be completed in FY-96.

The demonstration at SWEPP provided much useful input to be used in future generations of the user interface code. In particular, SWEPP personnel reacted very positively to the RTR display and analysis component of the WAMIS user interface. Thus, it was decided to spin off this component and make it immediately available to EM30 users of RTR equipment. The concept was to provide an RTR video-session server. The server would allow an operator to convert a raw videotape of an RTR session to a compressed digital format and store it locally on a PC server on CD. The CD would reside in a jukebox and would be available over the Internet to any person passing through password security. The user can then download the digital data and review the RTR session locally, simultaneously filling out the evaluation forms associated with the particular drum. Several video compression schemes were reviewed and tested with MPEG-1 being the present choice. The RTR video server and analysis tool will be completed in a beta form and installed at SWEPP for testing by the end of FY-96. A report describing the system will also be issued.

Intelligent Measurement Integration

This task incorporates the continued investigation, development, and demonstration of the overall expert system and the intelligent processing components of the expert system. It also includes development of methods to calculate and utilize measures of uncertainty associated with the data processing.

Deliverables for this task include:

1. Design and construct knowledge base. Incorporate the physics based limitations for gamma and neutron measurements for current assay systems.
2. Implement first conventional processing integration algorithm using radiography and tomography data in gamma or neutron assay.
3. Identify specific components derived from NDA/NDE measurements, waste generation history, and data bases to be used in integration algorithms.
4. Supporting modules for the expert system designed. Inference engine selected.
5. Design of framework and selection of operating system complete.

Deficiency : Characterization

TDRD Title : Nondestructive Assay of Radioactive Material in Waste Containers

6. Report on the development of expert systems
7. Report on integration of two or more independent measurements

User Interface, Algorithms, and Evaluation Tools

This task includes completion and installation of the RTR analysis server, development of tools to improve the analysis of radiography data, development of rapid three-dimensional imaging from RTR video, development of methods to extract and transfer information from NDE measurements to improve assays, access to off-site to measurement data and results from off-site NDA/NDE systems, and continued development of the WAMIS user interface.

Initial Data Format Standards

The integration of data from various systems, whether DOE developed or produced through the commercial sector, requires that all of the systems be developed and working under the similar data standards. The focus of this task will be to identify these standards and document them for use by DOE and commercial concerns.

WIT/APNEA Trailer Demonstrations

This will continue the support of the trailer demonstrations initiated at the RWMC in FY-96. The purpose of these demonstration is to prove the opportunity for these two developers to gain first hand knowledge on the waste problem and determine their capabilities of performing characterization of the various waste containers. This will lead to the improvements of the systems to allow to them to better support the needs of facilities such as SWEPP in the future.

Planned Activities

Planned activities for FY-97 include: establish limitations for conventional interpretation of NDA data. Experience with conventional waste assay will be combined with analytic derivations of the physics base limitations of NDA/NDE neutron and gamma ray measurements on waste containers. Information gathered will be stored in a database for decision making. Information from radiographic and tomographic measurements will be used to modify existing neutron and gamma ray assay algorithms.

Identification of available NDA/NDE measurement data and development of intelligent processing integration algorithms. Development of expert systems to contain the knowledge base and inference engine needed to identify waste components.

MWFA Contacts: WTM: Mike Connolly (208) 526-0238
POC: Whitney St. Michel (208) 526-3206

TTP # OK26MW51

Task NDA via Gamma-Ray A&PCT

97 Funding (K) 760

Scope Description This project funds continued development of the Gamma-Ray Active and Passive Computed Tomography (A&PCT) scanner. The scanner will be optimized for faster scan times/unit of activity, and hardware and software improvements will be made to optimize the data acquisition. Smart scan techniques will also be developed and incorporated into the unit. The program will complete design, not fabrication, of a multiple detector scanner in FY-97. TRU and fission product isotopic identification codes and the isotopic ratio codes shall be automated in the A&PCT, and a "lump" correction implemented.

Planned Activities The NDA image reconstruction on the system will undergo error analysis to identify total uncertainty in its capabilities. Work to be conducted in FY-97 includes validation of the 1-HPGe scanner, completion of a preliminary multi-detector scanner design, and completion of a performance specification report on the 1-HPGe scanner. A Technology Performance Report will be issued on all A&PCT scanner work conducted during FY-96 and FY-97.

MWFA Contacts: WTM: Mike Connolly (208) 526-0238
POC: Whitney St. Michel (208) 526-3206

Deficiency : Mercury Stabilization

TDRD Title : Mercury Stabilization

TTP # CH36MW63

Task Task B-Sulphur Polymer Cement Stabilization of Elemental Mercury Mixed Waste

97 Funding (K) 80

Scope Description This activity will demonstrate a two phase Sulfur Polymer Cement (SPC) stabilization process to stabilize 2.25 gallons (254 lbs) of elemental mercury located at Brookhaven National Laboratory. The first stage chemically stabilizes the mercury using finely ground SPC. This is followed by heating the SPC to 130 degrees C to melt the matrix. This process avoids forming soluble HgO and reduces the amount of unreacted mercury. Data generated will support the efforts of the MWFA Mercury Working Group.

Planned Activities Develop a Test Plan to perform a treatability study on stabilizing elemental mercury mixed waste, conduct the study, and issue a final report on the results.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

TTP # OR16MW61

Task Task A-Hg Working Group/Hg Treatment Demos

97 Funding (K) 1,945

Scope Description The focus of this work will be to perform mercury amalgamation, stabilization separation and removal demonstrations on actual MLLW from different DOE sites. These demonstrations will lead to technical and economic decisions concerning their need and use. Waste streams chosen will be well characterized, available for use in the demonstrations, represent the majority of DOE's wastes, and if possible, significantly accelerate one or more sites' compliance schedules.

Planned Activities The focus of this work will be to perform mercury amalgamation and stabilization demonstrations on actual mixed low level waste from different sites. There will be two amalgamation demonstrations and three stabilization demonstrations. The Mercury Working Group will also prepare a Separations demonstration to be initiated before FY-98.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

TTP # OR16MW61

Task Task B-Evaluation of Sulphur Polymer Cement Fast Track System

97 Funding (K) 157

Scope Description This activity will perform treatability studies to optimize operating parameters for a drum scale macroencapsulation process using sulfur polymer cement (SPC). Based on successful demonstration, the SPC Fast Track system is expected to be part of the planned Mixed Waste Treatment Facility at Oak Ridge. This system will also be available for treatment of offsite waste. Data developed during these tests will support the permitting process, which has already been initiated. Four waste streams, totaling 175 gallons, will be treated as part of the demonstration. The test plan, which will be developed in accordance with the MWFA Test Plan Guidance, must identify the disposition of all treatment residuals.

Planned Activities Develop a Test Plan to test the SPC Fast Track System.
Issue a Final Report detailing the results of the fiscal year activities.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

Deficiency : Salt Stabilization

TDRD Title : Ash/Salt Stabilization

TTP # CH24MW44

Task Task A-Phosphate Bonded Ceramic Waste Forms

97 Funding (K) 670

Scope Description A continuing development effort by ANL-E to demonstrate a highly effective mixed waste stabilization technique using chemically bonded phosphate ceramics (CBPC). Because phosphates are natural mineral analogs of radioactive elements CBPC were developed to stabilize mixed waste. When properly formulated, CBPCs result in high waste loading and high compressive strength meeting RCRA leach limits for heavy metal. Further development will concentrate on scaling the process for actual salt-mixed wastes generated via the scrub blowdown of future and existing mixed waste thermal units. Volume reduction techniques will also be investigated by coupling the process with that of an harmonic mixer.

Planned Activities During FY-97, testing will be conducted on actual mixed waste streams from the PHP and DETOX processes to determine maximum waste loadings, waste types and maximum operational time. These studies will help determine the acceptability of the stabilized product. A test plan will be developed to identify locations where the test will be completed, and the scale of the testing relative to a potential full-scale operation.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

TTP # CH24MW44

Task Task B-Dev. of Iron Phosphate Based CBCWFs

97 Funding (K) 50

Scope Description The goal of this proposal is to evaluate and develop a chemically bonded iron-phosphate based, low cost, room temperature technology to stabilize low level mixed waste streams. This work will complement and integrate the project supported by the MWFA being conducted at the V. G. Khlopin Radium Institute in St. Petersburg, Russia. This project will try to identify suitable chemistry based on rapid reactions between phosphoric acid and magnetite to produce a quick setting ceramic, and between phosphoric acid and haematite to produce a slow setting ceramic. Scoping tests will determine a ceramic composition suitable for stabilizing low level mixed waste streams, and the composition will be tested on surrogates.

Planned Activities Planned activities for this TTP include completing tests to develop suitable binders and ash waste forms, evaluate waste forms developed by ANL-E and the V. G. Khlopin Radium Institute in St. Petersburg, Russia, and complete a report describing the fiscal year's activities.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

Deficiency : Salt Stabilization

TDRD Title : Ash/Salt Stabilization

TTP # CH24MW44

Task Task D-Salt Stabilization in Low Temperature Ceramic Waste Forms

97 Funding (K) 205

Scope Description This TTP funds activities to develop methods to stabilize mixed wastes with high salt content. This work is particularly focused on development work needed to provide supplemental approaches to retention of salt ions in phosphate bonded ceramic waste forms. The three supplemental approaches to be developed are: (1) conversion of soluble salts prior to stabilization, (2) use of oxysalt cements for immobilizing ions, and (3) use of inorganic zeolites to occlude salts prior to stabilization in the chemically bonded phosphate ceramic.

