Department of Energy - Chicago Operations Office

Pit Disassembly and Conversion Facility

Waste Management Plan, Rev 1
Q-PRP-F-00001
June 30, 2005

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Integrated Engineering, Construction, and Management Solutions

Washington Group International
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Suite 100
Denver, CO 80237

Contract No. DE-AC02-99CH10903
Project No. 21124

U/NU
W.H. Roberts/PM Tech
June 29, 2005/161 pages

PIT DISASSEMBLY AND CONVERSION FACILITY

Waste Management Plan

APPROVALS

PIT DISASSEMBLY AND CONVERSION FACILITY	Q-PRP-F-00001
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SUMMARY OF CHANGES

Revision No. and Date	*Verified/Checked By and Date*	*Pages Affected by the Change*	*Reason for Change*
P1, 9/25/2001		Various	Initial Draft
P2, 9/3/2002		Various	Resolution of P1 comments, incorporate current design information
P2A, 2/28/2003		Various	Resolution of P2 comments, incorporate decommissioning and updated design information
A, 6/18/2003		Various	Updates to P2 comments, revised decommissioning, updated waste volumes, updated pollution prevention accomplishments
B, 12/12/2003		Various	Resolution of Rev A comments
0, 4/30/2004		Various	Resolution of Rev B comments
1, 6/30/2005	T. Satkowski, 6/30/2005	Various	Resolution of Rev 0 comments, incorporate current design information

EXECUTIVE SUMMARY

This Waste Management Plan provides a current compilation of anticipated waste types, estimated volumes, and proposed disposition pathways for wastes that will be generated during construction, operation, and decommissioning of the National Nuclear Security Administration's (NNSA's) Pit Disassembly and Conversion Facility (PDCF). The compiled data are based on design prior to 90% Title II. The plan addresses management of the following wastes, beginning when the waste is first generated and continuing through characterization, packaging, handling, and disposal:

- Solid forms of transuranic (TRU) waste, mixed TRU (MTRU) waste, and low-level waste (LLW)
- Liquid forms of high activity waste (HAW), mixed HAW (MHAW), mixed LLW (MLLW), and low activity waste (LAW)
- Solid and liquid forms of hazardous waste and nonhazardous waste

This plan also addresses control of air pollutant emissions and management of stormwater runoff.

The information presented in this plan will allow the appropriate reviewing officials at the Savannah River Site (SRS) and the specific recipients of the waste streams within the Westinghouse Savannah River Company (WSRC) to have direct involvement in waste handling and disposition decisions. This, in turn, will allow concurrence by all parties on the appropriate disposition of each PDCF waste stream.

Document Structure

This Waste Management Plan consists of (1) summary descriptions of the PDCF processes that involve plutonium and uranium, (2) a detailed discussion of anticipated waste types waste sources, and proposed disposition pathways, and (3) detailed waste management information, including estimated volumes by waste type and the applicable characterization requirements. Appendix A presents lists of the chemical and radiological constituents expected in PDCF process materials, waste streams, and laboratory chemicals; Appendix B contains the associated Waste Characterization Process Reports. Appendix C is classified and is appended as a separate document. Appendix D summarizes pertinent environmental requirements outlined in the PDCF *Facility Design Description* (FDD) and provides information to demonstrate compliance toward the waste management and environmental design requirements.

Relationship with Other Documents

This plan documents the waste handling and disposition decisions that have been made through the course of PDCF design. It provides a single source of information on the anticipated waste types, estimated waste volumes, and proposed disposition pathways, which will allow for a

greater level of consistency across all project documentation. The PDCF project document inputs include the following:

- FDD
- Government-Furnished Design (GFD) documentation
- State and federal regulations pertaining to waste management
- SRS *Site Treatment Plan*
- System Design Descriptions (SDDs)
- Process flow diagrams (PFDs) and mass balances
- PDCF waste stream calculation sets
- Air dispersion modeling
- Waste management study conducted in 2002
- Consistency reviews and comment resolution meetings with SRS personnel
- Technical direction provided by NNSA

NNSA Technical Direction

As PDCF design progressed, NNSA provided technical direction on certain waste management issues. These directives, which have been incorporated into the current FDD, are summarized as follows:

- In a letter dated April 23, 2002, NNSA identified the Waste Solidification Building (WSB), which is currently on hold, as the facility to receive the PDCF's liquid waste streams (NNSA 2002). The Analytical Laboratory, the Uranium Processing & Staging System, and the Product Canning System will generate liquid HAW/MHAW (11,700 gallons/year) and liquid MLLW (less than 0.5 gallon/year). As a proposed new facility, the WSB would represent infrastructure capability that would be available for the life of the PDCF.

- In a letter dated January 7, 2003, NNSA provided technical direction regarding removal of some analytical chemistry functions from the Analytical Laboratory System (NNSA 2003).

- In a letter dated March 18, 2004, NNSA provided technical direction to send all liquid wastewater from the PDCF to the WSB (NNSA 2004). This was accentuated with an Interface/Issue Control Form (ICF-02-017, Rev 0) directing that laboratory liquids, LAW, condensates, and blowdown be piped to WSB for disposition. In accordance with NNSA direction, nearly 12,000 gallons of HAW and 24,000 gallons of LAW will be piped to the WSB, while approximately 3.6 million gallons/year of liquid nonhazardous waste (blowdown and condensates) will be collected, transferred to a shared connection with the WSB, and then discharged through a permitted outfall. This direction does not pertain to liquid sanitary waste, which will be sent to the existing SRS sanitary waste treatment system. While the current PDCF drawings follow this direction, the FDD states

that LAW is to be piped to the Effluent Treatment Facility (ETF). This conflict will need to be resolved based on decisions regarding the future of the WSB. This plan recognizes that LAW could be piped to the ETF or WSB. Either facility provides an acceptable disposition.

Waste Streams and Disposition

The waste streams anticipated from PDCF processes and support activities are generally well-defined because of their expected similarity to wastes generated at other sites within the weapons complex. The anticipated waste types, characterization, regulatory classification, required handling, and estimated volumes for PDCF wastes were initially identified and quantified from studies performed by Los Alamos National Laboratory (LANL) and from operating experience with the Advanced Recovery and Integrated Extraction System (ARIES) pilot facility at LANL. This information was then modified on the basis of operational experience at SRS, engineering judgment, design constraints, and technical direction from NNSA.

In addition to the regulatory and SRS document inputs listed above, the following assumptions are reflected in the waste management approach presented in this plan:

- All PDCF waste streams can be managed in accordance with the WSRC 1S *SRS WAC Manual*.
- The PDCF will not generate any "orphan" waste streams (waste without an available treatment and/or disposal pathway).
- TRU waste generated at PDCF will be contact-handled waste.
- Thirty percent of open glovebox maintenance waste (e.g., gloves, swipes, and rags) will assay as LLW.
- All lead-lined gloves (including those that assay as LLW) will be managed as MTRU waste.
- Beryllium-laden waste will be packaged to comply with the Waste Isolation Pilot Plant (WIPP) waste acceptance criteria (WAC), Rev. 3 or most current version, which limit the percentage by weight and concentration of beryllium in drums and Transuranic Package Transporter-II (TRUPACT-II) casks.
- Decommissioning will reflect consideration for removal and reuse of equipment after "cleaning" but no general demolition of structures. Closure of the Sand Filter will consist of "cap and cover" of filter media. The only waste estimate associated with decommissioning is solid LLW from closure of the Sand Filter; no estimates are presented for wastes that would be generated from decontamination or demolition activities.
- Air pollutant emissions and impacts to air quality are anticipated to be well below all guides and regulatory standards.

Table ES-1 summarizes the anticipated PDCF waste types, estimated volumes, and proposed disposition pathways. The information is based on current design and reflects estimated volumes for the life cycle of the facility, listed separately for operations, construction, and decommissioning. The estimates will be refined as design progresses.

Table ES-1. Anticipated Waste Types, Estimated Volumes, and Proposed Disposition

Waste Type	Estimated Volume[a]	Proposed Disposition
Generated during operations		
Solid TRU waste	2,992 cubic feet (ft^3)/year	Transferred to WSB, shipped to WIPP
Solid MTRU waste	1,978 ft^3/year	
Concentrated liquid waste[b]	20.6 gallons/year	Dried and calcined in Analytical Laboratory glovebox, resulting solids handled as TRU waste (transferred to WSB, shipped to WIPP)
Liquid HAW (includes MHAW)	11,700 gallons/year	Collected in holding tanks, transferred to WSB for solidification, shipped to WIPP
Solid LLW	30,975 ft^3/year	Taken to SRS E-Area for onsite disposal
Liquid LAW	24,041 gallons/year	Collected in holding tanks, sampled, pumped to ETF or WSB
	26,100 gallons[c] of wastewater per fire event (not included in estimated annual volume)	
Liquid MLLW	Less than 0.5 gallon/year	Managed as liquid HAW (collected in holding tank, transferred to WSB for solidification, shipped to WIPP)
Liquid and solid hazardous waste	3.5 ft^3/year	Stored at Hazardous Waste Storage Facility (HWSF) pending shipment offsite for treatment and disposal
Solid nonhazardous waste	63,000 ft^3/year	Sent to Three Rivers Landfill or recycled
Liquid nonhazardous waste	8,234,829 gallons/year	Blowdown (1,594,950 gallons/year) and condensates (1,955,982 gallons/year) – collected, pumped to shared connection with WSB, then discharged through permitted outfall Sanitary wastewater (4,680,000 gallons/year) – sent to SRS sanitary waste treatment system Wastewater from fire suppression system testing (1,440 gallons/year[d]) – discharged on grade adjacent to Pu Processing Building Washdown water from truck bay (2,400 gallons/year) – collected in underground tank, trucked to permitted outfall for discharge Oils and hydraulic fluids (57 gallons/year) – stored in appropriate containers for offsite recycling by subcontractor

Table ES-1. Anticipated Waste Types, Estimated Volumes, and Proposed Disposition (cont)

Waste Type	Estimated Volume[a]	Proposed Disposition
Generated during construction (60-month schedule)		
Liquid and solid hazardous waste	176 ft^3/year[e]	Stored at HWSF pending shipment offsite for treatment and disposal
Solid nonhazardous waste	4,200 ft^3/year	Sent to Three Rivers Landfill or recycled
Liquid nonhazardous waste	400,000 gallons/year	Sent to SRS sanitary waste treatment system or taken offsite in portable toilets
Generated during decommissioning[f]		
LLW	513,000 ft^3	Sand filter media capped, covered, and abandoned in place
Stormwater		
Stormwater[g]	North Basin – 9.9 acre-feet	Collected in dedicated stormwater retention basins, discharged through permitted outfall
	Southeast Basin – 6.4 acre-feet	

a Waste volume estimates (excluding decommissioning waste) derived from Calculation Set Nos. X-CLC-F-00270 (WGI 2001b), X-CLC-F-00271 (WGI 2003a), X-CLC-F-00272 (WGI 2003b), X-CLC-F-00304 (WGI 2003c), X-CLC-F-00309 (WGI 2002b), X-CLC-F-00316 (WGI 2005a), X-CLC-F-00317 (WGI 2005m), X-CLC-F-00330 (WGI 2003d), and X-CLC-F-00331 (WGI 2005n).

b Concentrated liquid waste is radioactive liquid waste with greater than 1 gram per liter (g/l) plutonium and less than 0.65 weight percent U-235.

c Estimated volume of wastewater per fire event based on total discharge from five sprinkler heads for 30 minutes plus a water stream from the fire department hose for 30 minutes.

d Estimated volume of wastewater from fire suppression system testing could increase to approximately 2,000 gallons/year if problems are detected during tests.

e Estimated volume of hazardous waste generated during construction based on the following: (1) generation rate will be two 55-gallon drums per month during 60-month construction period, (2) waste will consist of spent cleaning solutions, spilled antifreeze and fuels, non-recyclable chemicals, and cleaning materials, and (3) waste will not include excavated soil that is characterized as hazardous.

f Decommissioning waste estimate based on assumptions documented in *PDCF Life Cycle Cost Estimate* (WGI 2004a) and *PDCF HEPA Filter/Sand Alternatives Analysis* (WGI 2001a).

g Estimated volumes for stormwater represent total discharge volumes for a 100-year storm (DCS01-WEP-DS-CAL-00070) [WGI 2003e]; C-CLC-F-00536 [WGI 2005b]).

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LIST OF ACRONYMS/ABBREVIATIONS

ARIES	Advanced Recovery and Integrated Extraction System
CFR	Code of Federal Regulations
cm^2	square centimeter(s)
D&D	decontamination and decommissioning
DI	deionized
DMO	Direct Metal Oxidation
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
dpm	disintegrations per minute
EPA	U.S. Environmental Protection Agency
ETF	Effluent Treatment Facility
FDD	Facility Design Description
FGE	fissile gram equivalent
FMD	fissile material detector
ft^3	cubic foot (feet)
g/l	gram(s) per liter
GFD	Government-Furnished Design
HAW	high activity waste
HEPA	high-efficiency particulate air
HEU	highly enriched uranium
HVAC	heating, ventilation, and air conditioning
HWSF	Hazardous Waste Storage Facility
I&C	instrumentation and controls
ISCST3	Industrial Source Complex, Short-Term, Version 3
kg	kilogram(s)
LANL	Los Alamos National Laboratory
LAW	low activity waste
LCD	liquid crystal display
LLW	low-level waste
LOI	loss-on-ignition
$\mu g/m^3$	micrograms per cubic meter
MC&A	material control and accountability
MFFF	Mixed Oxide Fuel Fabrication Facility
mg/l	milligrams per liter
MgO	magnesium oxide
MHAW	mixed high activity waste
MLLW	mixed low-level waste
mrem	millirem
MTRU	mixed transuranic (waste)
nCi/g	nanocuries per gram
NDA	non-destructive assay
NESHAPs	National Emissions Standards for Hazardous Air Pollutants

LIST OF ACRONYMS/ABBREVIATIONS (cont)

NIST	National Institute of Standards and Technology
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
PCB	polychlorinated biphenyl
PDCF	Pit Disassembly and Conversion Facility
PE-Ci	plutonium equivalent-curies
PFD	process flow diagram
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PSD	Prevention of Significant Deterioration
PVA	polyvinyl alcohol
PVC	polyvinyl chloride
RBA	radiological buffer area
RCRA	Resource Conservation and Recovery Act
RFI	Request for Information
SCDHEC	South Carolina Department of Health and Environmental Control
SDD	System Design Description
SNM	special nuclear material
SRL	Special Recovery Line
SRS	Savannah River Site
STP	standard temperature and pressure
SWD	Solid Waste Division
TID	tamper-indicating device
TMU	total measurement uncertainty
TRAMPAC	TRUPACT-II Authorized Methods for Payload Control
TRU	transuranic
TRUPACT-II	Transuranic Package Transporter-II
TSD	treatment, storage, and disposal
TSS	total suspended solids
VOC	volatile organic compound
WAC	waste acceptance criteria
WGI	Washington Group International
WIPP	Waste Isolation Pilot Plant
WSB	Waste Solidification Building
WSPF	Waste Stream Profile Form
WSRC	Westinghouse Savannah River Company
WWIS	WIPP Waste Information System

1.0 INTRODUCTION

The mission of the National Nuclear Security Administration's (NNSA's) Pit Disassembly and Conversion Facility (PDCF) at the Savannah River Site (SRS) is to (1) receive nuclear weapon components containing plutonium and highly enriched uranium (HEU) in the form of pits and other plutonium metals, (2) separate and convert the plutonium metal to plutonium oxide suitable for long-term storage, ship the auxiliary HEU oxide and sludge to another facility in the weapons complex, and ship HEU to Oak Ridge National Laboratory, and (3) remove residual classified attributes from (i.e., sanitize) the converted plutonium oxide. The PDCF will also declassify non-plutonium components and remove plutonium contamination from other components.

The PDCF will be designed for 7.5 years of operation, although the facility will have a 20-year design life. The PDCF will be capable of processing 3.5 metric tons of plutonium metal in a given year; the total volume expected to be processed during the 7.5 years of operation is 25 metric tons. The 20-year design life will provide margin for program delays or increases in the surplus materials destined for PDCF. The 7.5-year operating life is a goal that may be extended by NNSA.

The PDCF will include the Pu Processing Building-236000F, the Mechanical and Support Equipment Building-236001F, the Administrative Building-704069F, the security portal structure-701027F, a Fan House-292006F, a Sand Filter Structure-292005F, and an exhaust stack-291005F. The PDCF will be located at F Area at SRS, which is approximately 50 acres. Figures 1-1 through 1-3 show the site location, the site plan, and an aerial view of the site.

During construction of the PDCF, hazardous and nonhazardous waste streams will be generated. During operation and decommissioning of the PDCF, radioactive, hazardous, and nonhazardous waste streams will be generated. Operational experience and design efforts indicate that the PDCF will generate the following waste types:

- Solid forms of transuranic (TRU) waste, mixed TRU (MTRU) waste, and low-level waste (LLW)
- Liquid forms of high activity waste (HAW), mixed HAW (MHAW), mixed LLW (MLLW), and low activity waste (LAW)
- Solid and liquid forms of hazardous waste and nonhazardous waste

The PDCF will also generate air pollutant emissions and stormwater runoff during construction, operations, and decommissioning.

Through the integrated efforts of the PDCF design team and appropriate waste management officials at SRS, disposal pathways have been identified for all anticipated PDCF waste streams. In addition, design efforts were influenced to accommodate activities to comply with Westinghouse Savannah River Company (WSRC) 1S *Savannah River Site (SRS) Waste Acceptance Criteria (WAC) Manual* (WSRC 2001, WSRC 2002a, 2002b, 2002f, and 2002g) and WSRC 3Q *Environmental Compliance Manual* (WSRC 2002d).