Planned Activities Specific activities for FY-97 include:
(1) Complete testing to identify and introduce inorganic compounds such as Cs and Ba to precipitate salts as insoluble or less soluble nitrates.
(2) Using known approaches, test surrogate mixed waste to produce oxysalt cements with chlorides and sulfates. Optimize the process to incorporate the maximum amount of salts in the final waste matrix.
(3) Investigate and evaluate the use of zeolites to occlude salts from the waste streams.
(4) Integrate the above techniques with the basic chemically bonded phosphate ceramic process. Perform tests on the final developed waste forms to assess anion/cation leaching and determine waste loadings.
(5) Complete a report of the test results and issue to the MWFA.
(6) Prepare a TTP and Test Plan in accordance with MWFA guidelines, before testing.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

TTP # CH36MW63

Task Task A-Kinetic Mixer Demo

97 Funding (K) 500

Scope Description This task will demonstrate the effectiveness of a kinetic mixer, developed by EcoLEX, Inc., in removing moisture and organics from sludge waste streams, to allow subsequent polymer microencapsulation. This process uses a novel mixing mechanism to thoroughly homogenize the feed waste with the polymer prior to extrusion, while removing the moisture and organics. These will be vaporized under a vacuum, removed from the mixer, and condensed for additional treatment. Generally, more than 2% moisture or organics in the waste feed stream can cause frothing in the polymer extrusion, resulting in an unacceptable waste form. The kinetic mixer can potentially allow polymer microencapsulation of a variety of waste streams that would otherwise not be acceptable for this treatment.

Planned Activities FY-97 activities will continue development of the thermokinetic mixer as a pre-processor for polymer encapsulation of mixed waste. System parameters will be optimized by using surrogate waste materials and testing/demonstrating the integrated system with mixed waste from one or more DOE sites. Pilot-scale treatability studies will be performed on at least two mixed waste streams, representing applicable DOE wastes. Planned activities also include evaluating recycled polymer feed stock in this system.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

Deficiency : Salt Stabilization

TDRD Title : Ash/Salt Stabilization

TTP # ID77MW41

Task Encapsulation of Mixed Waste Salts for Shipment and/or Disposal as TRU & LLW

97 Funding (K) 200

Scope Description This TTP funds laboratory and engineering pilot-scale studies needed to demonstrate the stabilization of salt waste using the polysiloxane based material binder from Orbit Technologies.

Planned Activities Planned activities include:

- (1) Prepare simulated salt mixed wastes representative of actual mixed wastes in the DOE complex.
- (2) Complete bench-scale laboratory and engineering pilot-scale studies (55 gallons) with the polysiloxane binder, various salt waste surrogates, and cold tracers.
- (3) Test the resulting waste form samples to assess leach resistance, compressive strength, and durability compliance with RCRA Universal Treatment Standards, the NRC Technical Position Paper, and CERCLA regulations and guidelines. Waste loadings will also be determined.
- (4) Test waste forms against the DOT oxidizer tests, TCLP test, Accelerated Leach Test, compressive strength test, immersion testing, wet-dry cycling, and x-ray analysis.
- (5) Identify actual mixed waste salt samples for potential future demonstration testing in FY-98.
- (6) Prepare a TTP and Test Plan according to MWFA guidelines, prior to testing.
- (7) Prepare a final report of FY-97 results for submittal to the MWFA.

MWFA Contacts:
WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

TTP # OR16MW41

Task Task C-Cementitious Stabilization with High Salt Loadings

97 Funding (K) 372

Scope Description This TTP funds new start development activities for stabilizing salt containing mixed wastes. In particular, this TTP defines the statistical experimental design, bench-scale testing with actual mixed wastes, and long term expansion monitoring to be conducted in relation to technology development efforts concerning modifications of the standard Portland cement formulation. This modification involves substituting another binder for Portland cement and modifying the basic cementitious matrix into a more plastic matrix using clays.

Planned Activities Planned FY-97 activities include:

- (1) Develop a TTP and Test Plan, and obtain MWFA approval, prior to beginning work.
- (2) Develop a statistical experimental design model to predict grout properties with high salt loadings. The approach for the statistical model is to be a simple ternary design using dry blend, waste salts, and water.
- (3) If necessary, perform preliminary scope testing to define the boundaries for the statistical design defined above.
- (4) Complete bench-scale testing. The testing will include evaluation of at least three different dry blends including Portland cement as a baseline, ground granulated blast furnace slag, and clay-cement. Waste loadings will be based on the statistical design model. Surrogates may be used if no actual waste samples can be identified and obtained.
- (5) Assess waste form integrity by measuring the following: penetration resistance, free water, compressive strength, TCLP, and waste loadings.
- (6) Initiate monitoring of the destructive volume expansion of the waste forms. This task will extend beyond FY-97.
- (7) Identify actual or surrogate mixed wastes for an engineering-scale demonstration to be initiated after the completion of the tasks described above.

MWFA Contacts:
WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

Deficiency : Salt Stabilization

TDRD Title : Ash/Salt Stabilization

TTP # RL37MW41

Task Sol-Gel Stabilization of Salt Wastes

97 Funding (K) 250

Scope Description This TTP funds scope directed toward new start development activities for stabilization of salt containing mixed wastes. In particular, this TTP defines development activities for stabilizing high salt wastes using the sol-gel technology. The versatility of this process apparently allows entrainment and remediation of mixed wastes in multiple ways. The sol-gel process involves precipitating salts in the waste followed by alkoxide addition and gelling, and then drying and final consolidation in a glass form at 500-600 degrees C.

Planned Activities Planned activities for FY-97 include:

- (1) Identification of suitable sol-gel systems for given mixed waste types.
- (2) Production of sol-gel based waste forms with recommended sol-gel systems using simulated waste on a laboratory scale.
- (3) Complete durability testing on the waste forms produced from the sol-gel process lab-scale tests.
- (4) Initiate plans for a radioactive demonstration using the sol-gel processes at a pilot-scale level and complete the appropriate pilot-scale systems.
- (5) Investigate new sol-gel systems and specify waste candidates for the scaled-up pilot-scale tests.
- (6) Issue a final technical report of the FY-97 results to the MWFA.
- (7) Prepare a TTP and Test Plan for MWFA review prior to testing.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

TTP # RL47MW42

Task Microencapsulation of Salt Waste Using Polyester Resin

97 Funding (K) 330

Scope Description This TTP funds new start development efforts for stabilizing salt containing mixed wastes. In particular, this TTP defines the development work to extend previous work with the organic polymer-polyester resin (with a methyl ethyl ketone catalysts/initiator) to that of stabilizing high salt mixed wastes. Low contaminant leach rates and flexibility in treating wet and dry wastes are the main drivers for extending the development of this stabilization technology.

Planned Activities Planned activities include:

- (1) Prepare a TTP and a Test Plan in accordance with MWFA guidelines. Receive approval before beginning any testing.
- (2) Conduct a literature review to evaluate the applicability of the stabilization technique to typical high salt mixed waste streams in the DOE complex.
- (3) Specify surrogate waste stream compositions; waste/resin/catalyst ratios and equipment to be used during bench scale testing.
- (4) Complete bench-scale testing and assess the prepared waste form by completing EPA's and NRC's published performance requirements, as well as the RCRA Universal Treatment Standards. Other analysis includes compression testing, 90 day water immersion testing, modified ANSI 16-1 leach test, and the TCLP test.
- (5) Obtain samples of real salt wastes from the complex and complete treatability studies of these wastes using formulations developed in the surrogate bench-scale testing.
- (6) Issue final reports of bench-scale and treatability study test reports to the MWFA.
- (7) Prepare a proposal for future pilot-scale testing at a design capacity of 30 kg/hr.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

Deficiency : Waste Form Performance

TDRD Title : Waste Form Performance

TTP # AL34MW75

Task Task B-Waste Form Initiative

97 Funding (K) 351

Scope Description This TTP will establish a Waste Form Initiative (WFI) to ensure that mixed waste treatment systems being developed by DOE produce a final waste form acceptable for disposal at existing and/or planned facilities. The WFI will be an integrated effort between multiple sites and entities. Work conducted at Sandia National Laboratory will develop and refine waste acceptance criteria, identify testing and data needs, and refine issues associated with identified problem waste streams.

Planned Activities Waste Acceptance Criteria (WAC) will be developed, using existing Performance Evaluations (PE), for mixed waste. Correlations will be determined between the PEs and Performance Assessments (PA) for release rate data and allowable radionuclide concentration and inventory, for humid and arid disposal sites, relative to different final waste forms. This will maximize potential for acceptance and implementation by disposal sites of the WAC guidelines developed through this effort. This task will also analyze data used in the DOE Disposal Working Group PAs and PEs to determine WAC data gaps and research needs at targeted disposal sites.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

TTP # ID06MW76

Task Waste Form Initiative @ INEL

97 Funding (K) 1,620

Scope Description Develop and lead a Waste Form Initiative (WFI) at the INEL to ensure that mixed waste treatment systems being developed by DOE produce a final waste form acceptable for disposal at existing and/or planned facilities. The WFI will be an integrated effort between multiple sites and entities. Work conducted at the Idaho National Engineering Laboratory includes oversight, contracting, and coordination of the WFI tasks performed by all participants.

Planned Activities Planned activities for FY-97 include:
Complete Program Execution Guidance for new WFI work
Issue Calls for Proposal and Requests for Proposal
Present progress at the Mid-Year Review
Complete Data Analysis Report identifying waste form data, performance deficiencies and technology development and provide a Final Data Analysis Report to DOE Headquarters.

MWFA Contacts: WTM: Jim Herzog (208) 526-3191
POC: Jim Herzog (208) 526-3191

Deficiency : Material Handling

TDRD Title : TDRDs will be generated once technology evaluation is completed

TTP # ID06MW51

Task Task B-Robotic Removal of Noncompliant Articles from Waste Drums

97 Funding (K) 140

Scope Description This TTP supports the formation of the Users Group. The function of the Users Group will be to define technology development requirements for the equipment being developed that will lead to successful implementation of the equipment at various DOE sites. INEL will lead the Users Group and will plan, host, and follow up on User Group meetings. Input from the Users Group will be transmitted directly to the RTDP program, EM-53, who is leading the technology development. Because of the cooperative agreement between the MWFA and RTDP, recommendations, decisions and evaluations from the Users Group are essential to future equipment development. There will also be direct involvement in the Users Group by EM-30. As appropriate industry may also be involved.