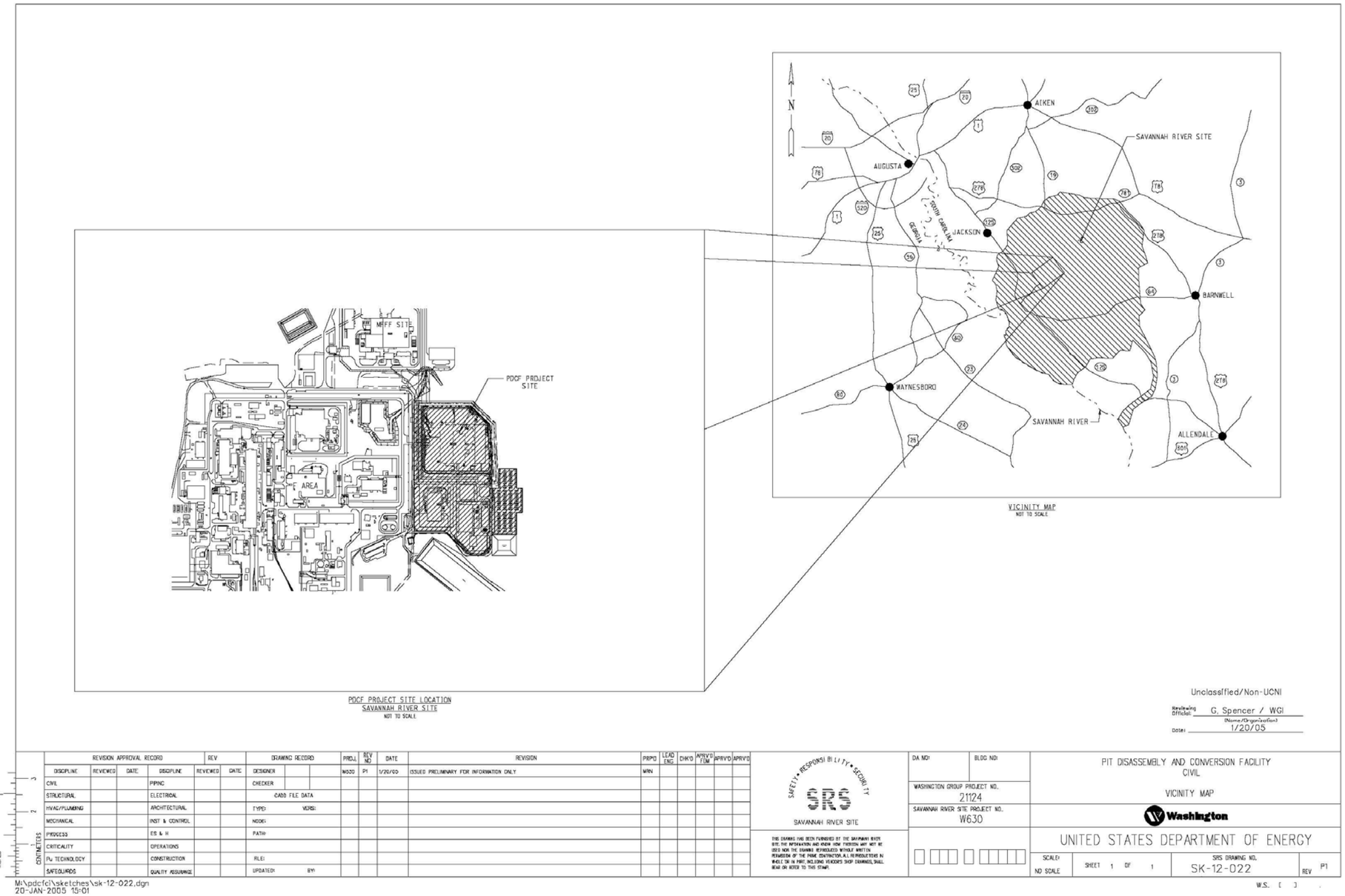

Figure 1-1. PDCF Project Site Location, Savannah River Site

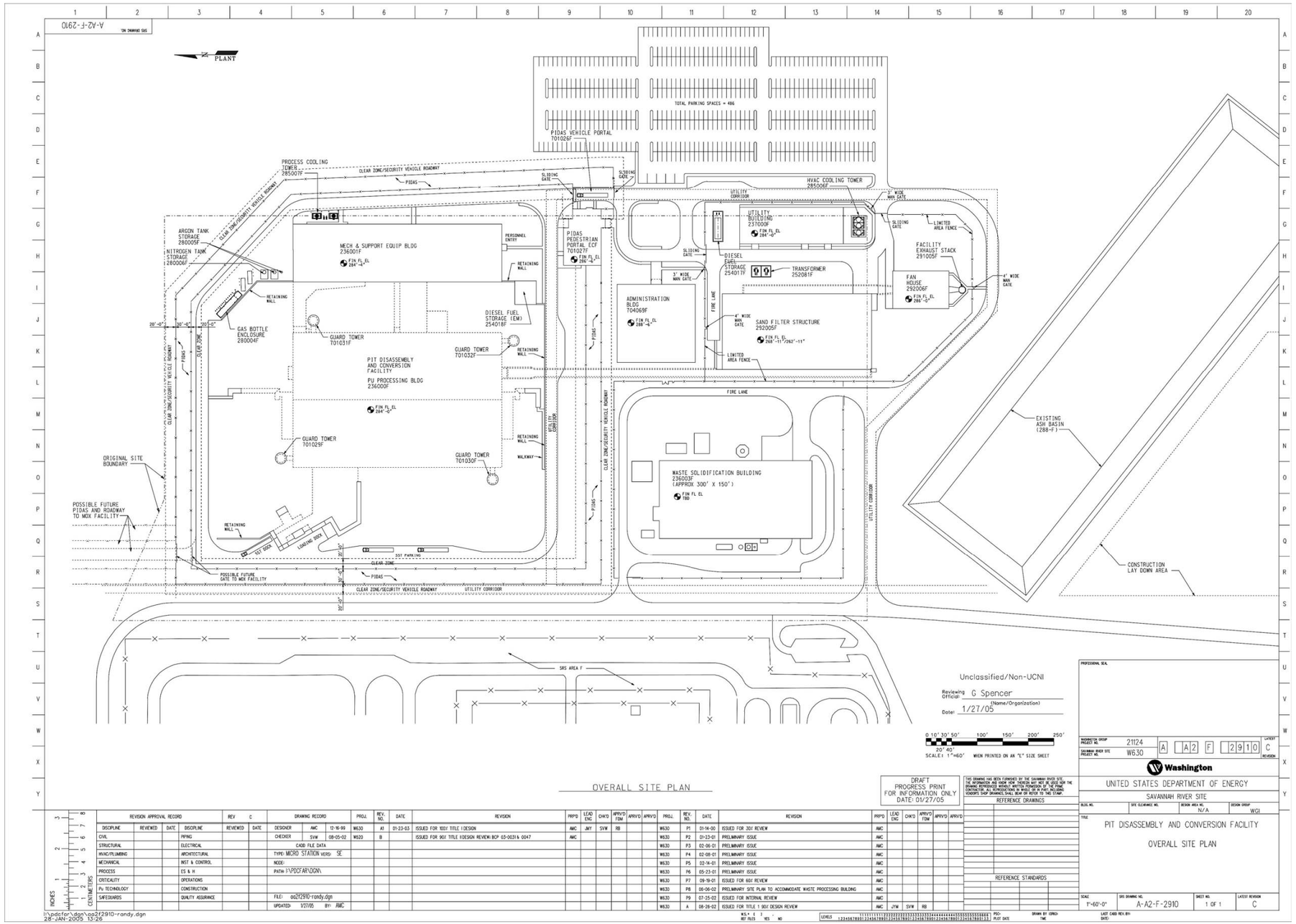

Figure 1-2. PDCF Site Layout, Savannah River Site

Figure 1-3. Aerial View of PDCF (Artist's Rendition), Savannah River Site

Waste streams anticipated from PDCF processes and support activities are generally well-defined because of their expected similarity to wastes generated at other sites within the weapons complex. The anticipated waste types, characterization, regulatory classification, required handling, and estimated volumes for PDCF wastes were initially identified and quantified from studies performed by Los Alamos National Laboratory (LANL) and from operating experience with the Advanced Recovery and Integrated Extraction System (ARIES) pilot facility at LANL. This information was then modified on the basis of operational experience at SRS, engineering judgment, design constraints, and technical direction from NNSA. These estimates will be refined as design progresses.

Based on current design, the following waste volumes have been estimated:

- Solid TRU and solid MTRU – 2,992 cubic feet per year (ft^3/year) of solid TRU waste and 1,978 ft^3/year of solid MTRU waste, which will be transferred to the Waste Solidification Building (WSB) prior to shipment to the Waste Isolation Pilot Plant (WIPP).

- Concentrated liquid waste – 20.6 gallons/year, which will be dried and calcined in the Analytical Laboratory glovebox, with the resulting solids handled as TRU waste.

- Liquid HAW (includes MHAW) – 11,700 gallons/year, which will be collected in holding tanks, transferred to the WSB for solidification, then shipped to WIPP.

- Solid LLW – 30,975 ft^3/year, which will be taken to the SRS E-Area for onsite disposal.

- Liquid LAW (estimated annual volume) – 24,041 gallons/year, which will be collected in holding tanks, sampled, and pumped to the Effluent Treatment Facility (ETF) or WSB.

- Liquid LAW from a fire event – 26,100 gallons/event (not included in the annual estimate for liquid LAW), which will drain to the firewater containment basin in the lower level of the PDCF and be held there for sampling, then transferred to liquid LAW tanks and the ETF (or WSB), or to liquid HAW tanks and the WSB.

- Liquid MLLW – Less than 0.5 gallon/year, which will be managed as liquid HAW (collected in a holding tank, transferred to the WSB for solidification, and shipped to WIPP.

- Liquid and solid hazardous waste from operations – 3.5 ft^3/year, which will be stored at the Hazardous Waste Storage Facility (HWSF) pending shipment offsite for treatment and disposal.

- Solid nonhazardous waste from operations – 63,000 ft^3/year, which will be sent to the Three Rivers Landfill or recycled.

- Liquid nonhazardous waste from operations – 8,234,829 gallons/year of liquid nonhazardous waste, consisting of the following:

    - Blowdown – 1,594,950 gallons/year of blowdown (523,750 gallons/year from the Process Cooling Tower; 1,070,000 gallons/year from the Heating, Ventilation, and Air Conditioning (HVAC) Cooling Tower; and 1,200 gallons/year from the Process Chilled Water system). Based on technical direction from NNSA (NNSA 2004), blowdown will be collected and pumped to a shared connection with the WSB, then discharged through a permitted outfall at Upper Three Runs Creek.

    - Condensates – 1,955,982 gallons/year of condensates from air handling units, air compressors, and a heat exchanger (1,900,000 gallons/year from HVAC; 41,876 gallons/year from Breathing Air; and 14,106 gallons/year from Plant and Instrument Air). Based on technical direction from NNSA, condensates will be collected and pumped to a shared connection with the WSB, then discharged through a permitted outfall at Upper Three Runs Creek.

    - Sanitary wastewater – 4,680,000 gallons/year of sanitary wastewater, which will be sent to the existing SRS sanitary waste treatment system.

    - Wastewater from fire suppression system testing – 1,440 gallons/year of wastewater generated from fire suppression system testing, which will be discharged on grade adjacent to the Pu Processing Building.

    - Washdown water from truck bay – 2,400 gallons/year of washdown water from the truck bay, which will be collected in an underground tank, pumped

approximately once per month to a transport truck, and discharged through a permitted outfall.

- Oils and hydraulic fluids – 57 gallons/year of oils and hydraulic fluids, which will be stored temporarily in appropriate containers for offsite recycling by a subcontractor.

- Liquid and solid hazardous waste from construction – 176 ft^3/year, which will be stored at the HWSF pending shipment offsite for treatment and disposal.

- Solid nonhazardous waste – 4,200 ft^3/year, which will be sent to the Three Rivers Landfill or recycled.

- Liquid nonhazardous waste from construction – 400,000 gallons/year (based on a 60-month schedule), which will be sent to the existing SRS sanitary waste treatment system or taken offsite in portable toilets.

- Decommissioning waste – 513,000 ft^3 of LLW (estimated for total project, not annual volume), consisting of Sand Filter media that will be capped, covered, and abandoned in place.

Based on current design, the following discharge volumes have been estimated for the dedicated stormwater retention basins that will collect runoff associated with the PDCF:

- North Basin – sized to provide a total discharge volume of 9.9 acre-feet of water (for a 100-year storm), which will be discharged through a permitted outfall.

- Southeast Basin – sized to provide a total discharge volume of 6.4 acre-feet of water (for a 100-year storm), which will be discharged through a permitted outfall.

The waste management approach presented in this plan incorporates a number of design inputs (e.g., the PDCF *Facility Design Description* [FDD], System Design Descriptions [SDDs], SRS *Site Treatment Plan*, NNSA technical direction) as well as assumptions that were incorporated as design progressed. These assumptions include the following:

- All PDCF waste streams can be managed in accordance with the WSRC 1S *SRS WAC Manual*.

- The PDCF will not generate any "orphan" waste streams (waste without an available treatment and/or disposal pathway).

- TRU waste generated at PDCF will be contact-handled waste.

- Thirty percent of open glovebox maintenance waste (e.g., gloves, swipes, and rags) will assay as LLW.

- In accordance with the SRS *Site Treatment Plan*, all lead-lined gloves (including those that assay as LLW) will be managed as MTRU waste.

- Beryllium-laden waste will be packaged to comply with current WIPP waste acceptance criteria (WAC), which limit the percentage by weight and concentration of beryllium in drums and Transuranic Package Transporter-II (TRUPACT-II) casks.

- Decommissioning will reflect consideration for removal and reuse of equipment after "cleaning" but no general demolition of structures. Closure of the Sand Filter will consist of "cap and cover" of filter media. The only waste estimate associated with decommissioning is solid LLW from closure of the Sand Filter; no estimates are presented for wastes that would be generated from decontamination or demolition activities

- Air pollutant emissions and impacts to air quality will be well below all guides and regulatory standards.

2.0 SCOPE

This Waste Management Plan provides a current compilation of information on the anticipated waste types and estimated volumes that will be generated during construction, operation, and decommissioning of the PDCF. It also presents the proposed disposition pathways, consistent with U.S. Department of Energy (DOE) Order 435.1 (DOE 2001a). DOE Order 435.1 was developed and implemented to provide specific requirements to adequately address radioactive waste management and disposal practices occurring within weapons complex facilities, with the overall objective of minimizing impacts to workers, the public, and the environment. The scope of this plan also includes management of air pollutant emissions and stormwater.

TRU waste generated at PDCF will be contact-handled waste. The term "contact-handled TRU waste," as defined in the WIPP WAC (DOE 2005) (or most current version) and the WSRC 1S *SRS WAC Manual* in Section 3.06 (WSRC 2001), means TRU waste with a surface dose rate not greater than 200 millirem (mrem) per hour. Remote-handled waste, as defined in the 1S *SRS WAC Manual* Section 3.06, with a surface dose rate of 200 mrem per hour or greater, will not be generated at the PDCF and thus is not addressed in this plan.

Certain types of waste will not be generated from PDCF construction, operation, and decommissioning. Spent nuclear fuel as defined in Section 2(23) of the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101(23)) and high-level radioactive waste as defined in Section 2(12) of the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101(12)) will not be generated by the PDCF, and thus are not evaluated in this report.

3.0 SYSTEM DESCRIPTIONS AND INTERACTIONS

As part of PDCF design, the facility's processing, handling, and support activities were divided among 46 engineered systems. Ten of those systems represent the facility's primary plutonium and uranium processing and handling activities: Pit Disassembly, Special Recovery Line (SRL), Plutonium Conversion, Oxide Product Handling, Uranium Processing & Staging, Product Canning, Sanitization, Analytical Laboratory, Waste Management, and Plutonium Separation. Summary descriptions of the 10 primary systems and their anticipated wastes are provided in Section 3.1, and system interactions are summarized in Section 3.2. Detailed information on each of the 46 PDCF systems can be found in the PDCF SDDs.

3.1 SYSTEM DESCRIPTIONS

Sections 3.1.1 through 3.1.10 provide summary descriptions of the PDCF's 10 primary plutonium and uranium systems and the anticipated wastes that will be generated from each system. The information presented in this section was taken from the SDDs (WGI 2005c through 2005l) and the Government-Furnished Design (GFD) documents (LANL 2002a, LANL 2002b, LANL 2003).

3.1.1 Pit Disassembly System

The Pit Disassembly System will disassemble pits received in containment vessels, sample pits, cut and seal pit stems, transfer pits, stage in pits and 3013 cans, prepare and cut uncontaminated (by tritium) pits and 3013 cans, provide lag storage of uncontaminated pits and 3013 cans, bisect and disassemble pits, and open welded cans containing plutonium metal or oxide. The special nuclear material (SNM) pit pieces will be size-reduced, and some will be loaded into transfer containers for follow-on processing in Direct Metal Oxidation (DMO) furnaces. Other components will be loaded in transfer containers for further processing in the Plutonium Separation System, Uranium Processing & Staging System, or Sanitization System. Pits that are contaminated with tritium will be disassembled in the SRL System.

The wastes anticipated from the Pit Disassembly System include high-efficiency particulate air (HEPA) filters (304 stainless steel and urethane, some of which may be contaminated with beryllium), lead-lined gloves; rags (cellulose, cotton, and potentially nylon), swipes (cellulose), light metal/tools (stainless steel, carbon steel, copper, aluminum, and carbides), plastics (polyvinyl chloride [PVC] and polyethylene), and used personal protective equipment (PPE).

3.1.2 SRL System

The SRL System will bisect and disassemble pits that are contaminated with tritium and will decontaminate the pit pieces to remove the tritium. The primary feed material will be tritium-contaminated pits received on shuttle carts from containment vessel unpackaging. The primary products will be plutonium, HEU, tritium gas (which will be captured in the SRL gas extraction system), and non-SNM pit pieces. The module will also generate crucible waste. The SRL System was designed as a backup to the Pit Disassembly System and will therefore inherit all of that module's missions except for the processing of cans containing plutonium metal or oxide.

The wastes anticipated from the SRL System include HEPA filters (304 stainless steel and urethane, some of which may contain beryllium), lead-lined gloves, rags (cellulose, cotton, and potentially nylon), swipes (cellulose), light metal/tools (stainless steel, carbon steel, copper, aluminum, and carbides), getter beds/molecular sieves (stainless steel, zeolite), plastics (PVC and polyethylene), crucibles (magnesium oxide [MgO]), and used PPE. Liquid scintillation cocktail waste generated from tritium swipes will be transferred to the Analytical Laboratory for disposal with other laboratory liquid waste.

3.1.3 Plutonium Conversion System

The Plutonium Conversion System will receive material from Pit Disassembly, SRL, Plutonium Separation, and the Main Vault (failed convenience cans). The Plutonium Conversion System will also include the Plutonium DMO and Auxiliary HEU DMO process lines. Plutonium metal will be converted to oxide in DMO furnaces. In the Auxiliary HEU DMO furnace, the plutonium metal from Plutonium Separation will be inside a MgO crucible. These furnaces will be identical to the DMO furnaces used in the Uranium Processing & Staging System. The resulting products will be subsequently processed in downstream blending and canning operations. Feed materials will include plutonium pucks, plutonium pucks within MgO crucibles, plutonium pieces, and convenience cans containing plutonium oxide.

The wastes anticipated from the Plutonium Conversion System include HEPA filters (304 stainless steel and urethane, some of which may contain beryllium), lead-lined gloves, rags (cellulose, cotton, and potentially nylon), crucibles (MgO), swipes (cellulose), light metal/tools (stainless steel, carbon steel, copper, and aluminum), plastics (PVC and polyethylene), and used PPE.

3.1.4 Oxide Product Handling System

The Oxide Product Handling System will receive milk bottles containing calcined plutonium oxide from the Plutonium Conversion System via the Interim Storage System. Inside the Oxide Product Handling System, the plutonium oxide will be milled and blended to meet sanitization requirements and Mixed Oxide Fuel Fabrication Facility (MFFF) specifications. The blended product will be loaded into convenience cans and sent to the Product Canning System to be sealed in approved inner and outer 3013 containers.

The wastes anticipated from the Oxide Product Handling System include HEPA filters (304 stainless steel and urethane, some of which may contain beryllium), lead-lined gloves, rags (cellulose, cotton, and potentially nylon), swipes (cellulose), failed oxide storage cans, porcelain, light metal/tools (stainless steel, carbon steel, copper, and aluminum), plastics (PVC, Viton, and low/high density polyethylene), and used PPE.

3.1.5 Uranium Processing & Staging System

The Uranium Processing & Staging System will process main HEU from Pit Disassembly and SRL systems. Main HEU is uranium material that can be successfully electrolytically decontaminated to become HEU product. The Uranium Processing & Staging System will also include the Auxiliary Oxide Handling process line. The auxiliary uranium mill and blender within the Auxiliary Oxide Handling process line will be physically retained in design space as

insurance in the event that future testing or operation indicates the need for restoring the auxiliary uranium processing line. Auxiliary HEU is uranium material that is contaminated with plutonium at levels that do not allow for effective decontamination. There will be three separate processing modules for main HEU: electrolytic decontamination (including the Fluid Supply System), oxidation, and oxide product handling. For auxiliary HEU, oxide product handling will be the only processing module.

The oxidation and oxide product handling modules for main HEU and auxiliary HEU will be very similar to the DMO and Oxide Product Handling modules for plutonium, with two exceptions: (1) no loss-on-ignition (LOI) tests will be performed on HEU oxide and (2) the main HEU DMOs are not required to calcine the oxide. As with plutonium oxide, the auxiliary HEU oxide will be packaged into 3013 containers in the Product Canning System. The main HEU oxide, however, will be packaged into an HEU oxide can (primary container) and then into an HEU oxide outer container (secondary container) for storage.