A Portable Non-Compliant Waste Removal system will be developed by RTDP to support the INEL in meeting the "Batt Agreement". However, interest and need has been expressed by various sites for similar equipment to perform sorting and repackaging tasks. Individuals from these sites will constitute the core members of a Users Group. The Users Group task will be to evaluate the design and performance of the Portable Non-Compliant Waste Removal system components and develop the requirements necessary to implement similar equipment for their needs.

Planned Activities The Users Group will consists of representatives from seven sites. The group will meet early in FY-97 to establish goals, objectives, and requirements for the development of equipment for remotely opening/closing drums, removing liners from drums, removing selective constituents, e.g., non-compliant items, from drummed waste, and other similar systems needed in remotely handling drummed waste across the DOE complex. Results from this meeting will be used in developing a Technology Development Requirements Document (TDRD) for the various subsystems. The Users Group will meet again near the end of the second quarter of the fiscal year and conduct a design review of the systems being developed by RTDP. A third meeting will be held in the fall of FY-97 for witnessing the demonstration testing of the opening/closing and liner transfer systems. Following testing the Users Group will publish the TDRD including an evaluation and recommendations for enhancements and further development.

MWFA Contacts: WTM: Cliff Thomas (803) 557-8080
POC: Whitney St. Michel (208) 526-3206

TTP # ID76MW61

Task Task C-Sorting & Segregation Technologies Program Support

97 Funding (K) 200

Scope Description The Principal Investigator will evaluate paste technology development efforts and existing technologies in the area of material handling/sorting and segregation and generate a report baselining these technologies for anticipated mixed waste treatment process flowsheets. The process flowsheets will be developed by the Technical Resource Team. The primary waste streams associated with each flowsheet and the unique characteristics (physical, hazardous, radiological) will be identified. The waste characteristics will be evaluated against the baseline technology established for that process flowsheet and limitations in current technologies/designs will be defined. EM-30, EM-40, and EM-60 can then reference this baseline to generate material handling/sorting and segregation requirements for their mixed waste treatment systems, and define technology development needs that can be addressed by EM-50.

Planned Activities Planned activities for this TTP include: Evaluating existing technologies and designs for material handling/sorting and segregation systems.
Generate a report which baselines the system(s) that are anticipated for key mixed waste treatment flowsheets. The report should provide a summary of the advantages/limitations of each baselined system and make recommendations on the areas that will most likely need technology development effort.
Support the Waste Type Teams by providing technical review of proposed material handling/sorting and segregation technology development activities for technical merit and capability to meet DOE needs.

MWFA Contacts: WTM: Cliff Thomas (803) 557-8080
POC: Whitney St. Michel (208) 526-3206

Deficiency : Sorting/Segregating

TDRD Title : TDRDs will be generated once technology evaluation is completed

TTP # ID06MW51

Task Task B-Robotic Removal of Noncompliant Articles from Waste Drums

97 Funding (K) 140

Scope Description This TTP supports the formation of the Users Group. The function of the Users Group will be to define technology development requirements for the equipment being developed that will lead to successful implementation of the equipment at various DOE sites. INEL will lead the Users Group and will plan, host, and follow up on User Group meetings. Input from the Users Group will be transmitted directly to the RTDP program, EM-53, who is leading the technology development. Because of the cooperative agreement between the MWFA and RTDP, recommendations, decisions and evaluations from the Users Group are essential to future equipment development. There will also be direct involvement in the Users Group by EM-30. As appropriate industry may also be involved.

A Portable Non-Compliant Waste Removal system will be developed by RTDP to support the INEL in meeting the "Batt Agreement". However, interest and need has been expressed by various sites for similar equipment to perform sorting and repackaging tasks. Individuals from these sites will constitute the core members of a Users Group. The Users Group task will be to evaluate the design and performance of the Portable Non-Compliant Waste Removal system components and develop the requirements necessary to implement similar equipment for their needs.

Planned Activities The Users Group will consists of representatives from seven sites. The group will meet early in FY-97 to establish goals, objectives, and requirements for the development of equipment for remotely opening/closing drums, removing liners from drums, removing selective constituents, e.g., non-compliant items, from drummed waste, and other similar systems needed in remotely handling drummed waste across the DOE complex. Results from this meeting will be used in developing a Technology Development Requirements Document (TDRD) for the various subsystems. The Users Group will meet again near the end of the second quarter of the fiscal year and conduct a design review of the systems being developed by RTDP. A third meeting will be held in the fall of FY-97 for witnessing the demonstration testing of the opening/closing and liner transfer systems. Following testing the Users Group will publish the TDRD including an evaluation and recommendations for enhancements and further development.

MWFA Contacts: WTM: Cliff Thomas (803) 557-8080
POC: Whitney St. Michel (208) 526-3206

TTP # ID76MW61

Task Task C-Sorting & Segregation Technologies Program Support

97 Funding (K) 200

Scope Description The Principal Investigator will evaluate paste technology development efforts and existing technologies in the area of material handling/sorting and segregation and generate a report baselining these technologies for anticipated mixed waste treatment process flowsheets. The process flowsheets will be developed by the Technical Resource Team. The primary waste streams associated with each flowsheet and the unique characteristics (physical, hazardous, radiological) will be identified. The waste characteristics will be evaluated against the baseline technology established for that process flowsheet and limitations in current technologies/designs will be defined. EM-30, EM-40, and EM-60 can then reference this baseline to generate material handling/sorting and segregation requirements for their mixed waste treatment systems, and define technology development needs that can be addressed by EM-50.

Planned Activities Planned activities for this TTP include: Evaluating existing technologies and designs for material handling/sorting and segregation systems.
Generate a report which baselines the system(s) that are anticipated for key mixed waste treatment flowsheets. The report should provide a summary of the advantages/limitations of each baselined system and make recommendations on the areas that will most likely need technology development effort.
Support the Waste Type Teams by providing technical review of proposed material handling/sorting and segregation technology development activities for technical merit and capability to meet DOE needs.

MWFA Contacts: WTM: Cliff Thomas (803) 557-8080
POC: Whitney St. Michel (208) 526-3206

Deficiency : **Sorting/Segregating**

TDRD Title : **TDRDs will be generated once technology evaluation is completed**

TTP # OR06MW62

Task OR-FUSRASP Volume Reduction of MW Using Radioactive Segregation

97 Funding (K) 150

Scope Description

This activity will use a material sorting technology to separate the radioactive and nonradioactive fractions of soil from Middlesex, TN. Under this demonstration, 500 cubic meters of soil contaminated with mixed waste will be conveyed under radiation sensors for segregation. This technology has previously been used to segregate radioactive soils from nonradioactive, but has not previously been used on mixed waste.

Middlesex soil is contaminated with lead and radium-226. Segregation could result in mixed, radioactive, or hazardous waste, and clean soil. This demonstration will provide statistical data relative to the natural distribution and resulting segregation of the lead and radionuclides. This data will be used to determine the cost effectiveness of using this process as a pretreatment to reduce the volume of Middlesex soil that must be managed as a mixed waste.

Cost estimates for treatment of Middlesex soil range from \$68M to \$250M. This process could reduce the mixed waste portion by at least 50%, which would potentially result in a savings of over \$30M. Study results will be documented in the Middlesex Site Engineering Evaluation/Cost Assessment, which will be completed in fiscal year 1997.

Planned Activities

This project plans install segregation equipment at the site. The equipment will be used to process approximately 500 m3 of waste. A final report that documents the results and applicable cost savings will be written.

MWFA Contacts:

WTM: Ron Nakaoka (505) 665-5971

POC: Jay Roach (208) 526-4974

Deficiency : Mercury Separation

TDRD Title : Mercury Separation/Removal

TTP # AL27MW62

Task Separation/Removal of Mercury Using Ligands in SCC02

97 Funding (K) 350

Scope Description FY-97 workscope includes work to develop and demonstrate an efficient, selective, and cost-effective chelating agent for separating mercury from waste through supercritical carbon dioxide extraction. Various candidate carbon dioxide soluble chelates will be evaluated including demercaptosuccinic acid, thioamalic acid, dithiocarbamate, calixarene, and triazole crown ether. These compounds have been shown to have an affinity for heavy metal ions, particularly divalent lead and mercury. This project will be performed in conjunction with SNL, the University of Pittsburgh, and the MWFA.

Planned Activities Planned FY-97 activities include:
(1) Prepare a TTP and Test Plan to perform the planned work scope.
(2) Perform extraction experiments with soil using carbon dioxide soluble ligands that have been developed by the University of Pittsburgh.
(3) Based on initial testing results, a joint decision to continue or discontinue these efforts will be made between the MWFA, RFETS, and the potential end user.
(4) Design and synthesize new chelating agents for mercury that have very high solubility in supercritical carbon dioxide, as required. This will be performed only if the available ligands cannot meet the quantified mercury removal criteria.
(5) Perform testing of best chelating agents using mixed waste surrogates for soils and aqueous solutions.
(6) Perform testing of chelating agents using actual mixed waste.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

TTP # OR16MW61

Task Task A-Hg Working Group/Hg Treatment Demos

97 Funding (K) 1,945

Scope Description The focus of this work will be to perform mercury amalgamation, stabilization separation and removal demonstrations on actual MLLW from different DOE sites. These demonstrations will lead to technical and economic decisions concerning their need and use. Waste streams chosen will be well characterized, available for use in the demonstrations, represent the majority of DOE's wastes, and if possible, significantly accelerate one or more sites' compliance schedules.

Planned Activities The focus of this work will be to perform mercury amalgamation and stabilization demonstrations on actual mixed low level waste from different sites. There will be two amalgamation demonstrations and three stabilization demonstrations. The Mercury Working Group will also prepare a Separations demonstration to be initiated before FY-98.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

Deficiency : Mercury Separation

TDRD Title : Mercury Separation/Removal

TTP # OR16MW61

Task Task D-Mercury Separation/Removal Using Sodium Hypochlorite Steel Wool

97 Funding (K) 100

Scope Description This TTP defines the work scope for bench scale demonstration of a mercury separation/removal technology that uses sodium hypochlorite to dissolve the mercury, which is collected on steel wool or scrap steel. Steel wool in canisters, which are commercially available, has been shown to effectively remove mercury from solution. The collected mercury can then be commercially reclaimed from the steel wool, or stabilized to meet RCRA Land Disposal Restrictions. A commercial partner, Cercona Inc., will assist in pilot scale demonstration of this technology in FY-98

Planned Activities Planned activities for FY-97 are:
(1) Develop a TTP and Test Plan for FY-97 test activities. Obtain MWFA approval before testing.
(2) Demonstrate mercury leaching from at least four mixed waste matrices using sodium hypochlorite and subsequent mercury removal from the leachate using steel wool. Optimum pH and oxidation potential for the leaching step and steel wool step will be determined during these tests for the different waste streams. Any interfering contaminants that exhaust the reagents will be documented. Waste will be treated to pass TCLP for mercury (0.2 mg/L).

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

TTP # RF16MW62

Task Task B-Mercury Separation Using Low Temperature Thermal Desorption

97 Funding (K) 175

Scope Description This activity will demonstrate the capability of a low temperature thermal desorption (LTTD) system to retort mercury from a wide variety of waste matrices, including porous and nonporous materials. In addition, ADA Technologies, Inc. has developed an offgas treatment component that uses sulfur to stabilize elemental mercury, while in the gaseous phase. ADA is providing equipment and engineering support to this project, which will serve as a test bed for the ADA technology, at no cost to DOE. Initial testing will process between one and two cubic meters of waste, eliminating two RFETS mixed waste streams.

This task will also support the Interstate Technical Regulatory Cooperation (ITRC) Work Group in preparation of a protocol document for mercury retorting using LTTD with mercury offgas treatment capability. Involvement with the ITRC will potentially expedite permitting and implementation of similar technologies in other states.

Planned Activities In FY-97 the PI plans to process non-radioactive Hg contaminated fluorescent bulbs. The PI also intends to process actual mixed waste at Rocky. (RF-W024)

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

Deficiency : Mercury Amalgamation

TDRD Title : Mercury Amalgamation

TTP # CH36MW63

Task Task B-Sulphur Polymer Cement Stabilization of Elemental Mercury Mixed Waste

97 Funding (K) 80

Scope Description This activity will demonstrate a two phase Sulfur Polymer Cement (SPC) stabilization process to stabilize 2.25 gallons (254 lbs) of elemental mercury located at Brookhaven National Laboratory. The first stage chemically stabilizes the mercury using finely ground SPC. This is followed by heating the SPC to 130 degrees C to melt the matrix. This process avoids forming soluble HgO and reduces the amount of unreacted mercury. Data generated will support the efforts of the MWFA Mercury Working Group.

Planned Activities Develop a Test Plan to perform a treatability study on stabilizing elemental mercury mixed waste, conduct the study, and issue a final report on the results.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

TTP # OR16MW61

Task Task A-Hg Working Group/Hg Treatment Demos

97 Funding (K) 1,945

Scope Description The focus of this work will be to perform mercury amalgamation, stabilization separation and removal demonstrations on actual MLLW from different DOE sites. These demonstrations will lead to technical and economic decisions concerning their need and use. Waste streams chosen will be well characterized, available for use in the demonstrations, represent the majority of DOE's wastes, and if possible, significantly accelerate one or more sites' compliance schedules.

Planned Activities The focus of this work will be to perform mercury amalgamation and stabilization demonstrations on actual mixed low level waste from different sites. There will be two amalgamation demonstrations and three stabilization demonstrations. The Mercury Working Group will also prepare a Separations demonstration to be initiated before FY-98.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

TTP # RF16MW62

Task Task B-Mercury Separation Using Low Temperature Thermal Desorption

97 Funding (K) 175

Scope Description This activity will demonstrate the capability of a low temperature thermal desorption (LTTD) system to retort mercury from a wide variety of waste matrices, including porous and nonporous materials. In addition, ADA Technologies, Inc. has developed an offgas treatment component that uses sulfur to stabilize elemental mercury, while in the gaseous phase. ADA is providing equipment and engineering support to this project, which will serve as a test bed for the ADA technology, at no cost to DOE. Initial testing will process between one and two cubic meters of waste, eliminating two RFETS mixed waste streams.

This task will also support the Interstate Technical Regulatory Cooperation (ITRC) Work Group in preparation of a protocol document for mercury retorting using LTTD with mercury offgas treatment capability. Involvement with the ITRC will potentially expedite permitting and implementation of similar technologies in other states.

Planned Activities In FY-97 the PI plans to process non-radioactive Hg contaminated fluorescent bulbs. The PI also intends to process actual mixed waste at Rocky. (RF-W024)

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

Deficiency : TRU Transportation

TDRD Title : TDRDs will be generated once technology evaluation is completed

TTP # AL16MW51

Task Task C-Hydrogen Gas Getters for TRU Waste

97 Funding (K) 150

Scope Description Wastes shipped to WIPP cannot exceed decay heat limits set forth in the TRUPACT-II Safety Analysis Report. Hydrogen "getters" are proposed for use on drums that exceed decay heat limits. Getters are solid materials that chemically and irreversibly bind hydrogen. Getters do not require oxygen to be effective, and do not produce water as a reaction product. This task will fund an assessment of the impact of poisons on the most promising hydrogen getter discovered thus far, 1,4-bis(phenylehtynyl)benzene (DEB). Potential poisons will be identified by examining previous gas generation studies and drum headspace sampling programs conducted at INEL, LANL, and RFETS.

Planned Activities A test plan for this task will be written and reviewed by the Technical Advisory Team and approved by the MWFA. A test apparatus will be designed and constructed to perform experimental work on the effects of poisons on hydrogen getters. Once constructed, DEB will be tested in the presence of potential poisons.

MWFA Contacts: WTM: Cliff Thomas (803) 557-8080
POC: Whitney St. Michel (208) 526-3206

Deficiency : TRU Transportation

TDRD Title : TDRDs will be generated once technology evaluation is completed

TTP # ID06MW51

Task Task C-Flammable Gas Headspace Measurements in TRUPACT-II

97 Funding (K)

282

Scope Description

Four U.S. Department of Energy-Carlsbad Area Office initiatives in progress are designed to increase the portion of transuranic (TRU) waste that can be shipped in the TRUPACT-II. Although these initiatives will substantially increase the percentage of drums that can be shipped, a portion of the waste will still exceed the current container wattage limits and cannot be shipped using the current methodology required in the Safety Analysis Report for the TRUPACT-II Shipping Package.¹ The container wattage limits were established by combining worst-case G-values (measure of flammable gas generation potential) with the maximum allowable flammable gas generation rates. The remainder of the waste will either have to be treated to destroy the hydrogenous waste matrix or repackaged into additional drums. Each remedy will be expensive and may increase the inventory of drums for disposal.

The purpose of this task is to develop a methodology that provides an alternative method for demonstrating compliance with the Transuranic Package Transporter-II (TRUPACT-II) flammable gas requirements. The method is based on sampling the waste container headspace for flammable gases, calculating the flammable gas generation rate, and comparing the rate to existing allowable flammable gas generation rate limits.

The proposed method is based on a parameter (i.e., the flammable gas concentration) that can be measured with greater confidence (i.e., low measurement error) than decay heat, the currently approved method. This provides the additional benefit that a lower error is used to define the upper confidence level with which to compare the allowable limit.

The basis for the method is the fact that at steady state (that is the condition when concentrations are not variable as a function of time), the flow rate of flammable gas across each confinement layer is the same and equal to the flammable gas generation rate. Thus, the flammable gas generation rate can be directly calculated from the flammable gas flow rate out of the drum. Specifically, the flammable gas flow rate or generation rate is the product of the flammable gas concentration in the drum headspace and the combined gas diffusivity through the drum filter and drum lid gasket.

Planned Activities

Methodology Development

The proposed method is based on sampling the waste container headspace for flammable gases as an alternative to demonstrating compliance with the flammable gas requirements (based on comparing wattage to wattage limits). The drum headspace flammable gas concentration is used to calculate the actual drum flammable gas generation rate for direct comparison with the allowable flammable gas generation rate limit. The basis for the method is the fact that at steady state (that is the condition when concentrations are not variable as a function of time), the flow rate of flammable gas across each confinement layer is the same and equal to the flammable gas generation rate. Thus, the flammable gas generation rate can be directly calculated from the flammable gas flow rate out of the drum. Specifically, the flammable gas flow rate or generation rate is the product of the flammable gas concentration in the drum headspace and the combined gas diffusivity across the drum filter and drum lid gasket. The proposed method is based on a parameter (i.e., the flammable gas concentration) that can be measured with greater confidence (i.e., low measurement error) than decay heat, the currently approved method. This provides the additional benefit that a lower error is used to define the upper confidence level with which to compare the allowable limit.

Software Development and Documentation

The methodology will be implemented through use of computer software that will calculate aspiration times or flammable gas flow rates for vented waste drums. The software will allow the user to calculate drum-specific flammable gas flow rates based on the headspace gas sample collected from a specific drum.

Applicable quality elements and requirements of the CAO Quality Assurance Program Document include:

- Quality Assurance Project Plan and Software Procedure (QAPJSP)
- Methodology and Software Requirements, Design Implementation Document
- Software Verification and Validation Plan
- Software Verification and Validation Report
- Software User Documentation
- Software Configuration Log
- Software Abstract Form

Software Analysis

The aspiration time is the time required for a newly vented waste drum to be vented before the drum contents can be assumed to be at steady state. The basis for the method for calculating the flammable gas generation rate is the fact that at steady state (i.e., conditions when concentrations are not changing with time), the flow rate of flammable gas across each confinement layer is the same and equal to the flammable gas generation rate. Thus, the flammable gas generation rate can be directly calculated from the flammable gas flow out of the drum. Specifically, the flammable gas flow rate or generation rate is the product of the flammable gas concentration in the drum headspace and the total gas diffusion characteristics across the drum lid. This includes gas transport across the drum filter as well as the drum lid gasket. Both the filter and gasket offer a potential pathway for flammable gas to exit the drum.