The wastes anticipated from the Uranium Processing & Staging System include liquid HAW, HEPA filters (304 stainless steel and urethane, some of which may contain beryllium), lead-lined gloves, dewatering pots (stainless steel), failed oxide storage cans dried solids, rags (cellulose, cotton, and potentially nylon), swipes (cellulose), light metal/tools (stainless steel, carbon steel, copper, and aluminum), plastics (PVC, Viton, and low/high-density polyethylene), and used PPE. HEU decontamination sludge and associated supernatant will be dried in a dewatering pot within the HEU fluids glovebox, and the dewatering pot and dried solids will be handled as TRU waste. There is potential for releases of nitrogen dioxides and/or sulfur dioxides during the drying process.

3.1.6 Product Canning System

The Product Canning System will consist of inner and outer canning modules. The objective of the Product Canning System will be to seal-weld convenience cans containing plutonium oxide and auxiliary HEU inside inner and outer containers that meet the DOE 3013-2000 Standard requirement (DOE 2000b). The 3013-2000 Standard provides criteria for long-term storage of plutonium-bearing oxides in NNSA facilities. Both the inner and outer container welds must be leak-tested at the time of closure. In addition, the inner canning module will electrolytically decontaminate exposed surfaces of the inner 3013 containers. The resulting sludge and supernatant from decontamination will be dried within the inner canning fluids glovebox. The exterior surface of inner 3013 containers must be contamination-free, as defined in Appendix D to 10 Code of Federal Regulations (CFR) 835, before exiting the inner canning module to outer canning. For criticality reasons, only one inner 3013 container can be processed through the inner canning module and only one outer 3013 container can be processed in the outer canning module at any one time.

After inner canning, the helium leak-tested inner can will be transported out of the enclosure to the outer canning equipment via an automated robot. As with inner canning, the outer canning system will be fully automated. Inside the outer canning system, the inner can will be placed into the outer 3013 container, the lid will be seal-welded, and the outer can will be transported via turntable to the radiological testing area to confirm that it is free of contamination. The outer can will then be transported to the helium leak check station. If the outer can passes the helium leak

test, the contamination-free 3013 container will be transported via a hoist and transfer passage to Product Non-Destructive Assay (NDA).

The wastes anticipated from the Product Canning System include liquid HAW, HEPA filters (304 stainless steel and urethane), lead-lined gloves, rags (cellulose, cotton, and potentially nylon), swipes (cellulose), light metal/tools (stainless steel, carbon steel, copper, and aluminum), plastics (PVC, Viton, and low/high-density polyethylene), solids from decontamination (iron, chromium, nickel, and sulfates), and used PPE. There is potential for releases of nitrogen dioxides and/or sulfur dioxides during the drying process.

3.1.7 Sanitization System

The Sanitization System will melt non-SNM components to sanitize them in preparation for disposal. Periodically, a batch of non-SNM components will be transferred to the Sanitization glovebox from the Pit Disassembly, SRL, or Plutonium Separation (Hydride/Dehydride) gloveboxes (via airlocks and an enclosed conveyor system). The system will also sanitize small quantities of tooling (e.g., pit chucks) and chips from the lathing operations in Pit Disassembly and SRL. Inside the Sanitization glovebox, the pieces will be removed from the container and segregated by material type into crucibles. The metal will be converted to kilogram (kg) quantities of metal ingots. The Sanitization System will have the capability to bag out waste ingots and crucibles directly into 55-gallon waste drums.

The wastes anticipated from the Sanitization System include various metals in ingot form (stainless steel, aluminum, copper, carbon steel, carbide, beryllium, and depleted uranium), HEPA filters (304 stainless steel and urethane, some of which may contain beryllium), lead-lined gloves, rags (cellulose, cotton, and potentially nylon), crucibles (alumina and fused-silica), and used PPE.

3.1.8 Analytical Laboratory System

The Analytical Laboratory System will receive and analyze product, waste, and industrial hygiene samples from PDCF processing and support systems. Sources of samples will include the Uranium Processing & Staging System (main HEU line and auxiliary HEU Oxide Handling line), SRL, and the Oxide Product Handling System. The laboratory will analyze plutonium oxide, HEU oxide, HEU smears, tritium swipes, stack monitoring samples, electrolytic decontamination sludge, out-of-spec materials, auxiliary HEU oxide, waste characterization samples, beryllium smears, and miscellaneous water samples (e.g., samples from the Limited Volume Cooling Water and Process Chilled Water Systems). The wastes anticipated from the Analytical Laboratory System include liquid HAW, concentrated liquid waste (radioactive liquid waste with greater than 1 gram per liter [g/l] plutonium and greater than 0.65 weight percent U-235), HEPA filters (304 stainless steel and urethane, some of which may contain beryllium), rags (cellulose, cotton, and potentially nylon), swipes (cellulose), plastics (PVC, Viton, and low/high-density polyethylene), and used PPE. Residuals of oxide samples will be returned to the point of origin via the Sample Transfer System. Concentrated liquid waste will be dried and calcined in the Analytical Laboratory glovebox, and the resulting solids will be handled as TRU waste.

3.1.9 Waste Management System

The Waste Management System will be involved in all activities related to the management and disposition of PDCF wastes, which will include TRU, MTRU, HAW, LAW, LLW, MLLW, hazardous, nonhazardous, and sanitary wastes. All wastes will be managed in accordance with 1S SRS WAC Manual and applicable WAC for the receiver site (e.g., WIPP). The Waste Management System will also be involved with management and control of air pollutant emissions as well as collection and discharge of stormwater runoff.

The Waste Management area in the PDCF will be sized to accommodate a 30-day storage capacity of TRU waste to provide flexibility and avoid interruption of operations. The area will provide storage capacity for seventy-two 55-gallon drums of TRU waste, eighteen B-25 boxes of LLW, one 55-gallon drum of hazardous waste, two 1,000-gallon tanks for HAW, five 10-gallon pencil tanks for HAW, two 1,000-gallon tanks for LAW, one LAW 11-gallon interim storage tank, and one 250-gallon flush water tank. See drawing number A-A2-F-2913 (WGI 2003f) for specific locations of waste collection areas. Hazardous waste will be appropriately labeled and stored in a designated area for accumulation. Design of the PDCF Waste Management gloveboxes will allow for an operator to load a drum with TRU waste and for a separate witness, standing next to the operator, to visually verify and document the waste as it is placed in a drum. Operators will have the ability to load drums with absorbent material as needed to absorb residual liquids in accordance with the acceptance criterion of the WIPP WAC, Section 3.4.1 (DOE 2005) (or most current version). The Waste Management passivation glovebox was designed to allow pyrophoric metal fines, plutonium hydride, or reactive chemicals to be reacted. The passivation glovebox ventilation system has the capability for introducing air at a slow rate in order to control any potential reactions. The HEPA filters may contain beryllium in the glovebox and airlock.

Individual waste packages will be identified at the point of generation with a bar-coded tag. This tag will allow the matrix and inventory of the waste to be tracked as it is packaged into waste drums at the Waste Management gloveboxes. The entrance airlock to the glovebox will be equipped with an enhanced accuracy fissile material detector (FMD) consisting of a high-purity germanium detector and a neutron coincidence counter. This detector configuration is expected to be able to detect the presence of plutonium at the level of approximately 100 milligrams per package. The detector suite will be capable of providing a reasonable estimate of the amount of plutonium present in quantities up to approximately 100 grams.

For some waste matrices, it is possible that WAC drum limits could be as low as 10 grams per drum. With the assumption that 100 bags of waste can be placed in a drum, this would require a detection of 0.1 gram. The detector suite currently considered has been demonstrated by the vendor to have detection limits of approximately 100 milligrams, which is sufficient to support packaging of drums even at this lower limit. Prudence would probably dictate reducing the number of waste cuts placed in the drum to ensure that subsequent certification analyses will be successful. But even in this reduced inventory case, the enhanced FMD suite will support packaging of compliant drums.

Once a drum has been loaded in the Waste Management glovebox, a tamper-indicating device (TID) will be affixed and the drum will be taken to Waste NDA for material control and accountability (MC&A) purposes and to determine if the drum repackaging meets waste certification requirements. Drums that are loaded with waste that originates outside of the glovebox or is bagged out it will be hand-carted to Waste NDA. At Waste NDA, the drum will be inspected to determine whether the protection termination requirements (DOE Order M 474.1-1A, Table 1-2) have been met and whether the drum is compliant with current WIPP WAC limits. If not, it will be transferred back to the Waste Management glovebox for repackaging. When the drum is compliant with both protection termination requirements and current WIPP WAC limits, it will be staged in the Waste Management area.

3.1.10 Plutonium Separation System

The Plutonium Separation System (Hydride/Dehydride System) will extract plutonium metal from pieces containing plutonium attached to another metal. The products will include a plutonium puck inside a MgO crucible and HEU or non-SNM, which are returned to either Main HEU DMO or Sanitization for further processing. The plutonium puck inside a MgO crucible will be sent to the auxiliary uranium DMO process line for further processing. The hydride/dehydride reactor will be charged with hydrogen to initiate the hydride reaction with plutonium to form plutonium hydride. As the plutonium hydride is formed, the tumbling action of the metal in the conversion drum will remove plutonium hydride from the metal pieces, exposing new material for reaction. The plutonium hydride will fall through drum perforations into a heated crucible, where the plutonium hydride reverts to hydrogen and plutonium metal. The crucible heat will be withdrawn, and the hydrogen will be reabsorbed into the ambient-temperature mixed metal hydride bed. The furnace will be allowed to cool slowly to avoid cracking the crucible. After the plutonium metal solidifies, the reactor will be purged with argon to remove the remaining hydrogen and then with a passivation gas to oxidize the remaining hydride. The glovebox manipulator will then move the can to an area where the crucible will be removed from the can and placed on a scale. After the crucible and plutonium puck are weighed, they will be placed in a transfer container and routed for further processing.

Wastes that will be generated from the Plutonium Separation System include HEPA filters (304 stainless steel and urethane, some of which may contain beryllium), lead-lined gloves, rags (cellulose, cotton, and potentially nylon), swipes (cellulose), light metal/tools (stainless steel, carbon steel, copper, beryllium, and aluminum), plastics (PVC and polyethylene), and used PPE.

3.2 SYSTEM INTERACTION AND WASTE GENERATION

The 10 primary PDCF systems described above are supported by 36 other internal and external systems that will contribute additional wastes to the Waste Management System. Waste volume estimates for construction and operations were derived from Calculation Set Nos. X-CLC-F-00270 (WGI 2001b), X-CLC-F-00271 (WGI 2003a), X-CLC-F-00272 (WGI 2003b), X-CLC-F-00304 (WGI 2003c), X-CLC-F-00309 (WGI 2002b), X-CLC-F-00316 (WGI 2005a), X-CLC-F-00317 (WGI 2005m), X-CLC-F-00330 (WGI 2003d), and X-CLC-F-00331 (WGI 2005n).

The decommissioning waste estimate was based on assumptions documented in *PDCF Life Cycle Cost Estimate* (WGI 2004a) and *PDCF HEPA Filter/Sand Alternatives Analysis* (WGI 2001a). Table 3.2C of the classified appendix (Appendix C) summarizes the anticipated known waste types and estimated volumes that will be generated within the PDCF systems during construction and operations. Anticipated waste types, sources, and proposed disposition pathways are discussed in detail in Sections 4.0, Section 5.0, and Appendix C.

4.0 ANTICIPATED WASTE TYPES, SOURCES, AND PROPOSED DISPOSITION PATHWAYS

The waste streams anticipated from PDCF processes and support activities are generally well-defined because of their expected similarity to wastes generated at other sites within the weapons complex. The anticipated waste types, characterization, regulatory classification, required handling, and estimated volumes for PDCF wastes were initially identified and quantified from studies performed by LANL and from operating experience with the ARIES pilot facility at LANL. This information was then modified on the basis of operational experience at SRS, engineering judgment, design constraints, and technical direction from NNSA.

Waste estimates for construction and operations were derived from Calculation Set Nos. X-CLC-F-00270 (WGI 2001b), X-CLC-F-00271 (WGI 2003a), X-CLC-F-00272 (WGI 2003b), X-CLC-F-00304 (WGI 2003c), X-CLC-F-00309 (WGI 2002b), X-CLC-F-00316 (WGI 2005a), X-CLC-F-00317 (WGI 2005m), X-CLC-F-00330 (WGI 2003d), and X-CLC-F-00331 (WGI 2005n). The decommissioning waste estimate was based on assumptions documented in the P*DCF Life Cycle Cost Estimate* (WGI 2004a) and *PDCF HEPA Filter/Sand Alternatives Analysis* (WGI 2001a). Estimates for stormwater represent total discharge volumes for a 100-year storm, based on calculation sets DCS01-WEP-DS-CAL-00070 (WGI 2003e) and C-CLC-F-00536 (WGI 2005b).

Appendix A presents lists of the chemical and radiological constituents expected in materials that will be processed in the PDCF and in the anticipated waste streams, along with a list of representative chemicals that will be used by the Analytical Laboratory. Waste Characterization Process Reports for these materials are provided in Appendix B. Appendix C (classified, and appended as a separate document) provides waste information sorted by stream numbers used on the PDCF process flow diagrams (PFDs).

During construction and operation, the PDCF will generate solid forms of TRU, MTRU, and LLW; liquid forms of HAW and LAW; and solid and liquid forms of MLLW, Resource Conservation and Recovery Act (RCRA) hazardous waste, and nonhazardous waste. The PDCF also will emit air pollutants and discharge wastewaters, cooling water blowdown/condensate, and stormwater. Upon decommissioning of the PDCF, additional waste streams will be generated.

Each waste type must be handled to meet its own set of regulatory requirements and disposal site WAC. Design considerations will ensure that wastes of different types are not combined, where practical. Additionally, the Waste Management glovebox for TRU waste will contain a unit that will allow pyrophoric metal fines, plutonium hydride, or reactive chemicals to be reacted. The unit will introduce air at a slow rate in order to control any potential reactions.

The PDCF design and operation are not expected to require a RCRA Part B Permit. Waste may be managed to meet (1) the treatment standards found in 40 CFR 268; (2) WSRC 1S SRS WAC Procedure 2.02 *Low-level, Hazardous, TRU, and Mixed and PCB Waste Characterization Requirements* (WSRC 2002f); and (3) DOE Order 435.1 (DOE 2001a). If necessary to meet waste disposal requirements, waste may be stabilized at the PDCF. This process may include pH adjustment, which will be done near the point of generation and in a manner that will meet the requirements of 40 CFR §270.1 (c)(2)(v) and 40 CFR §270.1 (c)(2)(vii). Therefore, this operation will not require a RCRA treatment permit.

This section discusses waste streams anticipated from operations, construction, and decommissioning. Air pollutant emissions and stormwater runoff are also discussed. Sections 4.1 through 4.6 describe the waste streams and their management, handling, and disposal paths; Section 4.7 discusses activities associated with decommissioning; and Section 4.8 discusses previous "orphan" waste issues.

4.1 TRU WASTE (INCLUDING WASTES HANDLED AS TRU)

The requirements for handling, packaging, storage, and disposal of TRU waste, MTRU waste, and PDCF wastes that will be managed as solid TRU waste are discussed in this section. The principal design functions, requirements, and criteria for handling and disposing of TRU waste are described in the PDCF FDD (WSRC 2005). These requirements provided the basis for design of the waste management processes.

4.1.1 Background

Five of the anticipated PDCF waste types will be handled as solid TRU waste and shipped to WIPP: solid TRU waste, solid MTRU waste, concentrated liquid waste that has been dried and calcined in the Analytical Laboratory glovebox, MLLW (including lead-lined gloves assayed as MLLW), and liquid HAW (including MHAW) that has been solidified at the WSB. Although concentrated liquid waste, MLLW, and liquid HAW/MHAW do not meet the definition of TRU waste, they are included in this section because they will be handled and disposed of as solid TRU waste at WIPP.

The waste types addressed in this section are defined as follows:

TRU waste – Radioactive waste that contains more than 100 nanocuries per gram (nCi/g) of alpha-emitting isotopes with atomic numbers greater than 92 (uranium) and with half-life greater than 20 years, except for (1) high-level radioactive waste; (2) waste that the Secretary of Energy has determined, with the concurrence of the U.S. Environmental Protection Agency (EPA) Administrator, does not need the degree of isolation required by disposal regulations; or (3) waste that the U.S. Nuclear Regulatory Commission (NRC) has approved for disposal on a case-by-case basis in accordance with 10 CFR 61 [40 CFR §191.02 (i)]. It is expected that all TRU waste at the PDCF will be contact-handled waste (TRU waste with a surface dose rate not greater than 200 mrem per hour).

MTRU waste – TRU waste that is also hazardous, as defined by RCRA (see Section 4.3)

Concentrated liquid waste – Radioactive liquid waste with greater than 1 g/l plutonium and greater than 0.65 weight percent U-235

Liquid HAW (including MHAW) – Radioactive liquid waste that does not result from direct processing of spent nuclear fuel or by-product material from uranium or thorium tailings, with an activity level greater than 1,000 disintegrations per minute (dpm) per milliliter, and with less than 1 g/l plutonium and less than 0.65 weight percent U-235

Liquid MHAW – HAW that is also hazardous as defined by RCRA (see Section 4.3)

High-alpha MLLW – MLLW that contains concentrations of TRU nuclides from 10 to 100 nCi/g

Alpha-contaminated MLLW – MLLW that contains concentrations of TRU nuclides less than 10 nCi/g

The WIPP site, as set forth in section 213 of the DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1980 (Pub. L. 96-164; 93 Stat. 1259, 1265) and the Land Withdrawal Act, Public Law 102-579, was established to safely dispose of radioactive waste materials generated by atomic energy defense activities. Standards for protection and certification have been established in 40 CFR 191, *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes,* and in 40 CFR 194, *Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR 191 Disposal Regulations.*

TRU waste is eligible for disposal at WIPP if one or more of the following functions have generated it in whole or in part:

- Naval reactor development
- Weapons activities, including defense inertial confinement fusion
- Verification and control technology
- Defense nuclear materials productions
- Defense nuclear waste and materials by-product management
- Defense nuclear materials security; safeguards and security investigations
- Defense research and development

TRU waste is classified as MTRU waste if it contains hazardous constituents regulated under RCRA. Only waste that meets the treatment, storage, and disposal (TSD) facility WAC will be accepted at the WIPP facility for disposal. These criteria are presented in the permit conditions of the WIPP Hazardous Waste Facility Permit (WIPP 2001), and the waste will be characterized in accordance with the WIPP Waste Analysis Plan (Attachment B of WIPP 2001).

Due to the lack of mixed waste treatment facilities for high-alpha MLLW within the weapons complex and private industry, DOE has been unable to disposition its mixed waste in full compliance with the RCRA regulations. The *Federal Facility Compliance Act*, signed into law on October 6, 1992, waived sovereign immunity from fines and penalties for RCRA violations at federal facilities. One of the provisions of the Act required DOE to prepare plans for developing the required treatment capacity for its mixed waste at each site where it stores or generates mixed wastes. SRS complied with this provision and developed the *Site Treatment Plan*. The original *Site Treatment Plan* was delivered to the state of South Carolina, approved, and incorporated into a Consent Order that became effective on September 29, 1995. The approved *Site Treatment Plan* contains NNSA's preferred options for each mixed waste stream, and disposition pathways will not deviate from those in the *Site Treatment Plan* without approval via the change process stipulated in the Consent Order (WSRC 2002c).

4.1.2 Sources

Solid Waste

Sources of solid TRU waste in the PDCF will be material from destructive laboratory analysis, waste from glovebox operations, and maintenance waste. Operations that will generate TRU waste are Pit Disassembly, SRL, Plutonium Conversion, Oxide Product Handling, Uranium Processing & Staging, Product Canning, Sanitization, Analytical Laboratory, Glovebox, Plutonium Separation, and Inert Gas Purification. TRU wastes generated during operations will take the form of HEPA filters, beryllium ingots, lead-lined gloves, used containers and equipment, paper and cloth wipes, PPE, solidified inorganic solutions, sanitized pieces, plastics, crucibles, failed oxide storage cans, and lathe-cutting wheels. HEU decontamination sludge and associated supernatant will be dried in a dewatering pot within the HEU fluids glovebox, and the dewatering pot and dried solids will be handled as TRU waste. Concentrated liquid waste generated from laboratory operations will be dried and calcined in the Analytical Laboratory glovebox, and the resulting solids will be handled as TRU waste. MTRU waste will include lead-lined gloves from gloveboxes that handle plutonium and Inner Canning sludge.