Deficiency : TRU Transportation

TDRD Title : TDRDs will be generated once technology evaluation is completed

Hydrogen Diffusion Characterization Experiments

The major flammable gas component is assumed to be hydrogen generated from the radiolysis of hydrogenated waste. A number of tests have already been performed to identify the hydrogen diffusion characteristics of various carbon-composite filters that might be used to vent a waste drum. In estimating the aspiration time of vented drum, assuming no diffusion across the drum lid gasket results in a conservative calculation. However, in comparing the calculated flammable gas generation rate to the allowable TRUPACT-II flammable gas generation limits, neglecting hydrogen diffusion across the drum lid gasket does not result in the most conservative result. It is necessary to quantify the rate of gas transport across the drum lid gasket or demonstrate that it is not a significant quantity.

MWFA Contacts:

WTM: Cliff Thomas (803) 557-8080

POC: Whitney St. Michel (208) 526-3206

Deficiency : Ash Stabilization

TDRD Title : Ash/Salt Stabilization

TTP # CH24MW44

Task Task A-Phosphate Bonded Ceramic Waste Forms

97 Funding (K) 670

Scope Description A continuing development effort by ANL-E to demonstrate a highly effective mixed waste stabilization technique using chemically bonded phosphate ceramics (CBPC). Because phosphates are natural mineral analogs of radioactive elements CBPC were developed to stabilize mixed waste. When properly formulated, CBPCs result in high waste loading and high compressive strength meeting RCRA leach limits for heavy metal. Further development will concentrate on scaling the process for actual salt-mixed wastes generated via the scrub blowdown of future and existing mixed waste thermal units. Volume reduction techniques will also be investigated by coupling the process with that of an harmonic mixer.

Planned Activities During FY-97, testing will be conducted on actual mixed waste streams from the PHP and DETOX processes to determine maximum waste loadings, waste types and maximum operational time. These studies will help determine the acceptability of the stabilized product. A test plan will be developed to identify locations where the test will be completed, and the scale of the testing relative to a potential full-scale operation.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

TTP # CH24MW44

Task Task B-Dev. of Iron Phosphate Based CBCWFs

97 Funding (K) 50

Scope Description The goal of this proposal is to evaluate and develop a chemically bonded iron-phosphate based, low cost, room temperature technology to stabilize low level mixed waste streams. This work will complement and integrate the project supported by the MWFA being conducted at the V. G. Khlopin Radium Institute in St. Petersburg, Russia. This project will try to identify suitable chemistry based on rapid reactions between phosphoric acid and magnetite to produce a quick setting ceramic, and between phosphoric acid and haematite to produce a slow setting ceramic. Scoping tests will determine a ceramic composition suitable for stabilizing low level mixed waste streams, and the composition will be tested on surrogates.

Planned Activities Planned activities for this TTP include completing tests to develop suitable binders and ash waste forms, evaluate waste forms developed by ANL-E and the V. G. Khlopin Radium Institute in St. Petersburg, Russia, and complete a report describing the fiscal year's activities.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

Deficiency : Ash Stabilization

TDRD Title : Ash/Salt Stabilization

TTP # CH24MW44

Task Task C-Stabilization of Debris Using Phosphate Bonded Ceramics

97 Funding (K) 200

Scope Description This activity will demonstrate the capability of the phosphate bonded ceramic (PBC) technology to effectively stabilize size-reduced debris. Two waste streams at Argonne National Laboratory-West (ANL-W), mercury contaminated crushed light bulbs and lead-lined gloves, totaling 8 gallons, will be processed during this demonstration. The wastes will be size-reduced as necessary for processing. A Toxicity Characteristic Leaching Procedure test will be performed on the final waste form to ensure that Resource Conservation and Recovery Act requirements have been met for disposal in a Subtitle D facility, such as the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory. After completing the demonstration, the installed equipment and technology will be used by ANL-W to treat other mixed waste streams (ie, offgas residuals from the Plasma Hearth Process equipment).

Planned Activities Planned activities for FY-97 are: develop an approved test plan, procure and install 5-gal mixer, evaluate regulatory requirements related to final waste form and treatment process, perform treatability studies, dispose of waste at RWMC or Environcare as appropriate, and provide final report.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

TTP # CH36MW63

Task Task A-Kinetic Mixer Demo

97 Funding (K) 500

Scope Description This task will demonstrate the effectiveness of a kinetic mixer, developed by EcoLEX, Inc., in removing moisture and organics from sludge waste streams, to allow subsequent polymer microencapsulation. This process uses a novel mixing mechanism to thoroughly homogenize the feed waste with the polymer prior to extrusion, while removing the moisture and organics. These will be vaporized under a vacuum, removed from the mixer, and condensed for additional treatment. Generally, more than 2% moisture or organics in the waste feed stream can cause frothing in the polymer extrusion, resulting in an unacceptable waste form. The kinetic mixer can potentially allow polymer microencapsulation of a variety of waste streams that would otherwise not be acceptable for this treatment.

Planned Activities FY-97 activities will continue development of the thermokinetic mixer as a pre-processor for polymer encapsulation of mixed waste. System parameters will be optimized by using surrogate waste materials and testing/demonstrating the integrated system with mixed waste from one or more DOE sites. Pilot-scale treatability studies will be performed on at least two mixed waste streams, representing applicable DOE wastes. Planned activities also include evaluating recycled polymer feed stock in this system.

MWFA Contacts: WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

Deficiency : Ash Stabilization

TDRD Title : Ash/Salt Stabilization

TTP # HQ06MW31

Task Task A - Evaluation of Russian Technologies to Treat DOE Mixed Waste

97 Funding (K) 875

Scope Description This project will identify, evaluate, and demonstrate technologies now available or under development in Russia that can directly meet MWFA needs. These technologies may represent new technology, modification of existing technology or equipment, or an opportunity to obtain data from the Russian scientific community that would be difficult or cost prohibitive to obtain in the US. Potential technologies will be evaluated against the 30 technology deficiencies. Emphasis will be placed on technologies or projects that fill gaps in the MWFA program, and efforts will be taken to prevent duplication of technology or effort.

Planned Activities Potential FY-97 projects will be reviewed by a team consisting of the Russian Project Principal Investigator (PI), DOE-ID Program Manager, MWFA Waste Type Manager and Point of Contact, MWFA Technical Review Team representative(s), and other Technical Specialists as determined by the PI. Projects will be reviewed for technical quality, application to MWFA needs, and application to MWFA waste streams. Russian scientists will submit test plans for projects selected for funding in FY-97.

MWFA Contacts:

WTM:	Leon Borduin	(505) 667-3150
POC:	Tom Fewell	(208) 526-7789

Deficiency : Mercury Monitor

TDRD Title : Mercury Monitoring

TTP # OR16MW74

Task Test Bed for CEMs

97 Funding (K) 391

Scope Description This TTP supports the development of a national test bed for evaluating continuous emissions monitors (CEM) at the Toxic Substances Control Act Incinerator at Oak Ridge's K-25 site. This includes working with CEM developers to prepare test plans to evaluate various CEMs.

Planned Activities At least four CEM technologies are to be demonstrated, tested, and evaluated, with a solicitation required for two of these CEMs in FY97. The technologies are to be subjected to various waste streams and off-gas compositions within the realm of normal TSCA operations, as well as other DOE incinerators. A Technology Performance Report will be prepared upon conclusion of the testing.

MWFA Contacts: WTM: Dave Hutchins (423) 241-6420
POC: Vince Maio (208) 526-3696

Deficiency : Alpha Monitor

TDRD Title : Alpha Monitoring

TTP # OR16MW74

Task Test Bed for CEMs

97 Funding (K) 391

Scope Description This TTP supports the development of a national test bed for evaluating continuous emissions monitors (CEM) at the Toxic Substances Control Act Incinerator at Oak Ridge's K-25 site. This includes working with CEM developers to prepare test plans to evaluate various CEMs.

Planned Activities At least four CEM technologies are to be demonstrated, tested, and evaluated, with a solicitation required for two of these CEMs in FY97. The technologies are to be subjected to various waste streams and off-gas compositions within the realm of normal TSCA operations, as well as other DOE incinerators. A Technology Performance Report will be prepared upon conclusion of the testing.

MWFA Contacts: WTM: Dave Hutchins (423) 241-6420
POC: Vince Maio (208) 526-3696

TTP # PE16MW71

Task Task A-Controlled Emissions Demo

97 Funding (K) 3,575

Scope Description The primary goal of the testing work funded by this TTP is to demonstrate that Destruction and Removal Efficiency can be improved for individual system components in a plasma arc system and that emission levels for treated offgas can meet the EPA's proposed combustion rule. This project includes funding for project management and engineering, startup/shakedown testing, organic destruction testing, metals scrubbing efficiency, a 1000 hour mass balance and operability test, development of equipment modifications, and testing of the Russian DeNOx catalyst in the system slipstream to reduce ammonia slip.

Planned Activities This project has seven subtasks:

1. Conduct project management/engineering activities, such as variance analysis, issuing project status reports, interfacing with outside project participants, and development of a Technology Development Plan.
2. Startup/shakedown testing will provide hands-on experience for system operators before any waste is introduced into the system. This also includes writing and performing Standard Operating Test Procedures, and developing Standard Operating Instructions.
3. Organic destruction tests, emphasizing chlorinated organics will be conducted to reestablish destruction and removal efficiency of the modified PACT-6 system.
4. Waste with high metals content will be burned to determine the efficiency of the ceramic filter installed downstream of the secondary combustion chamber. Lead, TRU surrogates, and alkali metals will be loaded in the feedstock to determine the effect on the operation and life of the filter.
5. A 1000 hour mass balance test will be made using a series of ten, 100 hour test runs.
6. This task provides for procuring and testing of additional emerging, technologically promising offgas components.
7. The Russian DeNOx catalyst will be tested in the offgas system to control ammonia slip in the offgas. This catalyst is reported to control ammonia slip over a wide range of temperatures, and be acceptable for regular landfill disposal.