Liquid Waste

Sources of liquid HAW (including MHAW) will be the Analytical Laboratory, Uranium Processing & Staging, and Product Canning systems.

4.1.3 Waste Acceptance

Solid Waste

TRU waste will be handled to meet (1) the 1S SRS WAC Manual Procedure WAC 3.06 *E-Area TRU Pads Transuranic Waste Acceptance Criteria* (Rev. 8, 10/01/01) for preparation and shipping to E-Area (WSRC 2001), and (2) the WIPP WAC Rev. 3.0 (DOE 2005) (or most current version). TRU waste will also have to meet the requirements of the WIPP waste certification program. The criteria and constraints to be addressed in the certification process include the following:

- **Container**
  - Description - 55-gallon drum, U.S. Department of Transportation (DOT) 7A, Type A.
  - Weight - 1,000 pounds (WSRC – Solid Waste Division [SWD] will be responsible for center-of-gravity and total weight requirements for the loaded TRUPACT-II).
  - Surface contamination - Packaging shall not exceed 20 dpm per 100 square centimeters (cm^2) alpha and 200 dpm/100 cm^2 beta-gamma.
  - Identification labeling - Labeling shall use medium- to low-density Code 39 bar code symbology. Labels shall be placed at three locations approximately 120 degrees apart so that at least one label is clearly visible when the drums are assembled into a seven-pack. Payload containers shall be marked "Caution Radioactive Material" using a yellow and magenta label as specified in 10 CFR

835. Those payload containers whose contents are also RCRA-regulated (MTRU) shall be additionally marked "Hazardous Waste" as specified in 40 CFR §262.32.

- Dunnage - WSRC-SWD will be responsible for dunnage in the TRUPACT-II payload configurations.

- Filter vents - Each payload container shall have one or more filter vents that meet the specifications of Appendix 2.5 of the *TRUPACT-II Authorized Methods for Payload Control* (TRAMPAC). For a 55-gallon drum, a minimum of one vent with a flow rate of 35 milliliters/minute at standard temperature and pressure (STP) at 1 inch of water, filter efficiency of 99.9 percent, and hydrogen diffusivity of 1.90E-6 mole/second/mole fraction at 25 degrees C are required. A filtered bag must have a flow rate of 35 milliliters/minute and hydrogen diffusivity of 1.075E-5 mole/second/mole fraction. It is recommended that filtered bags be used for bagging TRU waste. Operating procedures will allow open glovebox TRU waste to be bagged-into the Waste Management glovebox so that unfiltered bags can be discarded and replaced with filtered bags.

- **Radiological characteristics**
  - Radionuclide composition - The activities and masses of the 10 WIPP-tracked radionuclides (Am-241, Pu-238, Pu-239, Pu-240, Pu-242, U-233, U-234, U-238, Sr-90, and Cs-137) shall be established on a payload container basis for purposes of tracking their contributions to the total WIPP radionuclide inventory. All radionuclides other than the 10 WIPP-tracked radionuclides that contribute to 95 percent of the radioactive hazard for the payload container shall be reported on the TRUPACT-II bill of lading or manifest in accordance with 49 CFR §172.203 and 49 CFR §173.433. Information for both sets shall include their associated total measurement uncertainties (TMUs) expressed in terms of one standard deviation.

  - Fissile gram equivalent [FGE] - The sum of Pu-239 FGE plus two times its associated TMU, expressed in terms of one standard deviation, shall be less than or equal to 200 Pu-239 FGE (WSRC-SWD will be responsible for the Pu-239 FGE limit for the TRUPACT-II). Beryllium-laden TRU waste drums will be limited to 100 FGE. A TRUPACT-II will be limited to 100 FGE when transporting a drum that is greater than 1 percent by weight of beryllium (DOE 2005).

  - TRU alpha activity content - A TRU waste drum shall contain more than 100 nCi/g of alpha-emitting TRU isotopes with half-lives greater than 20 years.

  - Plutonium equivalent - The limit for a 55-gallon drum is 80 plutonium equivalent-curies (PE-Ci) of Pu-239.

  - Radiation dose equivalent rate - External radiation dose equivalent rate of individual payload containers shall be less than or equal to 200 mrem per hour at the surface.

- Decay heat - The sum of the decay heat for each payload container plus its TMU shall be less than or equal to the limits of the assigned shipping category specified in table 5.5-1 of Appendix 5.5 of the TRAMPAC. The hydrogen generated must be limited to a molar quantity that would be no more than 5 percent by volume of the innermost layer of confinement (or equivalent limits for other inflammable gases) if present at STP (i.e., no more than 0.063 gram-moles/ft^3 at 14.7 pounds per square inch absolute and 32 degrees).

- **Physical characteristics**
  - Residual liquids - Internal containers shall contain no more than 1 inch (2.5 cm) of residual liquid in the bottom. The total residual liquid in any payload container shall not exceed 1 percent by volume of that payload container.

  - Sealed containers - Payload containers shall be verified to be free of sealed containers greater than 4 liters.

- **Chemical content**
  - Pyrophoric materials - Radioactive pyrophorics in concentrations greater than or equal to 1 percent by weight and all nonradioactive pyrophorics shall be reacted (or oxidized) and/or otherwise rendered nonreactive prior to placement in the payload container. Nonradionuclide pyrophoric materials are not accepted at WIPP.

  - Hazardous - Hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes) are not accepted at WIPP. Each contact-handled TRU mixed waste container shall be assigned one or more EPA hazardous waste codes as appropriate. Only EPA hazardous waste codes listed as allowable in the Hazardous Waste Facility Permit may be managed at WIPP. Wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA hazardous waste numbers of D001, D002, or D003) are not accepted at WIPP.

  - Chemical compatibility - Chemical constituents shall conform to the lists of allowable materials in tables 4-1 through 4-8 of the TRAMPAC. Other chemicals or materials not identified in these tables are allowed, provided they meet the requirements for trace constituents as specified in section 4.3 of the TRAMPAC.

  - Explosive, corrosive, and compressed gases - Waste shall contain no explosives, corrosives, or compressed gases (pressurized containers).

  - Headspace gas concentrations - Flammable volatile organic compounds (VOCs) are restricted to less than or equal to 500 parts per million (ppm) in the payload container headspace. For those payload containers that exceed the flammable VOC limit, a determination of compliance with the flammable (gas/VOC) concentration limit as described in the TRAMPAC allows the payload container to be shipped in the TRUPACT-II under the test category.

- Polychlorinated biphenyl (PCB) concentration – Waste shall contain no PCB concentrations equal to or greater than 50 ppm.

- Beryllim content - Beryllium-laden TRU waste in a 55-gallon drum will be limited to 100 kg of beryllium per drum (DOE 2005).

- **Data package contents**
  - Characterization certification - A Waste Stream Profile Form (WSPF) for each waste stream shall be approved by the Carlsbad Field Office prior to the first shipment of that waste stream. Characterization and certification information for each payload container shall be submitted to the WIPP Waste Information System (WWIS) and approved by the Data Administrator. Sites are required to estimate the cellulose, plastic, and rubber weights and report these estimates in the WWIS on a payload container basis. Any payload container from a waste stream that has not been preceded by an appropriate certified WSPF is not accepted at WIPP.

  - Shipping - Operators at the PDCF will prepare either a bill of lading or a uniform hazardous waste manifest for contact-handled TRU waste shipments as required by the transportation requirements. The land disposal restriction notification for contact-handled TRU mixed waste shipments shall state that the waste is not prohibited from land disposal.

Liquid Waste

Drying and absorption techniques will be used on electrolytic decontamination solutions and sludges. The resulting solids will be handled as described above for TRU solid waste.

Liquid HAW and MHAW will be collected in tanks and transferred to the WSB for solidification, and the solids will be managed as TRU waste. The WSB is currently on hold; thus, the WAC have not been developed. Because the HAW establishes a portion of the baseline for the design of the WSB, it is assumed that this waste stream will comply with forthcoming WAC for the WSB.

Disposition of this waste stream at the WSB is based on technical direction from NNSA (NNSA 2002).

4.1.4 Characterization

Solid Waste

Extensive characterization of TRU waste will take place, including:

- TRU waste drums assay to determine the amount of radioactivity in the drum. This examination will not require entry into the drum.

- Headspace gas sampling to detect hydrogen, methane, and other VOCs.

At the WSRC-SWD, a head gas sample will be collected and the drum assayed by NDA for isotopic analysis to allow certification for WIPP disposal. Real-time radiography and loading of the TRUPACT-II for shipment to WIPP will occur at the TRU Waste Characterization and

Certification Facility at SRS. NDA will be used at PDCF to provide data for a TRU isotope (MC&A) mass balance.

While process knowledge will be a primary factor in determining waste type, laboratory analysis may occasionally be required for radiological and hazardous constituents and characteristics. Laboratory analysis will be conducted to provide initial characterization and will also be conducted periodically to revalidate the waste type. While the analysis is being performed, material will be placed in a holding area and labeled "undergoing characterization." Once the final waste type has been determined, the waste will be moved to the appropriate accumulation area. After a waste has been designated as containing TRU waste, the appropriate container will then be filled to meet current WIPP WAC requirements and stored at the PDCF awaiting pick-up by WSRC-SWD. TRU wastes will (when feasible) be segregated from non-TRU waste and accumulated in drums that meet the SRS WAC and current WIPP WAC container requirements. This will eliminate a significant effort and costs in material transfer handling, container decontamination, and resulting wastes. Waste characterization will be conducted in accordance with WSRC 1S SRS WAC Procedure 2.02 *Low-Level Hazardous, TRU, Mixed and PCB Waste Characterization Requirements* (WSRC 2002f). This procedure outlines the requirements for periodic validation of the radionuclide distribution of the waste streams.

For purposes of this plan, lead-lined gloves have been categorized as MTRU waste; however, they may assay as MLLW. MLLW gloves will be used to even out the activity of TRU waste drums to improve packaging and transport efficiencies. Along these lines, MLLW waste with high levels of alpha contamination will be blended with TRU waste to take up free space in drums and to provide a disposal solution for high-alpha MLLW. The MLLW containing concentrations of TRU nuclides between 10 and 100 nCi/g (alpha-contaminated MLLW) will be handled as TRU waste because its physical and chemical properties are similar. As documented in the SRS *Site Treatment Plan* (WSRC 2002c), the site strategy for high-alpha MLLW containing less than 100 nCi/g is to manage it as TRU waste. The blended waste streams will be further characterized, and the portion that is TRU (>100 nCi/g) will be sent to WIPP.

Liquid Waste

Based on technical direction from NNSA (NNSA 2002), liquid HAW (including MHAW) will be transferred to the WSB for solidification, and the resulting solids will be handled as TRU solid waste. Concentrated liquid waste will be dried and calcined in the Analytical Laboratory glovebox, and the resulting solids will be handled as TRU waste.

4.1.5 Packaging, Storage, and Disposal

Solid Waste

All solid TRU waste will be packaged in WIPP-compliant DOT Type A, Specification 7A 55-gallon drums (49 CFR §178.350) at the PDCF (Figure 4-1). Standard pipe overpacks will continue to be considered for use to increase the volume of waste accepted in each shipment, minimizing the total number of shipments required. At this point, pipe overpacks have been initially evaluated and determined not to be necessary for PDCF TRU waste. Although the PDCF design currently projects that all TRU waste could be packaged in 55-gallon drums, there may be cases when a waste item is too large to fit into a 55-gallon drum. In that case, it would then be bagged out, taken to the Waste Management area to be assayed, and, if found to be TRU waste,

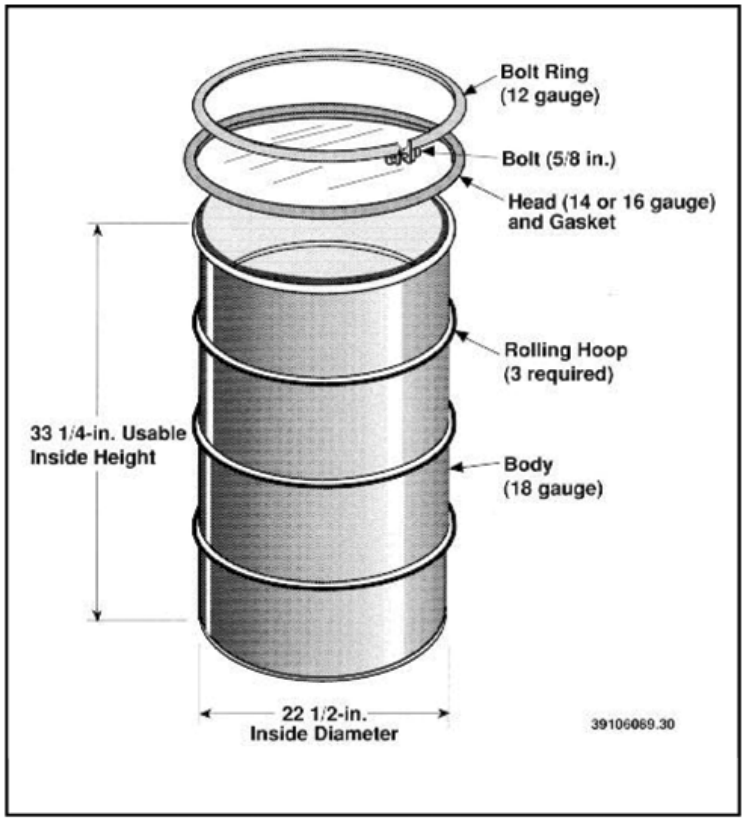

Figure 4-1. 55-Gallon Drum, DOT 7A Type A

The 55-gallon drum body, lid, and bolt ring are constructed of steel. A gasket of tubular or foam styrenebutadiene is required for drum lid closure. The drum must have a minimum of one filter vent. The 55-gallon drum is the most common container used for packaging TRU waste.

stored in a Standard Waste Box awaiting transportation for certification and disposal. A HEPA filter, while expected to be LLW, would be an example of an item being too large for a 55-gallon drum.

The PDCF design will provide suitable areas for TRU waste accumulation in the operations areas. Storage within the PDCF will accommodate 30 days of waste generation of TRU waste and approximately14 boxes of LLW and will be based on data presented in Section 5.0 of this plan (see Table 5-1 – column titled "Volume Used for Design Prior to 90% Title II"). See drawing number A-A2-F-2913 (WGI 2003f) for specific locations of waste collection areas. TRU waste drums containing beryllium will be labeled appropriately. The TRU waste drums will be loaded onto a truck provided by site transportation. TRU waste will be transported to the WSB for storage and final certification prior to loading on a TRUPACT-II for transportation to WIPP. Final certification will involve collecting a headspace gas sample and loading the TRU waste containers in a TRUPACT-II for transportation to WIPP. The TRUPACT-II is an NRC-licensed Type B transportation cask designed specifically for the transportation of TRU waste.

The individual waste packages will be identified at the point of generation with a bar-coded tag. This tag will allow the matrix and inventory of the waste to be tracked as it is packaged into waste drums at the Waste Management gloveboxes. Entrance airlocks to the Waste Management gloveboxes will be equipped with an enhanced accuracy FMD consisting of a germanium detector and a neutron coincidence counter. This detector configuration is expected to be able to

detect the presence of plutonium at approximately the 50- to 100-milligram level per package. The detector suite will be capable of providing a reasonable estimate of the amount of plutonium present in quantities up to approximately 100 grams.

For some waste matrices, it is possible that plutonium drum limits could be as low as 10 grams per drum. With the assumption that 100 bags of waste can be placed in a drum, this would require a detection of 0.10 gram. The detector suite currently considered has been demonstrated by the vendor to have detection limits of approximately 50 to 100 milligrams, which is sufficient to support packaging of drums even at this lower limit. Prudence would probably dictate reducing the number of waste cuts placed in the drum to ensure that subsequent certification analyses will be successful. But even in this reduced inventory case, the enhanced FMD suite will support packaging of compliant drums.

As discussed in Section 4.1.4, MLLW gloves will be used to even out the activity of TRU waste drums, high-alpha MLLW will be handled as TRU waste (blended with TRU waste to take advantage of free space in drums and to provide a disposal solution for high-alpha MLLW), and alpha-contaminated MLLW will be handled as TRU waste due to its similar physical and chemical properties.

Waste drums that have a potential to be contaminated with beryllium shall be appropriately labeled to warn of this potential hazard. This applies to all beryllium-laden drums, those drums that contain waste that has undergone beryllium processing, and those drums that contain waste that may have residual beryllium contamination. The labeling is important in those cases when a drum must be reopened.

Once a drum has been loaded in the Waste Management glovebox, a TID will be affixed, and the drum will be taken to Waste NDA for MC&A purposes and to determine if the drum repackaging meets waste certification requirements. Drums that are loaded with waste that originates outside of the glovebox or is bagged out it will be hand-carted to Waste NDA. There, the drum will be inspected to determine whether the protection termination requirements (DOE Order M 474.1-1 A, Table 1-2) have been met and whether the drum is compliant with current WIPP WAC limits. If not, it will be transferred back to the Waste Management glovebox for repackaging. When the drum is compliant with both protection termination requirements and current WIPP WAC limits, it will be staged in the Waste Management area.

The RCRA-regulated constituents in newly generated TRU wastes will be documented and verified at the time of generation based on acceptable knowledge for the waste stream. Characterization of newly generated MTRU waste will begin with verification that processes generating the waste have operated within established written procedures. Waste streams will be segregated, using process knowledge to the extent practical, by isotopic distribution, organic content, density, oxides, uranium/plutonium, and tritium streams. The operator will confirm that the waste is assigned to a waste stream that has the correct summary category group for the waste being packaged. Verification will be performed using visual examination. A second operator who is equally trained to the requirements will provide additional verification by reviewing the contents of the waste container to ensure correct reporting.

MTRU waste will require special handling to comply with all requirements of the WIPP. These requirements involve characterization of the waste stream, visual examination or radiography, and sampling. Also required is the following Hazardous Waste Manifest Information:

- Generator/storage site name and EPA identification
- Generator storage site contact name and phone number
- Quantity of waste
- List of the hazardous waste codes in the shipment
- List of all shipping container IDs (TRUPACT-II serial number)
- Signature of authorized generator representative

Based on current estimates, approximately 2,992 ft^3/year of solid TRU waste and 1,978 ft^3/year of solid MTRU waste will be generated; both are to be transported to the WSB prior to shipment to WIPP.

Liquid Waste

Approximately 11,700 gallons year of liquid HAW (including MHAW) will be generated, collected, and pumped to the WSB. The liquid HAW will be collected in two 1,000-gallon holding tanks at the PDCF. This liquid waste will originate in the Analytical Laboratory, Uranium Processing & Staging, and Product Canning systems. These tanks will require designation as a 90-day accumulation site since the liquid is likely to contain RCRA-corrosivity components. See drawing number M-PG-F-0085 (WGI 2004b) for the specific location of these tanks.

4.2 LOW-LEVEL WASTE (LLW) AND LOW ACTIVITY WASTE (LAW)

The requirements for handling, packaging, storage, and disposal of LLW, MLLW, and LAW are discussed in this section. The design requirements for handling and disposal of these waste types are described in the PDCF FDD (WSRC 2005). These requirements provided the basis for design of the waste management processes.

4.2.1 Background

LLW is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, TRU waste, by-product material (as defined in section 11 e. (2) of the Atomic Energy Act of 1954, as amended), or naturally occurring radioactive material with a concentration of TRU nuclides less than 100 nCi/g. MLLW is solid waste that contains LLW and RCRA hazardous waste (see Section 4.3). LAW is radioactive liquid waste with an activity level less than 1,000 dpm per milliliter.

4.2.2 Sources

Solid Waste

LLW will be generated from the following PDCF systems: Pit Disassembly; SRL, Plutonium Conversion, Oxide Product Handling, Uranium Processing & Staging, Product Canning, Sanitization, Analytical Laboratory; Glovebox, Plutonium Separation, HVAC, Safety and Health, Building Structures, and Inert Gas Purification. LLW will include used equipment, lead-

lined gloves, wipes, protective clothing, tools and equipment that have become contaminated with small amounts of radioactive material, solidified inorganic solutions, and tritium. It is assumed that 30 percent of the waste generated during open glovebox maintenance operations will be characterized as LLW.

Liquid Waste

Sources of liquid LAW will include blowdown from Reverse Osmosis Unit, Limited Volume Cooling Water, and Process Cooling Water; water from flushing tanks in the Waste Management System; water from safety showers; mop water; and water from flushing tanks and washing sumps in the Chemical Distribution System.

Another source of liquid LAW will be wastewater generated from a fire event. This water would collect (via floor drains) in the firewater containment basin in the lower level of the PDCF (see drawing A-A2-F-2915 [WGI 2003g]).

A minimal volume of RCRA-characteristic liquid MLLW will be generated in the Analytical Laboratory from analysis of process samples and disposal of excess chemicals (e.g., expired calibration standards, which are generally corrosive and may contain RCRA-regulated metals such as cadmium, chromium, or lead). Because this MLLW stream is expected to have the same characteristics as liquid HAW generated from Analytical Laboratory activities, it will be managed in the same manner as liquid HAW. The anticipated volume of liquid MLLW (less than 0.5 gallon/year) will not impact the design of the HAW handling system.

4.2.3 Waste Acceptance

Solid Waste

LLW will be handled in accordance with 1S SRS WAC Manual Procedure 3.17 *Low-Level Radioactive Waste Acceptance Criteria* (WSRC 2002g) for preparation for disposal. Waste characterization will be conducted in accordance with WSRC 1S SRS WAC Procedure 2.02 *Low-Level Hazardous, TRU, Mixed and PCB Waste Characterization Requirements* (WSRC 2002f). This procedure outlines the requirements for periodic validation of the radionuclide distribution of the waste streams.

Liquid Waste

Waste will be managed to meet (1) WSRC 1S SRS WAC Procedure 2.02 *Low-level Hazardous, TRU, Mixed and PCB Waste Characterization Requirements* (WSRC 2002f), and (2) the WAC of the final disposal facility – WSRC 1S SRS WAC Procedure 4.02 *F/H Effluent Treatment Facility Waste Acceptance Criteria* (WSRC 2002b). The LAW will be collected in a tank, sampled, then pumped to the ETF or WSB. The liquid waste will be sampled to ensure that it meets the ETF WAC. If this waste does not meet the ETF WAC, it will be transferred to the WSB. Although LAW is not specifically discussed in the design basis for the WSB, the volume and content are well within the parameters established by the HAW, which is destined for the WSB. The ETF represents SRS infrastructure that will also serve the MFFF and WSB, and thus should be available for the life of the PDCF. Liquid MLLW is expected to consist of only RCRA characteristic waste from expired calibration standards from the Analytical Laboratory and will be handled as HAW.

4.2.4 Characterization

Solid Waste
It is assumed that 30 percent of the waste generated during open glovebox maintenance operations will be assayed as LLW.

Lead-lined gloves assayed as MLLW will be handled as TRU waste (see Section 4.1.4). In addition, MLLW waste with high levels of alpha contamination will be blended with TRU waste to take up free space in drums and to provide a disposal solution for high-alpha MLLW. The MLLW containing concentrations of TRU nuclides between 10 and 100 nCi/g (alpha-contaminated MLLW) will be handled as TRU waste because its physical and chemical properties are similar. As documented in the SRS *Site Treatment Plan* (WSRC 2002c), the site strategy for high-alpha MLLW containing less than 100 nCi/g is to manage it as TRU waste.

Liquid Waste
Liquid LAW would be transferred to the interim storage tank, sampled to verify that it meets WAC for the ETF or WSB, and then pumped for disposal. If this wastewater does not meet ETF WAC, it will be transferred to the WSB.

4.2.5 Packaging, Storage, and Disposal

Solid Waste
Solid LLW from gloveboxes, including maintenance waste, will be packaged in drums and then placed in B-25 boxes prior to being directed to the SRS TSD facility for storage, final treatment, certification, and final disposal. Solid LLW is also controlled by WSRS 1S SRS Procedure WAC 3.17 (WSRC 2002g). This procedure provides detailed information on the waste form, radionuclide content, nuclear safety, packaging, labeling and marking, and other administrative controls. Solid LLW generated in the glovebox will be transported to the Waste Management glovebox via the Internal Transport System, where it will be sorted and bagged-out. LLW will also be generated outside of the glovebox through maintenance or as room waste. This bagged waste will be assayed, drummed, and hand-carted to the Waste Management area. Radionuclide content of the maintenance waste and room waste will occur through use of the smear-to-curie conversion as specified in WSRC 1S SRS WAC Procedure 2.02 *Low-level Hazardous, TRU, Mixed and PCB Waste Characterization Requirements* (WSRC 2002f), sections 3E and 3F. The LLW will be transferred to a B-25 box in an accumulation area. Based on current design, approximately 30,975 ft^3/year of solid LLW will be generated and taken to the E-Area, an onsite permitted LLW landfill, for disposal.

In accordance with the SRS *Site Treatment Plan*, lead-lined gloves that assay as MLLW will be handled as solid TRU waste. Gloves will be used to even out the activity of TRU drums to increase packaging and transport efficiencies. MLLW with high levels of alpha contamination will be blended with TRU waste to take advantage of free space in TRU waste drums and to provide a disposal solution for high-alpha MLLW. MLLW containing concentrations of TRU nuclides between 10 and 100 nCi/g (alpha-contaminated MLLW) will be managed as TRU waste because its physical and chemical properties are similar.

Liquid Waste

Liquid LAW will be collected in two 1,000-gallon tanks and piped to the ETF (or WSB) for treatment and disposal. See drawing number M-PG-F-0085 (WGI 2004b) for the specific location of these tanks. The ETF WAC specify that the acceptance limits for the wastewater collection tanks are less than 1,000 dpm per milliliter. Tanks will be provided to collect Reverse Osmosis Unit (Deionized [DI] & Process) water, mop water, safety shower water from the Pu Processing Building, washdown of floors, tank and sump washings, and equipment blowdown for waste classification determination. The liquid waste will be transported from the tanks to the disposal facility by pipe following acceptable results from sampling. LAW that does not meet ETF acceptance criteria (1,000 dpm per milliliter) will be transferred to the HAW system and, from there, sent to the WSB. Although LAW is not specifically discussed in the design basis for the WSB, the volume and content are well within the parameters established by the HAW, which is destined for the WSB. Approximately 24,041 gallons/year of liquid LAW will be generated and piped to the ETF or WSB.

Liquid LAW will be treated in the ETF. This facility will treat the liquid waste for discharge to a National Pollutant Discharge Elimination System (NPDES) permitted outfall, effectively capturing all chemical and radioactive contaminants except tritium. The process will include pH adjustment, submicron filtration, organic removal, reverse osmosis, and ion exchange.

Liquid MLLW will be generated from expired calibration standards and managed as HAW. This liquid waste stream will be transferred to the WSB for processing.

4.3 RCRA HAZARDOUS WASTE

The requirements for handling, packaging, storage, and disposal of RCRA hazardous waste are discussed in this section. The design requirements for handling and disposal of hazardous waste are described in the PDCF FDD (WSRC 2005). These requirements provided the basis for design of the waste management systems.

4.3.1 Background

RCRA hazardous waste contains hazardous components as defined by the RCRA. RCRA-regulated solid waste, which is defined in 40 CFR §261.2, includes solids, liquids, and containerized gases. RCRA waste is divided into two categories: characteristic and listed waste. Characteristic waste displays at least one of the hazardous characteristics listed in 40 CFR 261, Subpart C, such as ignitability, corrosivity, reactivity, or toxicity by leach testing (Toxicity Characteristic Leachate Procedure). Listed wastes are hazardous by definition based upon how the waste was generated (40 CFR 261, Subpart D).

The PDCF design and operation are not expected to require a RCRA Part B Permit. Waste may be managed to meet (1) the treatment standards found in 40 CFR 268; (2) WSRC 1S SRS WAC Procedure 2.02 *Low-level, Hazardous, TRU, and Mixed and PCB Waste Characterization Requirements* (WSRC 2002f); and (3) DOE Order 435.1 (DOE 2001a). If necessary to meet waste disposal requirements, waste may be stabilized at the PDCF. This process may include pH adjustment, which will be done near the point of generation and in a manner that will meet the

requirements of 40 CFR §270.1 (c)(2)(v) and 40 CFR §270.1 (c)(2)(vii). Therefore, this operation will not require a RCRA treatment permit.

Generators are allowed to accumulate as much as 55 gallons of RCRA hazardous waste in containers at or near any point where the wastes initially accumulate and which is under the control of the operator of the process generating the waste. The waste may accumulate indefinitely without a permit or interim status and without complying with the requirements of 40 CFR §262.34(a) in "satellite accumulation areas" as specified in 40 CFR §262.34(c). Waste may also accumulate in a 90-day accumulation area in accordance with 40 CFR §262.34(a) without a permit or interim status for up to 90 days. In summary, the site-specific generator may "satellite accumulate" until the container is full; at that time, the container must be moved to the 90-day accumulation area. The 90-day time period begins for these wastes when the container is placed in the accumulation area. The use of "satellite accumulation areas" has the potential to significantly reduce the handling costs and additional wastes generated by containerizing and moving small amounts of hazardous waste to the accumulation area.

Tanks larger than 55 gallons do not qualify for "satellite accumulation." If wastes were to be accumulated in those tanks for more than 90 days, a storage permit would be obtained. The PDCF will have two 1,000-gallon tanks for LAW that will be piped to the ETF or WSB at least once a month. In addition, there will be two 1,000-gallon tanks for HAW that will be discharged to the WSB. See drawing number M-PG-F-0085 (WGI 2004b) for the specific location of these tanks.

For purposes of this plan, lead-lined gloves are categorized as MTRU waste and will be handled as solid TRU waste (see Section 4.1).

With regard to the RCRA category of universal waste, the EPA has finalized less stringent management standards for batteries, recalled and unused pesticides, and mercury-containing thermostats to reduce the amount of these wastes being sent to municipal waste landfills, incinerators, and other nonhazardous management facilities.

Under RCRA, used oil is defined as "any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities" (40 CFR §260.10). None of the PDCF processing or support systems will generate waste consisting of used oil with hazardous or radiological contamination.

4.3.2 Sources

Approximately 3.5 ft^3/year of hazardous waste may be generated from operations, primarily in the Analytical Laboratory as excess chemicals, sample residues or excess sample, sample preparation, and analysis wastes. It may also be generated as the result of a spill cleanup. The hazardous waste will be packaged into drums and transported to the HWSF; in certain cases, it may be less costly to transport some waste to an offsite TSD facility.

Hazardous waste will be generated during construction. It will include liquids such as spent cleaning solutions, spilled antifreeze solutions or fuels, non-recyclable chemicals and cleaning materials, and rags or wipes contaminated with these materials. These wastes are typically

generated during construction of any industrial facility. For the PDCF, it is assumed that two 55-gallon drums of hazardous waste will be generated per month from construction activities (based on a 60-month schedule), which would yield approximately 176 ft^3/year. This estimate does not include excavated soil that is characterized as hazardous.

4.3.3 Waste Acceptance

If necessary to meet waste disposal requirements, hazardous waste may be managed at the PDCF. The management of this waste will be done in a manner that will meet (1) requirements of 40 CFR §270.1 (c)(2)(v) and 40 CFR §270.1 (c)(2)(vii), and (2) WSRC 1S SRS WAC Procedure 3.18 *Hazardous, Mixed and Polychlorinated Biphenyl Waste Acceptance Criteria* (WSRC 2002a). In consideration of the PDCF pollution prevention assessments, hazardous waste will (when feasible) be segregated and accumulated in drums that meet RCRA container requirements. This will eliminate a significant effort in material transfer handling, container decontamination, and resulting wastes.

4.3.4 Characterization

Waste may be characterized through laboratory analysis (radiological, chemical, and/or physical), process knowledge, and/or NDA. While analysis is being performed, material will be placed in a holding area and labeled "undergoing characterization." Waste characterization will be conducted in accordance with WSRC 1S SRS WAC Procedure 3.18 *Hazardous, Mixed and Polychlorinated Biphenyl Waste Acceptance Criteria* (WSRC 2002a) and the WAC of the final disposal facility. When the waste type has been determined, it will be moved to the appropriate accumulation area.

4.3.5 Packaging, Storage, and Disposal

Hazardous waste will be handled in accordance with 1S SRS WAC Procedure 3.18 (WSRC 2002a) for preparation for disposal. Hazardous waste may be repackaged for transport to WSRC-SWD, which will either dispose of the waste at the HWSF or transport it offsite for final treatment. Waste to be sent to offsite TSD facilities must be managed to meet the site-specific WAC.

4.4 NONHAZARDOUS WASTE

The requirements for handling, storage, and disposal of nonhazardous wastes are discussed in this section. The design requirements for handling and disposal of nonhazardous waste are described in the PDCF FDD (WSRC 2005). These requirements provided the basis for design of the waste management processes.

4.4.1 Background

Nonhazardous waste is solid or liquid waste that is not listed, does not exhibit RCRA hazardous characteristics, and is not radioactive. Nonhazardous waste does not meet (1) the definitions specified in WSRC 1S SRS WAC Procedure 2.02 *Low-Level Hazardous, TRU, Mixed and PCB Waste Characterization Requirements* (WSRC 2002f), (2) the definitions in 40 CFR §260

Appendix I and 40 CFR §261, or (3) the definitions as outlined above for TRU, MTRU, LLW, MLLW, and hazardous waste.

DOE-Savannah River and the Lower Savannah Council of Governments have committed to the development and use of the Three Rivers Landfill, which accepts wastes from SRS and eight South Carolina counties. The 1,400-acre site, located off Highway 125 adjacent to the site, is the state's first publicly owned, regulated landfill and is expected to provide safe and efficient disposal capacity for over 200,000 tons of sanitary waste each year for the next 50 years.

The existing SRS sanitary waste treatment system will be capable of managing sanitary wastewater generated during PDCF activities.

4.4.2 Sources

Solid nonhazardous waste will be generated during PDCF construction and operations. Liquid nonhazardous waste generated from operations will consist of blowdown and condensates, sanitary wastewater, truck bay washdown water, wastewater from fire suppression system testing, and oils and hydraulic fluids.

Approximately 400,000 gallons/year of liquid nonhazardous waste will be generated during construction.

4.4.3 Waste Acceptance

After sanitary waste items intended for recycling have been removed, SRS sends about 500 tons of waste per month to the Three Rivers Landfill. Because of this commitment, no other options for the disposal of solid sanitary waste are being considered (WSRC 2002e).

PDCF sanitary liquid waste will be accepted by the SRS sanitary waste treatment system.

The regulatory authority, the South Carolina Department of Health and Environmental Control (SCDHEC), has issued to SRS a final NPDES permit that contains metals limits that are more restrictive than in previous permits.

4.4.4 Characterization

Solid nonhazardous waste will meet disposal requirements for Three Rivers Landfill and PDCF sanitary waste will be acceptable for the SRS sanitary wastewater treatment system.

PDCF blowdown and condensates will be collected, transferred to the WSB via a shared connection, and then pumped to the H-16 outfall at Upper Three Runs Creek for discharge. PDCF stormwater will be collected in two dedicated retention basins (North Basin and Southeast Basin) prior to discharge through a new permitted outfall adjacent to the PDCF at the unnamed tributary. It is expected that all discharges will meet permit conditions. See Table 4-1 for provisional limits at both outfalls.

Table 4-1 – PDCF NPDES Permit
Provisional Limits For Discharge to Surface Waters

Wastewaters sent to Unnamed Tributary (Ephemeral Stream)		
Effluent Characteristics	**Permit Limits**	
	Monthly Average	**Maximum Daily**
Copper, total	6.0 µg/l	7.0 µg/l
Lead, total	0.83 µg/l	20.0 µg/l
Mercury, total	0.051 µg/l	0.07 µg/l
Zinc, total	--	70 µg/l
Total Suspended Solids (TSS)	20 mg/l	40 mg/l
pH	4.8 – 8.5	--
Flow	Monitor & Report	--
Wastewaters sent to H-16 Outfall (Direct to Upper Three Runs)		
Effluent Characteristics	**Permit Limits**	
	Monthly Average	**Maximum Daily**
Cadmium, total	260 µg/l	690 µg/l
Chromium, total	1,710 µg/l	2,770 µg/l
Copper, total	1,460 µg/l	2,070 µg/L
Lead, total	290 µg/l	580 µg/L
Mercury	2.3 µg/l	121 µg/L
Nickel, total	2,380 µg/l	3,980 µg/l
Silver, total	240 µg/l	430 µg/l
Zinc, total	1,480 µg/l	2,610 µg/L
Total Suspended Solids (TSS)	30 mg/l	60 mg/l
BOD	20 mg/l	40 mg/l
pH	6.0 – 8.5	--
Flow	Monitor & Report	--

Note: µg/l = micrograms per liter; mg/l = milligrams per liter

4.4.5 Disposal

Solid nonhazardous waste generated from construction and operations will be recycled or sent to the Three Rivers Landfill. Sanitary wastewater will be sent to the SRS sanitary waste treatment system. Blowdown and condensates will be collected, transferred to the WSB via a shared connection, and then discharged through a permitted outfall at Upper Three Runs Creek. Wastewater from fire suppression system testing will be discharged on-grade adjacent to the Pu Processing Building. Washdown water from the truck bay will be collected in a holding tank, pumped to a transport truck, and discharged through a permitted outfall. Oils and hydraulic fluids will be stored temporarily in appropriate containers for offsite recycling by a subcontractor.

Liquid nonhazardous waste generated during construction will be sent to the existing sanitary waste treatment system or taken offsite in portable toilets.

4.5 CONTROL OF AIR POLLUTANT EMISSIONS

The requirements for control and management of air pollutant emissions are discussed in this section. The design requirements for air emissions are described in the PDCF FDD

(WSRC 2005). These requirements provided the basis for design for control and management of air pollutant emissions.

4.5.1 National Ambient Air Quality and Prevention of Significant Deterioration

Impacts to ambient air quality from operations and construction of the PDCF have been modeled based on design inputs. The estimated concentrations from PDCF emissions are compared to the most stringent state or federal guideline such as the regulations in 40 CFR 50, *National Primary and Secondary Ambient Air Quality Standards,* and SCDHEC, Regulation 61-62.5 – Air Pollution Control: Standard No. 2 – Ambient Air Quality Standards (SCDHEC 1996). Neither SRS nor the surrounding counties are designated as nonattainment areas with respect to the criteria air pollutants. Table 4-2 contains estimated emissions from construction and operations as compared to the associated standard. The estimated concentrations shown in Table 4-2 are calculated at the SRS boundary and represent the "highest-high" concentrations for each pollutant and averaging time. In all cases, estimated impacts from construction of PDCF and its operations are well below the applicable standards. Table 4.5.1C in Appendix C provides a comparison to earlier emissions.