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

Deficiency : Mercury Filter

TDRD Title : Mercury Filter Technology

TTP # AL34MW75

Task Task A-Hg Removal & Control-Gold Amalgamation Filter

97 Funding (K) 834

Scope Description

This TTP provides for continued development and demonstration of a system to remove vapor phase mercury from emissions and flue-gas streams typical of DOE thermal/non-thermal treatment processes. Development of this system will allow DOE to comply with regulatory mercury emissions standards, increase mercury containing mixed waste stream feed capacity to existing thermal treatment systems, and provide DOE and contractors with baseline information for comparing technologies proposed for treating mercury containing mixed waste.

This mercury control technology relies on the sorption of mercury onto or into gold or another noble metal, which is highly dispersed in a microporous support material. Regeneration of the sorbent is also being demonstrated. FY 97 scope activities will address the design, installation, and operation of a 50 ACFM demonstration at an actual DOE mixed waste treatment site and the finalizing of the smaller durability tests at WETO, as well as optimization of the sorbent on the laboratory scale.

Planned Activities

Planned activities for FY-97 will be to:

1. Complete construction of a prototype mercury sorption system
2. Install and operate this system at a DOE mixed waste site treating mercury contaminated mixed waste
3. Demonstrate that the sorbent system successfully removes mercury to specific regulatory limits as well as satisfying other TDRD requirements
4. Demonstrate the cost/benefit of employing the new mercury sorbent over currently available GAC application.

MWFA Contacts:

WTM: Leon Borduin (505) 667-3150

POC: Vincent C. Maio (208) 526-3296

TTP # OR16MW61

Task Task E-Comparision of Platinum Catalysts with Gold Catalysts for Adsorption of Mercury Vapors

97 Funding (K) 45

Scope Description

This TTP fund work to compare an inexpensive, commercially available platinum catalyst with a gold catalyst being developed by ADA Technologies, Inc. for the MWFA. Mercury vapors can be passively adsorbed onto a ceramic base coated with platinum and stabilized through the resulting amalgamation.

Planned Activities

Planned activities for FY-97 include:

- (1) Development of a test plan to define work scope and required comparative testing.
- (2) Work with ADA Technologies, Inc., to determine if the platinum catalyst can be implemented into the mercury filtration system being developed by ADA.

MWFA Contacts:

WTM: Ron Nakaoka (505) 665-5971

POC: Jay Roach (208) 526-4974

Deficiency : Heavy Metal Monitor

TDRD Title : Heavy Metal Monitoring

TTP # CH23MW51

Task Task B-Process Monitoring & Control

97 Funding (K) 275

Scope Description The process characterization task provides for the operation, modifications, and extensions to the non-intrusive process monitoring and control instrumentation for the PHP Bench-Scale system, which can be applied to other thermal treatment systems, such as melters. Equipment currently installed will be used, and additional apparatus will be installed to enhance process monitoring.

Planned Activities Design and construct a gas sampling apparatus to remove volatilized metallic species from the PHP Bench-Scale system, modify the torch chamber or associated ductwork to accept the gas sampling apparatus, and demonstrate the ability to sample metallic gasses from the chamber. Establish a technically sound gas sampling and analysis approach, consistent with the experimental objectives of the program.

MWFA Contacts: WTM: Cliff Thomas (803) 557-8080
POC: Whitney St. Michel (208) 526-3206

TTP # OR16MW74

Task Test Bed for CEMs

97 Funding (K) 391

Scope Description This TTP supports the development of a national test bed for evaluating continuous emissions monitors (CEM) at the Toxic Substances Control Act Incinerator at Oak Ridge's K-25 site. This includes working with CEM developers to prepare test plans to evaluate various CEMs.

Planned Activities At least four CEM technologies are to be demonstrated, tested, and evaluated, with a solicitation required for two of these CEMs in FY97. The technologies are to be subjected to various waste streams and off-gas compositions within the realm of normal TSCA operations, as well as other DOE incinerators. A Technology Performance Report will be prepared upon conclusion of the testing.

MWFA Contacts: WTM: Dave Hutchins (423) 241-6420
POC: Vince Maio (208) 526-3696

TTP # RL36MW51

Task Task B-Continuous Emissions Monitor & Diagnostic Work

97 Funding (K) 850

Scope Description This task will pursue the development of a continuous emissions monitor (CEM) for metals and other diagnostics for monitoring and control of high temperature waste treatment processes. The CEM/diagnostic development work includes development of a microwave plasma and particulate metal emissions in process off gas and stack gas from thermal waste treatment processes, development of an all solid state active millimeter wave pyrometer for spatially resolving temperature profile measurements inside furnaces and investigation and initial laboratory testing of a real time monitor to assess refractory lining degradation without requiring internal furnace access.

Planned Activities Planned activities include development of a test plan for the microwave plasma CEM. Testing will develop, test and evaluate the CEM process for off-gas and stack metals emissions monitoring. Documentation will be provided for the CEM test plan, test results, monthly reports, and presentations at annual reviews.

MWFA Contacts: WTM: Cliff Thomas (803) 557-8080
POC: Whitney St. Michel (208) 526-3206

Deficiency : VOC/SVOC Monitor

TDRD Title : Dioxin & Furan Monitoring

TTP # CH23MW51

Task Task B-Process Monitoring & Control

97 Funding (K) 275

Scope Description The process characterization task provides for the operation, modifications, and extensions to the non-intrusive process monitoring and control instrumentation for the PHP Bench-Scale system, which can be applied to other thermal treatment systems, such as melters. Equipment currently installed will be used, and additional apparatus will be installed to enhance process monitoring.

Planned Activities Design and construct a gas sampling apparatus to remove volatilized metallic species from the PHP Bench-Scale system, modify the torch chamber or associated ductwork to accept the gas sampling apparatus, and demonstrate the ability to sample metallic gasses from the chamber. Establish a technically sound gas sampling and analysis approach, consistent with the experimental objectives of the program.

MWFA Contacts:
WTM: Cliff Thomas (803) 557-8080
POC: Whitney St. Michel (208) 526-3206

TTP # OR16MW74

Task Test Bed for CEMs

97 Funding (K) 391

Scope Description This TTP supports the development of a national test bed for evaluating continuous emissions monitors (CEM) at the Toxic Substances Control Act Incinerator at Oak Ridge's K-25 site. This includes working with CEM developers to prepare test plans to evaluate various CEMs.

Planned Activities At least four CEM technologies are to be demonstrated, tested, and evaluated, with a solicitation required for two of these CEMs in FY97. The technologies are to be subjected to various waste streams and off-gas compositions within the realm of normal TSCA operations, as well as other DOE incinerators. A Technology Performance Report will be prepared upon conclusion of the testing.

MWFA Contacts:
WTM: Dave Hutchins (423) 241-6420
POC: Vince Maio (208) 526-3696

Deficiency : Alternative Organic Oxidation

TDRD Title : Chemical Oxidation

TTP # ME06MW31

Task MWFA Working Group Model Solicitation

97 Funding (K) 2,320

Scope Description This program is aimed at demonstrating cooperation between stakeholders and the DOE with respect to developing a model procurement process to demonstrate nonthermal mixed waste treatment technologies. A DOE site will be selected using selection criteria jointly developed by stakeholders and DOE, and a nonthermal technology will be selected and demonstrated at that site with stakeholder involvement. The demonstration site and technology to be demonstrated are to be determined.

Planned Activities Issue a Request for Proposal for a nonthermal treatment system for mixed waste within six months after selecting a demonstration site.
Select a technology vendor three months after the Request for Proposal process is completed.

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

TTP # OK16MW31

Task Thermal Oxidation of Organics Using Catalytic Chemical Oxidation

97 Funding (K) 91

Scope Description This activity will demonstrate the catalytic chemical oxidation process on organically contaminated high activity tritiated mixed waste streams at Lawrence Berkeley Laboratory (LBL). LBL currently has four waste streams, totaling over 1,000 liters that contain 91 Curies of tritium. A fifth waste stream, totaling 475 liters and 1800 Curies could also be treated using this process. LBL currently annually generates between 80 and 100 liters of similar waste for which this process would be deployed for ongoing treatment. Subsequent to treatment, the waste streams will be delisted, such that they can be managed as radioactive waste only.

Planned Activities LBL will demonstrate the catalytic chemical oxidation process on organically contaminated tritiated mixed waste.

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

Deficiency : Alternative Organic Oxidation

TDRD Title : Chemical Oxidation

TTP # OK23MW35

Task Task B-Direct Chemical Oxidation

97 Funding (K) 443

Scope Description This project funds research into Direct Chemical Oxidation (DCO), a technology being developed at LLNL that uses peroxydisulfide as an oxidant to destroy organic liquids and solids. After oxidation, the sulfide solution is recycled by electrolysis. The process uses no toxic catalysts and has no unsolved corrosion problems. Secondary wastes are avoided by recycling the sulfate product into peroxydisulfate. This process will be demonstrated at the pilot scale in FY 97 on two "difficult" DOE Complex waste surrogates. Specific surrogates will be chosen by DOE sponsors and prospective users, consulting with LLNL.

Planned Activities Work scheduled for FY-97 falls into two subtasks:
Modify the peroxydisulfate waste technology for treating highly specialized "difficult" wastes containing heavily chlorinated, nitrated or sulfated components. The wastes will be chosen by sponsors in consultation with LLNL.
Develop limited pilot scale operations and associated flow charts for treating two important waste streams not adequately treated by other means. The pilot demonstration will be supplemented with limited, experimental efforts where additional data is needed, and will address and solve practical issues of pretreatment, separations, and final waste forms. This program will also identify existing industrial equipment necessary to support the recycle of the ammonium sulfate for the pilot scale, but will reduce overall costs of the demonstration by using purchased ammonium peroxydisulfate.