Table 4-2. Ambient Air Concentrations (µg/m^3) From Construction and Operation of the PDCF at SRS

Pollutant	Averaging Period	Most Stringent Standard or Guideline	PDCF Estimated Emissions from Operations	PDCF Estimated Emissions from Construction	Highest % of Standard from Construction and Operations
Carbon Monoxide	8 hours	10,000	2.98	2.8	0.03
	1 hour	40,000	15.6	14.7	0.039
Nitrogen Dioxide	Annual	100	0.044	0.025	0.044
PM_{10}	Annual	50	0.042	0.048	0.096
	24 hours	150	0.97	1.1	0.73
Sulfur Dioxide	Annual	80	0.0025	0.0014	0.0031
	24 hours	365	0.056	0.031	0.015
	3 hours	1,300	0.30	0.17	0.023
Total Suspended Particulates	Annual	75	0.04	0.055	0.073
Lead	Calendar Quarterly Mean	1.5	1.7E-09	NA	1.1E-07
Gaseous Fluorides	12 hours	3.7	2.7E-7	NA	7.2E-7
	24 hours	2.9	1.4E-8	NA	4.8E-7
	1 week	1.6	1.4E-8	NA	8.7E-7
	1 month	0.8	1.7E-9	NA	2.1E-7

Note: µg/m^3 = micrograms per cubic meter

The concentrations were estimated using the Industrial Source Complex, Short-Term, Version 3 (ISCST3) computer code based on hourly atmospheric data from 1992 through 1996. The 399 receptor locations used in the analysis were taken from the *Mixed Oxide Fuel Fabrication Facility Environmental Report* (NNSA 2001) and are at the SRS boundary. Fugitive, diesel,

concrete batch plant, and vehicle emissions were modeled as volume sources. PDCF process area emissions were modeled as a point source.

The impacts from construction were based on a 60-month schedule and included the following: fugitive emissions, emissions from diesel construction equipment, a concrete batch plant, and employee vehicles. Fugitive emissions were based on AP-42, *Compilation of Air Pollutant Emission Factors,* Section 13.2.3. Emission factors for diesel construction equipment and employee vehicles were taken from the *Mixed Oxide Fuel Fabrication Facility Environmental Report.* Concrete batch plant emissions were based on AP-42, Section 11.12, and represent controlled emissions from a central mix concrete facility.

The impacts from operations considered potential emissions from the process area, diesel generators, and employee vehicles. Emission factors for employee vehicles were taken from the *Mixed Oxide Fuel Fabrication Facility Environmental Report.* Emission factors for diesel generators were taken from AP-42, Section 3.3. Process area emissions were taken from XCLC-F-00277 (WGI 2003h). The vehicle emissions dominated both the construction and operations categories because, conservatively, all vehicle emissions were modeled as coming from a volume source located at the PDCF.

The purpose of the state Prevention of Significant Deterioration (PSD) program is to implement the federal Clean Air Act requirements for the PSD of air quality. The SCDHEC regulates PSD through Air Pollution Control Regulations and Standards, Regulation 61-62.5, Standard No. 7 Prevention of Significant Deterioration. Class I covers pristine areas of the country where no change from current air quality is allowed. There are no PSD Class I areas within 50 miles of SRS. Table 4-3 shows the expected emissions of pollutants that are estimated to be released from PDCF operations. In all cases, the PDCF emissions are less than the maximum allowable.

Table 4-3. PSD Limits (tons per year) from Operation of the PDCF at SRS

Pollutant	Maximum Allowable Concentration	PDCF Estimated Emissions from Operations
Carbon Monoxide	100	NA
Nitrogen Oxides	40	8.0E-03
Sulfur Dioxide	40	2.4
Particulate Matter	25	NA
PM_{10}	15	2.6
Ozone	40	3.5
Lead	0.6	7.7E-07
Beryllium	4.0E-04	8.3E-06
Fluorides	3.0	7.7E-07

The diesel generators are exempt from permitting requirements provided that they operate for fewer than 250 hours per year. This is expected to be the case, as each generator is expected to operate approximately 2 hours per month for required testing, for a total of 24 hours. However, the releases from each generator were modeled at 250 hours of operation and the emissions still were under the maximum allowable, although the release of nitrogen oxides was 90 percent of the standard.

4.5.2 National Emissions Standards for Hazardous Air Pollutants

Preliminary estimates of the radiological air emissions have been updated, and the specific radionuclide emissions from each operation are listed in Table 4.5.2C of the classified appendix (Appendix C). These estimates have been developed for the purpose of compliance with the Clean Air Act (codified in 40 CFR 61: Subpart C — Beryllium and Subpart H — Radionuclides) and for SCDHEC, Regulation 61-62.63 — *National Emission Standards for Hazardous Air Pollutants.* Impacts from the emission of radiological contaminants during operations shall have a dose to the maximally exposed individual below the threshold of 0.1 mrem/year (0.019 mrem/year), or be subject to a review under the National Emissions Standards for Hazardous Air Pollutants (NESHAPs), Subpart H. The standard (40 CFR §61.92) requires that the release of radionuclide emissions shall not exceed that which would cause any member of the public to receive an effective dose equivalent of 10 mrem/year. The radiological impacts were modeled using CAP88-PC, an EPA-approved radiological air dispersion model, and the resulting dose to the maximally exposed individual was 0.019 mrem/year. This is below the threshold for permitting and far below the standard.

Potential releases of beryllium have been estimated from routine operations at the PDCF and used in NESHAPs modeling of potential impacts. The routine release of beryllium is also well below the NESHAPs standard of 10 grams over a 24-hour period (40 CFR §61.32). Because there is no threshold quantity to determine permitting requirements, any release requires a permit. Therefore, a NESHAPs permit is being pursued for the PDCF.

4.5.3 Toxic Air Pollutants

The state of South Carolina regulates 256 toxic air pollutants through Regulation 61-62.5 — Air Pollution Control Standards: Standard No. 8 — Toxic Air Pollutants (SCDHEC 1996). The potential contaminants of concern are shown in Table 4-4. Potential releases of toxic air pollutants have been estimated from routine operations at the PDCF and were used to model potential impacts. In all cases, the contaminant of concern is well below the regulatory limit. The impacts were estimated for the SRS boundary and were modeled using ISCST3 and 1992 through 1996 hourly atmospheric data. The emissions were modeled as coming from a point source located at the PDCF.

Table 4-4. Toxic Air Pollutant Concentrations (µg/m^3) From Operation of the PDCF at SRS

Pollutant	Maximum Allowable Concentration (µg/m^3)	PDCF Estimated Impacts from Operations	Percent of Standard
Beryllium	0.01	1.8E-08	1.8E-04
Cadmium	0.25	6.9E-09	2.8E-06
Chlorine	75.0	2.1E-09	2.8E-09
Chromium (+6)	2.50	1.7E-07	6.9E-06
Cobalt	0.25	6.9E-09	2.8E-06
Manganese Compounds	25.0	6.9E-09	2.8E-08
Nickel	0.50	1.4E-08	2.8E-06
Phosphorus	0.50	6.9E-09	1.4E-06

Note: µg/m^3 = micrograms per cubic meter

4.6 STORMWATER

The requirements for management of stormwater runoff associated with the PDCF structure are discussed in this section. The design requirements for stormwater management are described in the PDCF FDD (WSRC 2005). These requirements provided the basis for design of stormwater management processes and features.

Stormwater is runoff from a storm event, snowmelt runoff, and surface runoff and drainage.

The PDCF will have two dedicated stormwater retention basins. One basin will be located on the north side of the PDCF (North Basin); another will be located on the southeast portion of the PDCF site (Southeast Basin). Both retention basins were designed to manage runoff from the PDCF site, including WSB runoff to the Southeast Basin. The locations of the stormwater retention basins are illustrated in Figure 4-2.

The North Basin was sized to provide a total discharge volume of 9.9 acre-feet of water (DCS01-WEP-DS-CAL-00070) (WGI 2003e) for a 100-year storm. The Southeast Basin was sized to provide a total discharge volume of 6.4 acre-feet of water for a 100-year storm (C-CLC-F-00536) (WGI 2005b). Stormwater will be collected in the retention basins and discharged through a new permitted outfall adjacent to the PDCF at the unnamed tributary.

4.7 DECOMMISSIONING WASTE

A preliminary discussion of management of waste that will be generated from decommissioning of the PDCF is presented in this section. The PDCF is scheduled to be operational in 2010 and have an operational life of approximately 7.5 years. Given the technological advances that will occur over the next several years, as well as the changes that will occur in the facility mission, regulatory requirements for waste generation and management, and SRS practices and procedures over the next quarter century, the discussion of waste from decommissioning activities is preliminary. For purposes of this plan, decommissioning would consist of the disposition option "Sand Filter Abandoned in Place," which is described along with other options in Section 4.7.5.

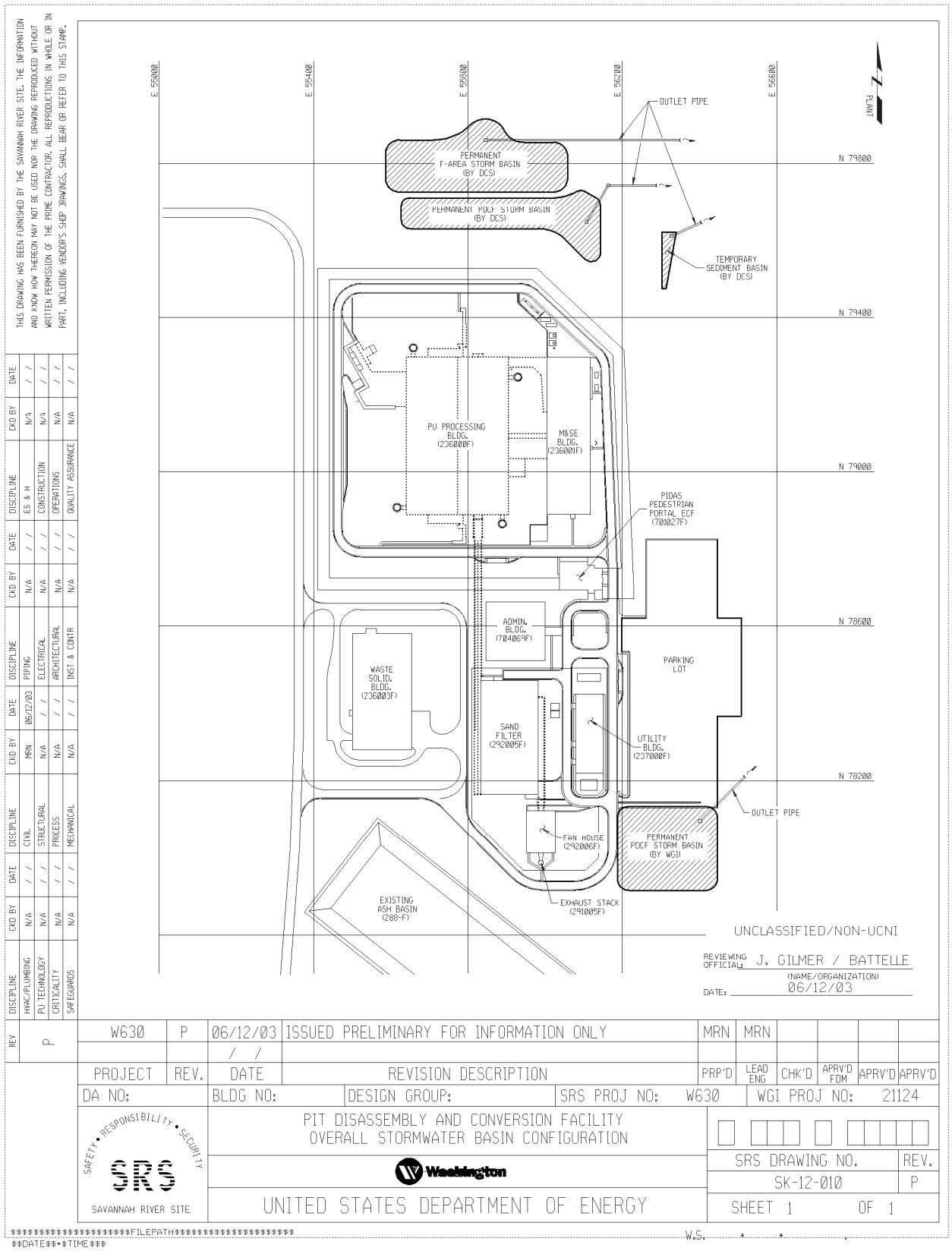

Figure 4-2. Locations of Stormwater Retention Basins, Savannah River Site

With this disposition option, the PDCF would be readied for other activities or NNSA missions by closing the Sand Filter and removing equipment. The Sand Filter would be capped, covered, and abandoned in place. Based on current design and assumptions documented in the *PDCF Life Cycle Cost Estimate* (WGI 2004a) and *PDCF HEPA Filter/Sand Alternatives Analysis* (WGI 2001a), the estimated volume of waste from closure of the Sand Filter would be 513,000 ft^3 of solid LLW (i.e., Sand Filter media). Demolition of other PDCF facilities is not included in this plan. Likewise, because the methods of decontamination have not been selected, no estimates of waste volumes were calculated for waste associated with decontamination. Facility design has incorporated features that will minimize the effort required and the wastes that would be generated during decommissioning.

In order to track the management of wastes that will be generated as a result of facility decommissioning, the following discussion presents the current FDD requirements for decommissioning (WSRC 2005), an overview of existing DOE guidance for PDCF decommissioning (DOE 1999a through 1999c, DOE 2001b, and DOE 2001c), brief summaries of the phases of the facility disposition process, a brief discussion of the impacts of facility disposition decisions on waste management, and PDCF options.

The overview of DOE/NNSA guidance provides general descriptions of the types of activities that may occur during final operations through final disposition as well as the sequencing of activities that will likely generate "post-operational" waste. In this framework, the sequencing of activities is presented to illustrate that decisions impacting estimates of decommissioning waste types, volumes (e.g., decontamination methods), and costs will not be made until a number of end-state planning and evaluation steps have been completed.

4.7.1 FDD Requirements for Decommissioning

The design requirements for decommissioning are described in the PDCF FDD (WSRC 2005) as follows:

- The PDCF shall be designed to facilitate eventual decommissioning and the related waste disposal in accordance with the requirements of DOE Order 430.1A, *Life Cycle Asset Management*; DOE Order 420.1A, *Facility Safety*; DOE Order 435.1 Change 1, *Radioactive Waste Management*; DOE-STD-1128, *Guide of Good Practices for Occupational Radiological Protection in Plutonium Facilities*; and DOE-HDBK-1132, *Design Considerations*. (FDD, Section 3.2.9.12)

4.7.2 DOE Orders and Guidance for Decommissioning

The DOE Orders and guidance for implementing DOE requirements specific to transition and disposition of contaminated, excess facilities are listed below. The information in this section is taken from these guides.

1. DOE Order 430.1A, *Life Cycle Asset Management* (DOE 1998) — identifies minimum requirements for disposition of a facility.

2. DOE Policy 441.1, *DOE Radiological Health and Safety Policy* (DOE 1996a) — provides a technical standard for integrating health and safety measures into decommissioning activities.

3. *Transition Implementation Guide,* DOE G 430.1-5 (DOE 2001c) — provides guidance on developing, planning, and implementing requirements and activities during the transition phase at DOE facilities that have been declared or are forecast to become excess to any future mission requirements.

4. *Deactivation Implementation Guide*, DOE G 430.1-3 (DOE 1999b) — provides guidance on developing, planning, and implementing deactivation requirements for weapons complex facilities that have been declared or are forecast to become excess to any future mission requirements.

5. *Decommissioning Implementation Guide,* DOE G 430.1-4 (DOE 1999c) — provides guidance on planning and implementing decommissioning activities for weapons complex facilities that have been declared or are forecast to become excess to any future mission requirements.

6. *Implementation Guide for Surveillance and Maintenance During Facility Transition and Disposition,* DOE G 430.1-2 (DOE 1999a) — provides guidance on surveillance and maintenance activities conducted as part of facility transition and disposition activities at weapons complex facilities that have been declared or are forecast to become excess to any future mission requirements.

7. *Decommissioning Handbook, Procedures and Practices for Decommissioning* (DOE 2000c) — provides examples and lessons learned as well as practices and procedures for implementing each step of life-cycle asset management as prescribed by DOE Order 430.1A.

8. *Radioactive Waste Management*, DOE O 435.1 Change 1 (DOE 2001a) — provides guidance to ensure that all NNSA radioactive waste is managed in a manner that is protective of worker and public health and safety, and the environment.

9. *Radioactive Waste Management Manual*, DOE M 435.1-1, Change 1 (DOE 2001b) — describes the requirements and establishes specific responsibilities for implementing DOE O 435.1, *Radioactive Waste Management*.

10. *Decommissioning Benchmarking Study* (DOE 1997) — presents approaches for improved facility decommissioning based on lessons learned; also provides preliminary waste volume estimating assumptions.

11. *Pit Disassembly and Conversion Facility, Design Considerations for Implementation of Decontamination and Decommissioning Design Features* (WGI 2000) — presents design considerations that can be used to facilitate decontamination; also provides options for decontamination methodologies.

The goal of the processes described in the guides is continued hazard mitigation and risk reduction throughout the transition and disposition phases of the facility.

4.7.3 Facility Disposition Process

The phases of the facility disposition process are summarized as follows:

Transition Phase - When PDCF operations cease and the facility is declared or forecast to be excess, it will pass into a transition phase in which the facility is placed in stable and known conditions and hazards are identified, eliminated, and/or mitigated. According to the *Deactivation Implementation Guide,* transition activities should be completed before facility operational capabilities are lost. An example that is applicable to waste management would be processing/solidifying all remaining expired calibration standards and excess chemicals as part of normal operations while the Analytical Laboratory glovebox is online.

Deactivation Phase - Following operational shutdown and transition, the next phase is deactivation, which places the facility in a safe shutdown condition that is economical to monitor and maintain for an extended period, until eventual decommissioning of the facility. Deactivation places the facility in a low-risk state with minimum surveillance and maintenance requirements.

Decommissioning Phase - The final facility disposition phase is decommissioning, during which the facility is taken to its ultimate end state through decontamination and/or dismantlement. Activities during this phase will likely generate the most significant volumes of post-operational waste.

Surveillance and Maintenance - Surveillance and maintenance activities are conducted throughout the life cycle of the facility, at levels appropriate to maintain the facility safety envelope during final operations, transition, and final disposition. Surveillance and maintenance activities include periodic inspections and maintenance of structures, systems, and equipment to ensure that contamination is adequately contained and that potential hazards are eliminated or mitigated and controlled.

The phases and sequencing of the disposition process are illustrated in Figure 4-3 (taken from *Deactivation Implementation Guide* [DOE 1999b]).