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

TTP # OK23MW35

Task Task C-Direct Chemical Oxidation of Organic Waste

97 Funding (K) 194

Scope Description This activity will demonstrate the peroxydisulfate system to oxidize chlorinated solvents. Previous treatability studies were performed on solid and liquid organics. However, this waste stream is a refractory, water-insoluble chlorinated organic, with 80% chlorine, which represents a challenging technology application. Three hundred kilograms of solvent waste will be destroyed by oxidation at 75 - 90 degrees C using acidified solutions of sodium peroxydisulfate at ambient pressure.

Planned Activities Demonstrate the peroxydisulfate oxidation system in a treatability study to destroy 300 kilograms of solvents containing 80% chlorine.

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

Deficiency : Alternative Organic Oxidation

TDRD Title : Chemical Oxidation

TTP # OR16MW41

Task Task B-Wet Oxidation/Vit of Organic Mixed Wastes

97 Funding (K) 228

Scope Description This activity will establish optimum conditions for wet oxidation of organically contaminated wastes as pretreatment to vitrification, specifically the Transportable Vitrification System (TVS) at Oak Ridge. Four mixed waste streams, totaling over 500 kg. will be treated during the demonstration. The oxidant used for the demonstration, sodium hydroxide, is itself a mixed waste, contaminated with metals. After oxidation, the treatment residual will be vitrified on a bench scale unit to stabilize the metals to meet Resource Conservation and Recovery Act requirements. The test plan, which will be developed according to the MWFA Test Plan Guidance, will include a key decision point, after initial treatability studies have been completed, to evaluate the effectiveness of the process in destroying organics, particularly as applicable to TVS limitations. The remaining studies will be completed pending review and concurrence by the MWFA and appropriate TVS personnel with the preliminary results.

Planned Activities Develop a Test Plan to conduct wet oxidation and bench scale activities.
Issue a Final Report detailing the results of the fiscal year activities.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vincent C. Maio (208) 526-3696

TTP # RF16MW31

Task Delphi Detox Process Support-RF

97 Funding (K) 500

Scope Description The Delphi demonstration unit at Rocky Flats continues work started under TTP SR16MW31. The Delphi unit will be set up at SRS, tested using hazardous wastes only, and transported to RFETS. A detailed test plan will be written, and the unit will be installed and tested using mixed waste. The testing will determine how well the Delphi DETOX process can treat organically contaminated waste matrices found within the DOE complex. Testing will also determine how secondary waste streams generated from the process are eliminated or minimized and can be disposed with minimal treatment, effort, and cost. Testing will determine whether the chemical oxidant can be regenerated, and whether the process is scaleable, and radioactive constituents can be partitioned from the chemical oxidant after mixed waste treatment. Finally, testing will determine cost of the Delphi process compared to thermal treatment options.

Planned Activities Planned activities include obtaining necessary permits to locate the Delphi equipment at RFETS and to actually treat mixed waste (hot demo only). The Delphi unit will be relocated from SRS to RFETS and installed, and actual testing will take place. Shakedown testing, site specific safety analysis, and testing preparations are also included, as is a Technology Performance Report, detailing testing results.

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

Deficiency : Alternative Organic Oxidation

TDRD Title : Chemical Oxidation

TTP # SR16MW32

Task Task A-Acid Digestion of Contaminated Wastes

97 Funding (K) 219

Scope Description Acid Digestion technology consists of two distinct parts: organic oxidation and metal stabilization. Oxidation is achieved by HNO₃ in concentrated phosphoric acid. Metal stabilization occurs when iron oxide is added to the phosphoric acid and heated to 1100-1150 degrees C to form iron phosphate glass. This task will fund activities to test materials for constructing a pilot scale facility, construct a pilot scale facility, develop and construct a chemical sort decontamination system to determine waste fractionation under varying process conditions, test surrogate wastes at the pilot scale, and create a conceptual design for a full scale facility.

Planned Activities Planned activities include: testing materials candidates for a pilot scale facility, construct a pilot scale (5-15 gallons) facility, test chemical sort decontamination components and construct a chemical sort decontamination system, test the pilot scale unit, and provide a conceptual design for a full scale facility.

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

TTP # SR16MW32

Task Task B-Delphi Detox

97 Funding (K) 218

Scope Description The Delphi DETOX unit will be tested at SRS using a wide variety of organic hazardous wastes (no mixed waste) typically found within the DOE complex. These wastes will be specified in a test plan. This scope includes management of residual waste generated during the process. This task also includes funding to clean, inspect, and breakdown the Delphi unit for transport to RFETS.

Planned Activities Planned activities include the development of a test plan that will specify organic wastes to be tested in the Delphi unit, followed by actual testing of those test wastes. Upon testing completion, the Delphi unit will be cleaned, inspected and broken down for transport to RFETS

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

Deficiency : High Temp Part Removal

TDRD Title : CEM

TTP # PE16MW71

Task Task A-Controlled Emissions Demo

97 Funding (K) 3,575

Scope Description The primary goal of the testing work funded by this TTP is to demonstrate that Destruction and Removal Efficiency can be improved for individual system components in a plasma arc system and that emission levels for treated offgas can meet the EPA's proposed combustion rule. This project includes funding for project management and engineering, startup/shakedown testing, organic destruction testing, metals scrubbing efficiency, a 1000 hour mass balance and operability test, development of equipment modifications, and testing of the Russian DeNOx catalyst in the system slipstream to reduce ammonia slip.

Planned Activities This project has seven subtasks:

1. Conduct project management/engineering activities, such as variance analysis, issuing project status reports, interfacing with outside project participants, and development of a Technology Development Plan.
2. Startup/shakedown testing will provide hands-on experience for system operators before any waste is introduced into the system. This also includes writing and performing Standard Operating Test Procedures, and developing Standard Operating Instructions.
3. Organic destruction tests, emphasizing chlorinated organics will be conducted to reestablish destruction and removal efficiency of the modified PACT-6 system.
4. Waste with high metals content will be burned to determine the efficiency of the ceramic filter installed downstream of the secondary combustion chamber. Lead, TRU surrogates, and alkali metals will be loaded in the feedstock to determine the effect on the operation and life of the filter.
5. A 1000 hour mass balance test will be made using a series of ten, 100 hour test runs.
6. This task provides for procuring and testing of additional emerging, technologically promising offgas components.
7. The Russian DeNOx catalyst will be tested in the offgas system to control ammonia slip in the offgas. This catalyst is reported to control ammonia slip over a wide range of temperatures, and be acceptable for regular landfill disposal.

MWFA Contacts:

WTM:	Leon Borduin	(505) 667-3150
POC:	Tom Fewell	(208) 526-7789

Deficiency : Radionuclide Partitioning

TDRD Title : Plasma & DC Arc Electric Melters

TTP # CH23MW51

Task Task A-PHP Radioactive Bench-Scale Testing

97 Funding (K) 2,635

Scope Description

This activity focuses on demonstrating the Plasma Hearth Process (PHP) for treating mixed waste. A bench scale PHP system will gather and analyze data that will be used to evaluate the PHP approach to treating mixed waste. Detailed tests will be performed to determine the correlation between surrogates (e.g. cerium oxide) and radionuclide partitioning. This task has two general task areas. The first task covers project management, test planning and reporting, test operations, sampling and analysis of solid and liquid test products, test feed preparation and waste disposition, and engineering support. The second task covers non-intrusive monitoring and extractive sampling of the PHP offgas stream and development of a method to obtain samples during test runs.

Planned Activities

Planned activities under this TTP include:

Operating the PHP unit and all associated systems for a series of 16 to 24 tests during FY-97.

Development of a test plan and sampling and analyses requirements. The test plan will determine the distribution of actinides and toxic metals in the system, identify whether further surrogate work is credible for mimicking Pu and Am in plasma systems, provide for processing anomalies such as the effects of feeding large pieces into the system, and establishing an operating envelope that can be realistically supported in a larger scale system.

Program planning and control, subcontract administration, periodic reports and community interface through attendance at symposia, meetings, and project tours.

Design, construct, and operate a gas sampling and analysis system that can conduct sampling during operations.

Associated with this is the development of a technically sound gas sampling and analysis approach.

MWFA Contacts:

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TTP # HQ06MW31

Task Task A - Evaluation of Russian Technologies to Treat DOE Mixed Waste

97 Funding (K) 875

Scope Description

This project will identify, evaluate, and demonstrate technologies now available or under development in Russia that can directly meet MWFA needs. These technologies may represent new technology, modification of existing technology or equipment, or an opportunity to obtain data from the Russian scientific community that would be difficult or cost prohibitive to obtain in the US. Potential technologies will be evaluated against the 30 technology deficiencies. Emphasis will be placed on technologies or projects that fill gaps in the MWFA program, and efforts will be taken to prevent duplication of technology or effort.

Planned Activities

Potential FY-97 projects will be reviewed by a team consisting of the Russian Project Principal Investigator (PI), DOE-ID Program Manager, MWFA Waste Type Manager and Point of Contact, MWFA Technical Review Team representative(s), and other Technical Specialists as determined by the PI. Projects will be reviewed for technical quality, application to MWFA needs, and application to MWFA waste streams. Russian scientists will submit test plans for projects selected for funding in FY-97.

MWFA Contacts:

WTM: Leon Borduin (505) 667-3150

POC: Tom Fewell (208) 526-7789

Deficiency : Radionuclide Partitioning**TDRD Title : Plasma & DC Arc Electric Melters****TTP #** RL36MW51**Task** Task A-Graphite DC Arc Projects**97 Funding (K)** 2,725**Scope Description**

This task is intended to demonstrate a novel graphite electrode DC arc plasma furnace to treat DOE buried and other waste. This task will provide waste process ability data and contaminant fate data over a range of waste compositions and operating conditions. This data will support the evaluation of this thermal treatment technology as well as provide data applicable to evaluate and design other thermal treatment technologies. This task is a collaborative effort between PNNL, MIT and T&R Associates, and provides data required by SRS and the Advanced Mixed Waste Treatment Facility at the INEEL. Testing conducted will be conducted at the bench and engineering scale, on both radioactive and nonradioactive materials. Operating conditions for the furnace and the simulated waste composition will be similar to those of the recently completed bench-scale test series.