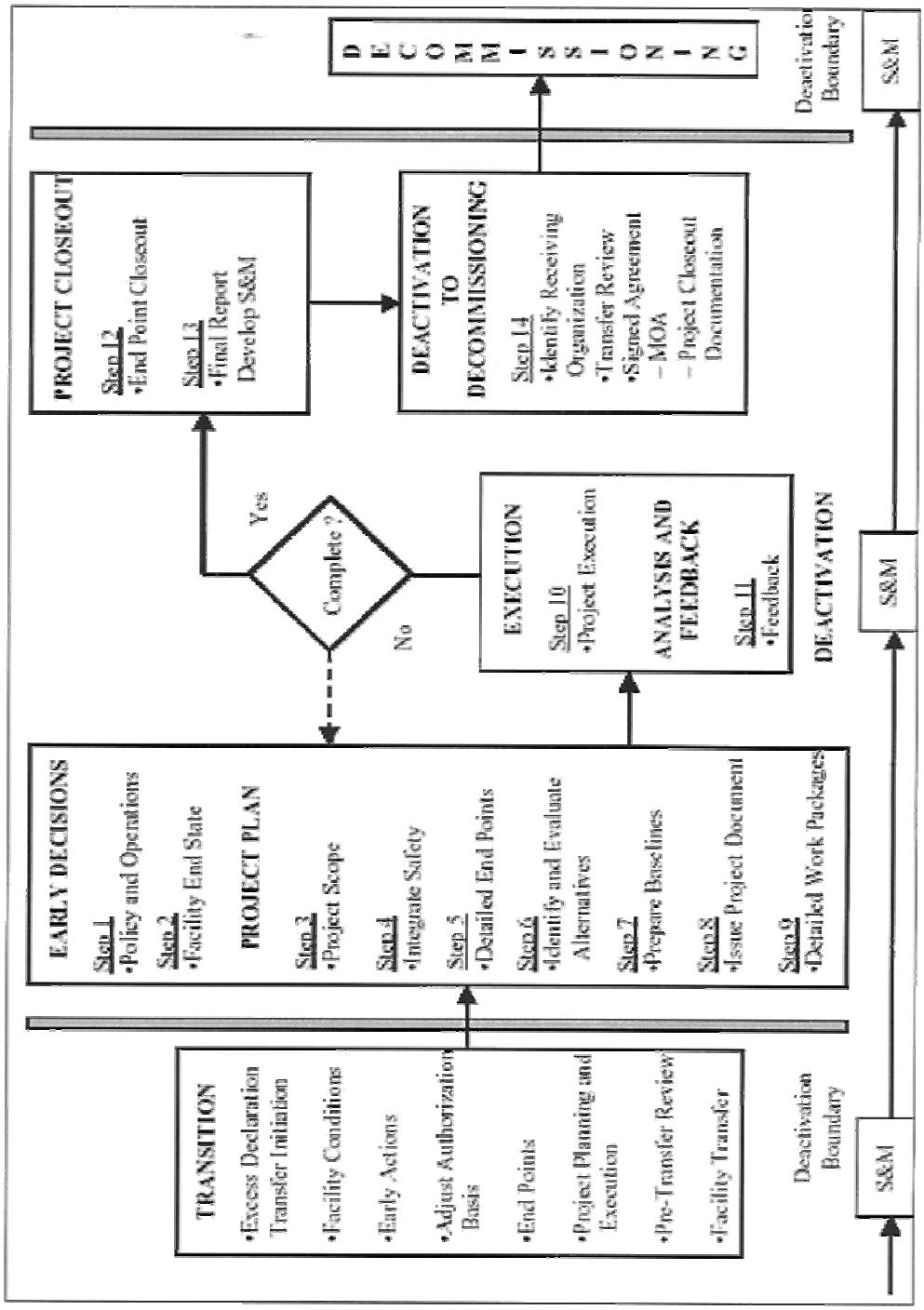

Figure 4-3. Facility Disposition Process
(from DOE G 430.1-3, Figure 1) (DOE 1999b)

4.7.4 Impacts of Facility Disposition Decisions on Waste Management

The decision points in facility disposition that will impact the types and volumes of waste that will be generated from post-operational activities include the following:

- Overall facility end-state
- Detailed end-points for specific areas within the facility
- End-point closure methods and practices, including:
    - Disposition of remaining radiological and hazardous materials
    - Equipment removal
    - Decontamination in-place of structures and equipment
    - Decontamination of structures and equipment that will be removed

4.7.5 Options Considered During Design

Sand Filter Abandoned in Place: The PDCF Sand Filter would be capped, covered, and abandoned in place. The volume of waste associated with this option is estimated to be approximately 513,000 ft^3. A preliminary evaluation (WGI 2001a) indicated that waste from decommissioning of the Sand Filter (i.e., Sand Filter media) would be categorized as LLW. The remaining PDCF structures are assumed to be readied for other NNSA missions; thus, waste volume estimates associated with demolition are not included in this plan. Likewise, the methods of decontamination have not been selected; thus, no waste volume estimates associated with decontamination are presented.

All PDCF Facilities Readied for New Mission: Under this scenario, the Sand Filter would not be abandoned in place but would be cleaned depending on existing levels of contamination. Other PDCF facilities would go through the phases described in Section 4.7.3 in order to accept a new mission. This would include the following activities:

- Removing obsolete equipment
- Flushing lines such as the HAW and LAW
- Removing GFD equipment, except for the robotics and Internal Transport System
- Wiping down gloveboxes to reduce contamination levels
- Removing instrumentation and control equipment
- Sealing gloveports
- Determining the level of contamination in the Sand Filter, then cleaning for reuse

- Determining the level of contamination in the HVAC system, and considering cleaning for reuse

- Placing the Utility Building in cold standby to be reactivated for new mission

4.8 WASTE ISSUES

PDCF operation, construction, and decommissioning activities will not generate any "orphan" waste streams. All PDCF waste streams that have been identified during the design stage of the PDCF have an appropriate disposition pathway. This section is provided in this plan to identify previous waste-related issues.

- Radiologically contaminated oil from equipment in process areas and gloveboxes – Based on communications with LANL design engineers (LANL 2002c), no equipment in the process areas will require oil. However, samples will be drawn from oil systems to check for contamination, creating a potential for small amounts of oil waste. Any waste of this nature would be absorbed on a rag and disposed of as a solid waste. Current design information also indicates that radiologically contaminated oil will not be generated. The lathe will use about 100 milliliters of hydraulic fluid, but it is expected that this fluid will not be changed out. Thus, there should be no opportunities for radiologically contaminated waste oil to be generated in volumes requiring disposal as a liquid.

- Verification that HEU content for liquid waste is within limits to be transferred to ETF – All LAW liquids destined for transfer to the ETF will be collected in a tank and sampled prior to being pumped to the ETF. The results of sample analysis will determine the final disposition of the liquid. It is expected that these liquids will meet the WSRC 1S SRS WAC Procedure 4.02 *F/H Effluent Treatment Facility Waste Acceptance Criteria* (WSRC 2002b). However, if analysis indicates a deviation from the acceptance limits in Procedure 4.02, the liquid waste will be transferred to the HAW tank for disposal at the WSB. Although LAW is not specifically discussed in the design basis for the WSB, the volume and content are well within the parameters established by the HAW, which is destined for the WSB.

- Classification issues related to PDCF waste – see discussion in Section 4.8 of Appendix C.

- Earlier versions of the Waste Management Plan were developed based on technical guidance that auxiliary HEU oxide and sludge would be transported to another DOE facility for processing. This direction has changed based on the Engineering Order for Baseline Change Proposal 03-0069 dated August 11, 2004. Auxiliary HEU is now included in waste estimates for PDCF.

- Earlier versions of the Waste Management Plan discussed DOE's *Transuranic Waste Performance Management Plan* and DOE's intent to greatly accelerate shipments of legacy waste in the DOE system, with a target completion in the year 2013. Due to funding problems, the plan to greatly accelerate shipments is no longer being followed; thus, the infrastructure at SRS should not be taxed when PDCF begins generating TRU waste.

5.0 WASTE MANAGEMENT

This section provides tables showing (1) the estimates of waste volumes and management of anticipated waste streams from the PDCF for construction, operations, and stormwater, and (2) waste characterization by system. Waste characteristics are based on best available information and will be updated as design progresses and new information is made available. It should be noted that waste volume estimates do not include any estimates from decontamination or decommissioning.

The anticipated waste types and estimated volumes for construction and operation of the PDCF were derived from nine calculation sets that support facility design. Supporting calculations for waste volumes are contained in Calculation Set Nos. X-CLC-F-00270 (WGI 2001b), X-CLC-F-00271 (WGI 2003a), X-CLC-F-00272 (WGI 2003b), X-CLC-F-00304 (WGI 2003c), X-CLC-F-00309 (WGI 2002b), X-CLC-F-00316 (WGI 2005a), X-CLC-F-00317 (WGI 2005m), X-CLC-F-00330 (WGI 2003d), and X-CLC-F-00331 (WGI 2005n). The information presented here will assist pollution prevention efforts and allow the proposed waste disposition paths to be certified by WSRC waste officials as required in FDD Section 3.2.9.6.

5.1 ESTIMATED WASTE VOLUMES FOR NORMAL PROCESS CONDITIONS

In February 2002, a PDCF waste management study (WGI 2002a) was published to identify, quantify, and provide preliminary characterization of all waste types identified as a result of processes from the PDCF. This information has been used to prepare this waste management plan. One purpose of this plan is to update the waste characterization information and to assess its disposition. Table 5-1 lists total waste volumes by waste type. Table 5.1C of Appendix C provides a comparison with documentation developed earlier.

The waste stream discussions in Section 4.0 are needed to determine system-specific needs that relate to a physical location and type of waste handled. The total waste stream volume estimates have been compiled to address PDCF programmatic issues and PDCF and SRS system capabilities and capacities. By understanding the total volumes of waste generated by the PDCF and the volumes currently generated at SRS and other proposed facilities, project designers can evaluate capacity, additional permitting needs, and any required design changes to address cumulative waste activities at the PDCF and the combined activities of the PDCF, SRS, and other proposed waste handling facilities.

5.2 SOLID WASTE CHARACTERIZATION

Solid wastes from the processing areas are assumed to be radiologically contaminated by the isotopes shown in Table 5-2, to the same percentage distribution shown in that table. Table 5-3 shows chemical impurities that may be present in waste streams. Additional chemical impurities are in Table 5.2-1C of the classified appendix (Appendix C). Table 5.2-2C in Appendix C shows waste information sorted by stream numbers used on the PDCF PFDs. Refer to drawings PFD X-M7-0051 (WGI 2003j) and PFD X-M7-0052 (WGI 2003k) or further identification of the waste streams described in Table 5.2-2C of Appendix C.)

Table 5-1. Projected Waste Volumes and Management[a,b]

Waste Type	Disposal Form	Volume Used for Design Prior to 90% Title II	Storage	Management	Disposal
TRU	Solid	2,992 ft^3/year	PDCF/WSB	Drying	WIPP
MTRU	Solid	1,978 ft^3/year	PDCF/WSB	Drying/ absorption	WIPP
Concentrated Liquid Waste	Solid	20.6 gallons/year	PDCF/WSB	Dry/calcine in Analytical Lab	WIPP
HAW (includes MHAW)	Liquid	11,700 gallons/year	PDCF Tank	Collected in tanks, pumped to WSB, solidified	WIPP
LLW	Solid	30,975 ft^3/year	E-Area	Drying/ absorption	E-Area
LAW	Liquid	24,041 gallons/year, and 26,100 gallons per fire event	PDCF tank, sampled	Piped to ETF or WSB	Permitted outfall
MLLW	Solid & Liquid	<0.5 gallon/year liquid only	Tank	Collected in HAW tank, pumped to WSB, solidified (if liquid)	WIPP
Hazardous	Solid & Liquid	3.5 ft^3/year	HWSF		RCRA TSD
Hazardous (Construction)	Solid & Liquid	176 ft^3/year	HWSF		RCRA TSD
Nonhazardous	Solid	63,000 ft^3/year			Landfill or Recycle
Nonhazardous (Construction)	Solid	4,200 ft^3/year			Landfill or Recycle
Nonhazardous	Liquid	8,234,829 gallons/year		Periodic sample	Sanitary Waste Treatment; Permitted outfall; Oil-Offsite Recycle
Nonhazardous (Construction)	Liquid	400,000 gallons/year		ETF	Permitted outfall
Stormwater	Liquid	North pond – 9.9 acre-feet; Southeast pond – 6.4 acre-feet	Retention basin	Controlled release	Permitted outfall (unnamed tributary)

a Waste volume estimates (excluding decommissioning waste) derived from Calculation Set Nos. X-CLC-F-00270 (WGI 2001b), X-CLC-F-00271 (WGI 2003a), X-CLC-F-00272 (WGI 2003b), X-CLC-F-00304 (WGI 2003c), X-CLC-F-00309 (WGI 2002b), X-CLC-F-00316 (WGI 2005a), X-CLC-F-00317 (WGI 2005m), X-CLC-F-00330 (WGI 2003d), and X-CLC-F-00331 (WGI 2005n).

b Waste volume estimates do not include decommissioning waste.

Table 5-2. Isotopic Distribution[a]

Plutonium Isotopes	Percent
Plutonium-238	0.05
Plutonium-239	92.35
Plutonium-240	6.50
Plutonium-241	0.00
Plutonium-242	0.10
Americium-241	1.00
Uranium Isotopes	**Percent**
Uranium-232	0.00
Uranium-234	1.00
Uranium-235	93.1
Uranium-236	0.50
Uranium-238	5.40

a. Plutonium isotopic distribution derived from *Isotopic Values and Dose Conversion Factors* (DOE 2000a), and from *Uranium Isotopic Distribution from Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement*, Vol. 1, Table G.1-1, June 1, 1996 (DOE 1996b).

Table 5-3. Chemical Impurities in Plutonium Oxide[a]

Chemical Component				
Aluminum	Cobalt	Gadolinium	Nickel	Tin
Boron	Chromium	Indium	Phosphorus	Titanium
Beryllium	Copper	Magnesium	Lead	Thorium
Bismuth	Dysprosium	Manganese	Potassium	Vanadium
Carbon	Europium	Molybdenum	Lithium	Tungsten
Calcium	Fluorine	Nitrogen	Sulfur	Zinc
Cadmium	Iron	Sodium	Silicon	Zirconium
Chlorine	Gallium	Niobium	Samarium	

a. Information on trace elements derived from *Pit Disassembly and Conversion and Mixed Oxide Fuel Fabrication Facilities, Interface Control Document*, (NNSA 2001, Table 5-1).

Potential weights of TRU waste drums are under evaluation, and preliminary information indicates that all of the waste drums will be well under the 1,000-pound limit listed in WIPP WAC Rev 3.0 (DOE 2005) (or most current version). Only a small percentage will approach 800 pounds. Further detail will be provided once the evaluation is completed. The activity level of TRU waste drums is also being evaluated. Preliminary information suggests that PDCF waste streams will be able to meet the current WIPP WAC FGE and decay heat requirements. Further evaluation is needed to determine appropriate loading for each PDCF waste stream to remain in compliance with PE-Ci limits.

5.2.1 Maintenance Wastes

The waste streams listed in Table 5.2.1C of Appendix C are segregated into three categories: (1) closed glovebox maintenance (failed equipment, worn parts, etc.), (2) open glovebox maintenance (lead-lined gloves, swipes, rags, etc.), and (3) process-related waste. These estimates indicate that maintenance activities account for 100 percent of the LLW volume and 65 percent of the TRU waste totals. Open glovebox conditions account for approximately 2 percent of the TRU waste and 1 percent of the LLW.

During closed glovebox conditions, maintenance wastes will be either transported to the Waste Management glovebox through the Internal Transport conveyor or bagged out. Bagged-out wastes will be placed in a drum, sealed, and hand-carted to the Waste Management area.

During open glovebox conditions, all maintenance waste will be placed in a drum, sealed, and hand-carted to the Waste Management area. The volume of maintenance waste that will be hand-carted to the Waste Management gloveboxes can conservatively be assumed to equal the open glovebox waste (TRU – 113 ft^3; LLW – 302 ft^3). Under this assumption, a vast majority of the maintenance waste is generated during operations on an operating day, while 2 percent or less is generated on a maintenance day. A level of contamination of the maintenance waste will be estimated based on an assumption of a certain level of surface contamination in the glovebox. Waste that cannot be sent to the Internal Transport System will be removed through a bagout port, if possible. If the waste item is too large to be removed through a bagout port, it will be removed through a maintenance panel. Waste that is identified as closed-glovebox maintenance waste will be sent through the Internal Transport System to the Waste Management glovebox for TRU waste.

5.2.2 Criticality Controls

The Waste Management gloveboxes will have a limit of 200 grams of fissile mass that can be present at any one time. The layouts of gloveboxes in the Waste Management area has/have been designed so that individual gloveboxes are independent criticality control areas. The Waste Management gloveboxes are at least 2 feet from the Waste NDA station.

Fissile material introduced from the process conveyors will be handled one waste batch at a time. The insertion or removal of fissile material is forbidden through bagout ports during normal operations. However, exceptions to this administrative control may be necessary in special circumstances. In order to provide the PDCF with a means to remedy nonconforming waste containers, it was agreed at the 60% Waste Topical Review (WGI 2003l) that approval could be granted to bag-in a nonconforming container at the Waste Management glovebox and allow waste bags to be removed to bring the container into conformance. The Waste Management glovebox was designed to allow for management of nonconforming containers, and the special circumstances of such an event would trigger close oversight that would ensure the safety of the operation without violation of criticality controls.

During conditions when a glovebox must be opened, any known fissile material must be removed through the criticality interlocks. A convenience vacuum can be used to clean up the glovebox.

5.2.3 Reactive Metals or Chemicals

The Waste Management glovebox will contain a unit that will allow pyrophoric metal fines, plutonium hydride, or reactive chemicals to be reacted. The unit will be filled with nitrogen and will introduce air at a slow rate in order passivate reactive metals or chemicals. The slow introduction of air allows any potential reactive metals or chemicals to lose their chemical reactivity in a controlled manner. Once this process is complete, the waste is reintroduced into the Waste Management glovebox for further processing.

There may be instances, such as equipment failure in the Hydride/Dehydride glovebox, when it is necessary to passivate remaining material in the process glovebox. In such a case, a material assessment would be needed to determine the amount of material that remains in the glovebox prior to opening and its potential for an uncontrolled reaction. This would be the appropriate course of action to be taken to minimize risk of a fire event.

5.3 LIQUID WASTE CHARACTERIZATION

The liquid waste characteristics presented in Table 5-4 are nonhazardous liquids from sources that require disposition through a permitted outfall, through offsite recycling for oil, or through the SRS sanitary waste treatment system. Table 5-5 presents expected characteristics of blowdown. The outfall sources include sanitary waste, blowdown, and condensate from various tanks. Refer to drawings PFD X-M7-F-0087 (WGI 2003m), PFD X-M7-F-0088 (WGI 2003n), and PFD X-M7-F-0093 (WGI 2003o) for further identification of these waste streams. The basis for these volumes is derived from calculations in X-CLC-F-00304 (WGI 2003c), X-CLC-F-00309 (WGI 2002b), X-CLC-F-00317 (WGI 2005m), X-CLC-F-00330 (WGI 2003d), and X-CLC-F-00331 (WGI 2005n).

5.4 CHARACTERIZATION OF ANALYTICAL LABORATORY LIQUID WASTES

The chemical and radiological constituents of materials that will be processed in the PDCF, the chemical and radiological constituents that are anticipated in PDCF waste streams, and representative chemicals that will be used by the Analytical Laboratory are listed in Appendix A; the associated Waste Characterization Process Reports are provided in Appendix B. A representative grouping of these chemicals (Table 5-6) is provided as information on the general nature of chemicals from the Analytical Laboratory. The liquids resulting from Analytical Laboratory processes will total gallons/year.

Table 5-7 provides characterization information for HAW and concentrated liquid waste. All liquid radiological waste generated by the PDCF, excluding concentrated liquid waste, will be sent to existing facilities at SRS for treatment. HAW will be collected in tanks and pumped to the WSB for solidification, and LAW will be sent to the ETF or WSB for further treatment prior to discharge. No liquid radiological discharges will require additional monitoring and surveillance as specified in the *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (DOE 1991).