Planned Activities

A series of tests will be conducted during FY-97. Eighteen radioactive bench scale, 12 nonradioactive and 6 radioactive engineering scale tests are planned for FY-97.

MWFA Contacts:

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POC: Whitney St. Michel (208) 526-3206

TTP # SR16MW51**Task** DC Arc Melter Enhanced Capabilities**97 Funding (K)** 428**Scope Description**

Elevated migration of Pu-238 within a melter system, compared to Pu-239, is a potential concern in treatment of Pu-238 contaminated wastes. Studies shall focus on determination of the affect of small particle size Pu-238 partitioning in a high-temperature melter such as the DC arc melter. The first task under this TTP is to provide theoretical or experimental data showing that Pu-238 will partition/behave other than expected (other Pu isotopes or currently accepted surrogates).

If additional testing is warranted, based on the outcome of the first task, correlation studies using Pu-238 spiked wastes shall then be completed on a limited test matrix. Experiments shall also be conducted with small particle size cerium and Pu-239, in addition to the Pu-238 tests, for comparison purposes.

Planned Activities

Provide theoretical (or past experimental) data showing that Pu-238 will partition/behave other than expected.

Determine cause of enhanced migration and complete a limited test matrix, approved by the MWFA, to obtain data comparing Pu-238 migration with cerium and Pu-239 migration.

MWFA Contacts:

WTM: Cliff Thomas (803) 557-8080
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Deficiency : Trace Metal Removal

TDRD Title : Trace Metal Removal

TTP # OR16MW61

Task Task C-Demo of Ion Exchange Treatment for Mixed Waste Water

97 Funding (K)

340

Scope Description

This activity will perform treatability studies to demonstrate the capability of an electrochemical ion exchange process to cost-effectively treat waste waters at Oak Ridge National Laboratory (ORNL). Over 19,000 liters of mixed waste water are produced annually at ORNL. These waste waters contain radionuclides and metals, and are a byproduct of the waste water treatment process that uses ion exchange (IX) to remove radionuclides followed by regeneration of the IX resin using nitric acid. The proposed process, developed by AEA Technologies of the United Kingdom, performs electrochemical regeneration of the IX resin, which eliminates generation of the large volumes of mixed waste waters. This system has not been tested in the United States nor has it been demonstrated on mixed waste. This work scope includes installation of a small scale processing unit that will treat between 50,000 and 80,000 liters of mixed waste during this testing. Data developed will be used to perform a cost analysis of the process; however, estimates indicate that this system will provide a cost avoidance of \$665K per year. Based on demonstration results, a full scale system will be contracted to be built and installed by AEA at ORNL for an estimated \$2.5 M.

Planned Activities

MWFA Contacts:

WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

Deficiency : Fission Product Removal

TDRD Title : Fission Product Removal

TTP # OR16MW61

Task Task C-Demo of Ion Exchange Treatment for Mixed Waste Water

97 Funding (K) 340

Scope Description

This activity will perform treatability studies to demonstrate the capability of an electrochemical ion exchange process to cost-effectively treat waste waters at Oak Ridge National Laboratory (ORNL). Over 19,000 liters of mixed waste water are produced annually at ORNL. These waste waters contain radionuclides and metals, and are a byproduct of the waste water treatment process that uses ion exchange (IX) to remove radionuclides followed by regeneration of the IX resin using nitric acid. The proposed process, developed by AEA Technologies of the United Kingdom, performs electrochemical regeneration of the IX resin, which eliminates generation of the large volumes of mixed waste waters. This system has not been tested in the United States nor has it been demonstrated on mixed waste. This work scope includes installation of a small scale processing unit that will treat between 50,000 and 80,000 liters of mixed waste during this testing. Data developed will be used to perform a cost analysis of the process; however, estimates indicate that this system will provide a cost avoidance of \$665K per year. Based on demonstration results, a full scale system will be contracted to be built and installed by AEA at ORNL for an estimated \$2.5 M.

Planned Activities

MWFA Contacts:

WTM: Ron Nakaoka (505) 665-5971
POC: Jay Roach (208) 526-4974

Deficiency : Refractory Performance

TDRD Title : Plasma & DC Arc Electric Melters

TTP # CH23MW51

Task Task A-PHP Radioactive Bench-Scale Testing

97 Funding (K) 2,635

Scope Description This activity focuses on demonstrating the Plasma Hearth Process (PHP) for treating mixed waste. A bench scale PHP system will gather and analyze data that will be used to evaluate the PHP approach to treating mixed waste. Detailed tests will be performed to determine the correlation between surrogates (e.g. cerium oxide) and radionuclide partitioning. This task has two general task areas. The first task covers project management, test planning and reporting, test operations, sampling and analysis of solid and liquid test products, test feed preparation and waste disposition, and engineering support. The second task covers non-intrusive monitoring and extractive sampling of the PHP offgas stream and development of a method to obtain samples during test runs.

Planned Activities Planned activities under this TTP include:
Operating the PHP unit and all associated systems for a series of 16 to 24 tests during FY-97.
Development of a test plan and sampling and analyses requirements. The test plan will determine the distribution of actinides and toxic metals in the system, identify whether further surrogate work is credible for mimicking Pu and Am in plasma systems, provide for processing anomalies such as the effects of feeding large pieces into the system, and establishing an operating envelope that can be realistically supported in a larger scale system.
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Design, construct, and operate a gas sampling and analysis system that can conduct sampling during operations.
Associated with this is the development of a technically sound gas sampling and analysis approach.

MWFA Contacts: WTM: Cliff Thomas (803) 557-8080
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TTP # OR16MW41

Task Task A-TVS Demo Support

97 Funding (K) 1,400

Scope Description This task supports demonstration of the Oak Ridge Transportable Vitrification System (TVS) on mixed waste.

Planned Activities Activities covered under this guidance are:
On-site technical/engineering support from both OR and SRS personnel during the demonstration.
Analytical support needed to address issues related to development and demonstration of the TVS only.
Outstanding treatability and pilot study costs not covered by the \$400K previously provided by SR under last year's Memorandum of Understanding.

MWFA Contacts: WTM: Scott Anderson (303) 966-9645
POC: Vince Maio (208) 526-3696

Deficiency : Refractory Performance

TDRD Title : Plasma & DC Arc Electric Melters

TTP # RL36MW51

Task Task A-Graphite DC Arc Projects

97 Funding (K) 2,725

Scope Description This task is intended to demonstrate a novel graphite electrode DC arc plasma furnace to treat DOE buried and other waste. This task will provide waste process ability data and contaminant fate data over a range of waste compositions and operating conditions. This data will support the evaluation of this thermal treatment technology as well as provide data applicable to evaluate and design other thermal treatment technologies. This task is a collaborative effort between PNNL, MIT and T&R Associates, and provides data required by SRS and the Advanced Mixed Waste Treatment Facility at the INEEL. Testing conducted will be conducted at the bench and engineering scale, on both radioactive and nonradioactive materials. Operating conditions for the furnace and the simulated waste composition will be similar to those of the recently completed bench-scale test series.

Planned Activities A series of tests will be conducted during FY-97. Eighteen radioactive bench scale, 12 nonradioactive and 6 radioactive engineering scale tests are planned for FY-97.

MWFA Contacts:
WTM: Cliff Thomas (803) 557-8080
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Deficiency : Nitrate Destruction

TDRD Title : NOx Selective Catalytic Reduction

TTP # OK23MW35

Task Task A-Russian DENOX Catalyst

97 Funding (K) 100

Scope Description This work supports LLNL efforts to coordinate and provide technical support for testing inexpensive, environmentally benign catalysts for selective reduction of NOx with ammonia. The catalysts were developed at the Boreskov Institutes of Catalysis in Russia, and the testing will be performed at the WETO facility in Butte, Montana. These tests will compare these catalysts against a commercial selective catalytic reduction catalyst available in the West. This task also fund the management of the staff and work efforts at LLNL to ensure that the two technology projects are conducted as proposed, milestones are achieved, and reports are written and sent as required.

Planned Activities The DeNOx catalysts will be tested in a slip stream of the Mountain States Energy, Inc./Western Environmental Technology Office plasma arc offgas system. The catalysts will be compared for effectiveness with a commercial Western selective catalytic reduction catalyst. Initial testing will begin in early FY-97. Objectives will be to demonstrate the NOx concentrations in offgas streams can be reduced by a minimum of 95%, that ammonia slip can be reduced by a minimum of 75%, spent catalysts meet the requirements for disposal in a non-RCRA landfill, and NOx destruction efficiencies for concentrations of NOx less than 1000 ppm are determined.

MWFA Contacts: WTM: Leon Borduin (505) 667-3150
POC: Tom Fewell (208) 526-7789

Deficiency : Molten Product Decant

TDRD Title : Plasma & DC Arc Electric Melters

TTP # CH23MW51

Task Task A-PHP Radioactive Bench-Scale Testing

97 Funding (K) 2,635

Scope Description This activity focuses on demonstrating the Plasma Hearth Process (PHP) for treating mixed waste. A bench scale PHP system will gather and analyze data that will be used to evaluate the PHP approach to treating mixed waste. Detailed tests will be performed to determine the correlation between surrogates (e.g. cerium oxide) and radionuclide partitioning. This task has two general task areas. The first task covers project management, test planning and reporting, test operations, sampling and analysis of solid and liquid test products, test feed preparation and waste disposition, and engineering support. The second task covers non-intrusive monitoring and extractive sampling of the PHP offgas stream and development of a method to obtain samples during test runs.

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TTP # OR16MW41

Task Task A-TVS Demo Support

97 Funding (K) 1,400

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POC: Vince Maio (208) 526-3696

Deficiency : Molten Product Decant

TDRD Title : Plasma & DC Arc Electric Melters

TTP # RL36MW51

Task Task A-Graphite DC Arc Projects

97 Funding (K) 2,725

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