Table 5-4. Liquid Waste Sources and Volumes

Waste Source	Waste Type	Volume (Gallons/Year)	Disposition
Hydraulic Fluids and Oils	Nonhazardous	57	Offsite Recycle
Sanitary	Nonhazardous	4,680,000	Sanitary Waste Treatment
Breathing Air Condensate	Nonhazardous	41,876	Collected and pumped to tie-in with WSB then pumped Upper Three Runs Creek Outfall
Instrument/Plant Air Condensate	Nonhazardous	14,106	
Utility Cooling Tower Blowdown	Nonhazardous	523,750	
Process Chilled Water Blowdown	Nonhazardous	1,200	
HVAC Condensate	Nonhazardous	1,900,000	
HVAC Cooling Tower Blowdown	Nonhazardous	1,070,000	
Stormwater	Nonhazardous	North pond – 9.9 acre-feet; Southeast pond – 6.4 acre-feet	Collected in retention basins, discharged through permitted outfall
Wastewater from Fire Suppression System Testing	Nonhazardous	1,440 (could increase to 2,000 if problems encountered during tests)	Discharged on grade adjacent to Pu Processing Building
Washdown Water from Truck Bay	Nonhazardous	2,400	Exterior buried holding tank, pumped to transport truck, discharged at outfall
Waste Management System	LAW	2,200	ETF/WSB – Outfall
Reverse Osmosis Blowdown	LAW	4,135	ETF/WSB – Outfall
Limit Volume Cooling Water	LAW	32	ETF/WSB – Outfall
Mop Water (Pu Processing Building only)	LAW	4,488	ETF/WSB – Outfall
Safety Shower (Pu Processing Building only)	LAW	4,536	ETF/WSB – Outfall
Process Cooling Water Blowdown	LAW	1,050	ETF/WSB – Outfall
Tank Flushing/Sump Washing	LAW	7,600	ETF/WSB – Outfall
Wastewater from Fire Event	LAW	26,100 gallons per fire event	ETF/WSB – Outfall
Uranium Processing & Staging System	HAW	38	PDCF storage tank – WSB for evaporation, solidification, and transport to WIPP; supernatant to ETF – outfall
Product Canning System	HAW	337	
Analytical Laboratory	HAW	11,325	
Concentrated Liquid Waste	HAW	20.6	Dried, calcined in Analytical Laboratory glovebox, resulting solids handled as TRU waste – WIPP

Table 5-5. Estimates of Blowdown Concentrations

Parameter	Makeup Service Water Concentrations[a]	Blowdown Water Concentrations
pH	4.23	-
Temperature, °F	73.2	-
Aluminum, mg/l	0.291	1.54
Copper, mg/l	0.00422	0.0224
Iron, mg/l	0.8924	4.73
Lead, mg/l	0.002652	0.0141
Magnesium, mg/l	0.3943	2.09
Manganese, mg/l	0.01679	0.089
Mercury, ppb	0.1956	1.04
Zinc, mg/l	0.01321	0.07
Total Suspended Solids, mg/l	4.0	21.2
Calcium, mg/l	0.93	4.93
Chloride, mg/l	1.7	9.01
Hardness, mg/l	17	90.1

a–Data from F-Area, 2003; mg/l = milligrams per liter; ppb = parts per billion.

Table 5-6. General Chemical Categories of Analytical Laboratory

Category	Volume
Hydrochloric acid and mixtures	18 gallons/year
Miscellaneous liquid chemicals	49 gallons/year
Nitric acid and mixtures	280 gallons/year
Solid chemicals	44 pounds/year
Standards	28.6 gallons/year
Water	95 gallons/year
Gas	1,398 standard ft^3/year

Table 5-7. Average Contaminant Concentration for HAW and Concentrated Liquid Waste

Contaminant	HAW Average (grams)	Concentrated Liquid Waste Average (grams)
Nitrates	334	0
Sulfates	2.5	--
Chlorides	9.18	--
Fluorides	0.28	--
Chromium	0.67	--
Beryllium	4.9E-06	--
Barium	0.033	--
Acetone	0.06	--
Plutonium	3.9	60
HEU	2.5	590
Approximate pH	<1	--

6.0 POLLUTION PREVENTION / WASTE MINIMIZATION

DOE requires that principles of pollution prevention, sustainable design, and energy efficiency be incorporated into its facilities built with DOE funding or used to house DOE-funded operations. Pollution prevention and waste minimization requirements are set forth in the FDD, Rev. 5, and are addressed in two separate documents prepared for the PDCF: the Pollution Prevention Design Assessment (WGI 2003q) and the Pollution Prevention Opportunity Assessment (WGI 2003p). Both pollution prevention assessments were completed early in Title II design; thus, the opportunities presented in this section may be reduced or even eliminated because of decisions made through design evolution and future operational decisions. This section discusses the accomplishments and opportunities of the pollution prevention program.

6.1 POLLUTION PREVENTION DESIGN ASSESSMENT

The *Pollution Prevention Design Assessment* (WGI 2003q) documents the pollution prevention accomplishments and opportunities identified in Title I and through 30% of Title II that (1) impact a portion of the facility design, and/or (2) include design elements of the facility or its equipment.

Eighteen pollution prevention accomplishments have been identified in the design assessment report:

- Instrumentation and controls (I&C) placed outside of contamination areas: Design documents for the PDCF incorporate an approach for locating I&C support such that items are accessible to workers but outside of radiological buffer areas (RBAs) and contamination areas wherever feasible.

- Oil-less breathing air compressors: The PDCF design documentation calls for purchase of three oil-less breathing air compressors.

- Oil-less vacuum pump: The PDCF design specifies oil-less vacuum pumps.

- Decontamination and decommissioning (D&D): As a result of planning for pollution prevention, routine operations and process equipment are designed to minimize waste generated during operations and to curtail introduction of materials that would change the waste designation of D&D waste.

- Elimination of wastewater pipe drain traps: HAW drains from the Analytical Laboratory are designed without traps to allow for greater flow of liquid waste, lessening the accumulation of liquid waste and radioactive contaminants. The liquid waste storage tanks have been designed with smooth surfaces and curved bottoms. This will minimize the accumulation of radioactive contaminants.

- Joint infrastructure coordination: The design basis for the PDCF incorporates requirements to integrate facility infrastructure with that of existing and other new facilities. The existing Savannah River Consolidated Sewer System will provide service

for all new facilities. Integration of road upgrades takes into account requirements from the MFFF, the PDCF, the WSB, and the existing F-Area. A determination to set up a single concrete batch plant was based upon construction needs for all of these facilities.

- Filter of exhaust ports: Exhaust ports from gloveboxes and waste tanks are filtered prior to entering the HVAC exhaust system. The filters minimize particulates entering the HVAC system.

- MFFF common fill material: The design basis for the PDCF incorporates requirements to utilize surplus common fill removed during the MFFF facility construction.

- Design for recycling containers: Following the practices established for the SRS, all waste materials that can be recycled will be identified, and the facility design incorporates locations for collecting recyclables within the facility.

- Environmentally preferable purchasing: Design specifications state that environmentally preferable materials are to be used when those materials meet design and site requirements, are cost competitive, and are available for the items required by the EPA.

- T-8 low-mercury lamps: The design specifies high efficiency premium lamps but with the reduced mercury.

- Energy-efficient occupancy sensors: Approximately 73 occupancy sensors will be placed in areas not needing continuous illumination or with sporadic use (such as restroom facilities, conference rooms, break rooms, etc.).

- Eco-10 dimming ballasts: The design specifies Lutron® Eco-10 dimming ballasts in typical work environments where ultra low-level dimming is not needed.

- Electronic ballasts: The design specifications will be augmented or replaced with various criteria as outlined in the Pollution Prevention Design Assessment.

- Architectural modifications: Many architectural design features have been considered for materials use reduction, including the raised loading dock located on the north end of the Mechanical and Support Equipment Building, the utility tunnel, the 14 barrier doors, the location of water closets and urinals, the number of airlocks, the door between Waste Management and Sanitation, and the selected wall materials.

- Boulder vs. rubble for berm: Recycled concrete rubble will be used as much as possible to form the stabilizer of the rooftop berm.

- Native grass ground cover: The berm will be planted with Indian grass. Indian grass is the state grass of South Carolina and meets the native plant requirement of the design criteria.

- Biofuels: Five generators will provide standby and emergency power for the PDCF. There are several fuel options to consider for fueling the generators: pure diesel fuel, low-

sulfur diesel fuel, diesel fuel mixed with various concentrations of biofuel, and pure biofuel. In the United States, two types of biofuel are currently available: a soy-based biofuel and a recycled vegetable oil biofuel. Both forms of biodiesel provide a non-sulfur alternative fuel that could be substituted for petroleum-based diesel. The most commonly used biodiesel is a 20-percent blend of biodiesel and petroleum-based diesel, which reduces overall cost (100 percent biodiesel is approximately twice as expensive as petrodiesel), and significantly reduces emissions generated from using pure petroleum based diesel.

Incorporation of these pollution prevention elements will result in a cost avoidance of approximately $4 million. Details of this evaluation are available in the *Pollution Prevention Design Assessment* (WGI 2003q).

6.2 POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

The *Pollution Prevention Opportunity Assessment* (WGI 2003p) documents the accomplishments and opportunities identified in Title I and through 30% of Title II that (1) impact a portion of the operating environment within the PDCF, once built, and/or (2) include routine waste management and operations within the facility, once built.

Fifteen pollution prevention accomplishments have been identified in the opportunity assessment:

- Segregate processing wastes: Design documents for the PDCF incorporate measures for process waste segregation as well as waste characterization based on process knowledge. Waste will be segregated at the point of origin prior to movement to the Waste Management glovebox.

- Segregate liquid wastes generated from operations-related activities: Design documents for the PDCF incorporate measures for segregating liquid waste streams.

- Flat-screen monitors: Design documents for the PDCF incorporate the use of liquid crystal display (LCD) monitors to meet computer requirements. Prior to actual purchase, the availability of mercury-free LCD monitors should be evaluated.

- Launderable personal protective clothing/equipment: Design documents for the PDCF incorporate the recommendation to launder PPE. Laundering is most successful when PPE has not been highly contaminated (i.e., worn under a second set of PPE or worn in contamination areas with low levels of removable contamination). Potentially beryllium-contaminated PPE will not be sent to offsite laundry. Further evaluation should be conducted through the remaining stages of design and during the early stages of operation to determine the extent of potential beryllium contamination. This evaluation could reduce the benefit of this opportunity or eliminate it entirely.

- Recycle solid nonhazardous waste: Following the practices established for SRS, the PDCF will identify all waste materials that could be recycled; determine whether collection containers are furnished by the recycler or must be purchased; and purchase

collection containers as needed as part of setting up the facility. Collection of recyclable materials may be considered as procedures for the job classifications that collect solid waste to ensure effective and efficient collection.

- Segregate nonradioactive operations-related waste: The PDCF will adopt the existing SRS "Green is Clean" program for operations-related PDCF wastes.

- Recycle instrumentation parts: The PDCF will recycle used electronic equipment, either through existing recycling programs at SRS or through an electronics recycler.

- DI water system: The PDCF will purchase and install the Exton Industries Explorer I Reverse Osmosis and DI system, or equivalent, and the Exton Industries Explorer II Reagent Grade lab water system, or equivalent.

- Environmentally preferable purchasing: PDCF design documents state that environmentally preferable materials/materials with recycled content are to be used when those materials meet design and site requirements, are cost competitive, and are available for the items required by the EPA.

- Bar code materials/chemicals: The PDCF will establish an electronic bar code-based system during initial purchases of chemicals for the PDCF.

- TRU waste packaging: The PDCF can incorporate the use of multiple types of TRU waste packaging, with appropriate waste segregation being conducted to support the waste packaging requirements. The WAC for WIPP (the disposal facility for TRU waste) allows ≤2,800 grams of plutonium-239 FGEs per shipment of 55-gallon drums containing pipe overpacks, a factor of eight higher than the direct packaged drums. Depending on the variation of the TRU waste generated at the PDCF, using pipe overpacks may reduce packaging costs and costs associated with waste verification and documentation. While pipe overpacks are available, it is expected that nearly all TRU waste generated at the PDCF will be disposed of in 55-gallon drums.

- Code waste in glovebox: The PDCF will develop a coding system that identifies waste type by container early in the process, enabling process operators to segregate waste into appropriate containers as it is generated. The intent of the system would be to minimize inadvertent placement of highly complex wastes with less hazardous wastes. The PDCF design incorporates the practice of bar-coding individual waste containers at the point of generation. The tag will allow the waste matrix and inventory to be tracked as it is packaged into waste drums at the Waste Management glovebox.

- Maintenance practices: A pollution prevention hierarchy was established for consideration during maintenance activities.

- Alternative PPE: The PDCF design will use disposable PPE for work in areas where protective clothing is likely to become highly contaminated or damaged. Polyvinyl alcohol (PVA) disposable clothing is used as the example PPE for this comparison. When

PVA clothing is disposed of, it can be treated with heat and microbial oxidation to achieve a 10,000:1 volume reduction.

- Segregate LLW for compaction: The PDCF can support a waste segregation program in which generators separate LLW into non-compactable wastes (such as contaminated equipment, metal ingots, mixed waste, etc.) or compactable wastes (paper, plastic, wipes, etc.) at the time of waste generation. Compactable waste could then be compacted into 55-gallon drums prior to final disposal. LLW compaction was considered as a design feature specific to the PDCF, but Design Change Notice 1093-47, LLW Compactor, was subsequently canceled. However, the benefits of such a feature could be enhanced by operating it at a more centralized location, such as the WSB.

Incorporation of these pollution prevention elements will result in a cost avoidance of approximately $36 million. Details of this evaluation are available in the *Pollution Prevention Opportunity Assessment* (WGI 2003p).

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APPENDICES

APPENDIX A. CHEMICAL AND RADIOLOGICAL CONSTITUENTS OF PDCF PROCESS MATERIALS, WASTE STREAMS, AND LABORATORY CHEMICALS

Chemicals Present in the Process and/or Waste
Aluminum
Beryllium
Cadmium
Chromium
Lead
Sodium hydroxide
Stainless steel
Sulfuric acid
Radioactive Materials Present in the Process and/or Waste
Americium – 241
Plutonium – 238, 239, 240, 241, 242
Tritium – 3
Uranium – 232, 233, 234, 235, 236, 238
Californium – 252 (in the NDA equipment, should not be in the waste)

Analytical Laboratory Chemicals
0.02 HNO3 – 0.02 M HF 0.02 M NH4I (duplicate)
0.02 M nitric acid/ 0.005 M HF (duplicate)
0.1 M HCL – 0.05 HF (duplicate)
0.5 mg/ml collodion in ethanol
12 M HNO3/0.1 M HF
2.5 M – 0.5 M Aluminum nitrate
3 M Nitric acid – 0.2 M HF (duplicate)
3 M Nitric acid – 0.1 M ferrous sulfamate – 0.1 M ascorbic acid (duplicate)
4% Hydrogen in helium
95% Methanol, 5% ethanol
Acetone, reagent grade (for making diphenylcarbazide solution)
Aluminum nitrate, 2M
Anhydrone (magnesium perchlorate - NFPA Class 2 oxidizer)
Argon
Ascorbic acid
Calibration and QC solutions
Cellulose binder, Spex CertiPrep #3642 (or equivalent)

Analytical Laboratory Chemicals
Conductivity standards
Deionized (DI) water
Depleted U_3O_8
Diphenylcarbazide solution
Eluant solution (sodium bicarbonate, sodium carbonate, DI water)
F/Cl standard
Ferrous sulfamate 2M
Ferrous sulfate 1.5 M
HCl-Oxalic acid, 6M-0.05M
Helium
HNO3-aluminum nitrate, 2.5M-0.5M
HNO3-HF, 0.02M-0.02M, 0.02M-0.1M
Hydrochloric acid 0.04M, 8M
Hydrogen peroxide, 3%, 30%
Ionic strength adjuster, pHisa, Orion
Isopropyl alcohol
Lecosorb (proprietary absorbent)
Liquid scintillation cocktail (organic, non-RCRA)
Low ionic strength buffer Ph 4.10 - 9.15, Orion
Mixed anion standard #1 - #5
National Institute of Standards and Technology (NIST) 612, 614, 616
Nitric acid, 0.05M, 1M, 1%, 2M, 3M, 4M, 8M, 12M
Nitrogen
Oxygen gas
Plutonium isotopic abundance standards
Potassium dichromate ($K_2Cr_2O_7$) stock and standard solutions
Potassium oxalate 1M
Propane
Plutonium concentrated solutions (NBL CRM 949) (4M Nitric)
Plutonium-244 spike solution (3M Nitric)
Rare earth copper oxide
Sodium hydroxide
Sodium nitrite, 3M
Staticide solution
Stores catalog buffer solution, pH 4, 7, 10
Stores catalog potassium chloride solution, 4M
Sulfate standard
Sulfuric acid, 12M

Analytical Laboratory Chemicals
Tetrasodium pyrophosphate decahydrate 1% solution
TEVA resin
Tin 20 mesh granules
Total NO_3 Cal #1, Cal #2, Std.
Traceable standards for matrix spike solution (NIST)
Tuning solution - nitric acid
U standard solution
Uranium-plutonium mixed spike, U-233/Pu-244 spike materials in same vial (duplicate)
Uranium isotopic abundance standards
Uranium-233 spike solution (3M Nitric)
UTEVA resin
Vanadyl sulfate ($VOSO_4$)
Water

APPENDIX B. WASTE CHARACTERIZATION PROCESS REPORTS

Waste Characterization Process Report
Dewatering Pot Waste
Stream 12 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, HEU Decontamination process

Physical Description of Waste:

Dewatering pot waste is expected to consist of 316 stainless-steel pots with dried residual HEU decontamination sludge from the HEU decontamination sludge process. The waste is expected to contain no free liquids.

Process or Activity that Generate Waste:

This waste is expected to be generated from concentrating and drying HEU decontamination solutions. The resulting dried sludge will be removed by mechanical means, and the pot will be disposed of as waste. The waste will be collected in a common waste container and transported to the Waste Management area.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably expected to be Present:

None

Radioactive: Yes: X No:

The waste is expected to contain HEU, plutonium, and their decay products. The expected concentration of radioactive contaminants is estimated at greater than 100 nCi/g Pu. Summary of isotopic distribution is included in attached Table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents used in Characterization:	
1. PFD X-M7-F-0051[a], sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. Battelle mass balance 3. LANL-AE-08L-003-D18-0005	4. Calculation X-CLC-F-00268[b]

Characterization Basis:

1. Dewatering pot description is based on GFD design.
2. Plutonium/uranium content based on expectation that the dried sludge will be removed from the dewatering pot, with only a residual amount of surface contamination remaining.

Methodology:

Listed Waste
The waste is not expected to contain any RCRA-listed contaminants. This waste is not expected to be RCRA listed.

Toxicity
The waste is expected to contain stainless steel, which contains chromium, but in a non-leachable form. The waste is not expected to exhibit any RCRA toxic characteristic. This waste is not expected to be RCRA toxic.

Ignitibility This waste is expected to be a solid, not an oxidizer, and not capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes. The flash point of this waste is expected to be greater than 140°F. This waste is not expected to be RCRA ignitable.
Reactivity This waste is expected to contain stable solids. This waste is not expected to be RCRA reactive.
Corrosivity This waste is expected to be a solid and not have a pH exceeding the RCRA corrosivity limit. This waste is not expected to be RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not expected to be RCRA hazardous waste. The waste is expected to be radioactive due to its uranium and plutonium content. Process knowledge is expected to establish that the waste will not contain any RCRA constituents.
Characterization Summary: The waste is expected to be a solid waste contaminated with radioactive contaminants. This waste will be generated by plutonium processing operations at an estimated rate of 42 ft^3/year TRU waste. Characterization is based on the expectation that dried sludge will be removed from the dewatering pot, with only a residual amount of surface contamination remaining.
Waste Handling: The waste will be collected in the glovebox where the waste is generated and transported to the Waste Management area via internal transport conveyor system. In the Waste Management glovebox, the waste will be sorted, inventoried, and packaged into 55-gallon drums with other waste material. The waste drum will be analyzed by NDA equipment and shipped to the SRS Solid Waste division for final certification and packaging for transport to WIPP.

a. Process Flow Diagram PFD X-M7-0051, *Waste Collection and Storage*, June 11, 2003
b. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Dewatering Pot Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	42 ft^3
Pu and HEU Quantity	~900 g

Dewatering Pot Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996 (DOE 1996b)

Waste Characterization Process Report
Concentrated Liquid Drying Crucible Waste
Stream 43 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Laboratory Destructive Analysis.

Physical Description of Waste:

The Concentrated Liquid Drying Crucible waste is expected to consist of magnesium oxide crucible with dried and calcined concentrated liquid from Analytical Laboratory processes. The waste is expected to contain no free liquids.

Process or Activity that Generate Waste:

This waste will be generated by laboratory destructive analysis and drying of the concentrated solution. The waste will be bagged out of the glovebox and collected in a common waste container and transported to the Waste Management area.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably expected to be Present:

None

Radioactive: Yes: X No:

The waste is expected to contain Pu oxide, HEU and their decay products. The concentration of radioactive contaminants is estimated at 66 g Pu and 91 g U. Summary of isotopic distribution is included in Table 2.

Detailed Waste Evaluations:
Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. Calculation X-CLC-X-00271	3. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. The waste characterization is based on the laboratory analysis procedures. Reagents used are estimated and totals determined by the number of samples of that type.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not contain any RCRA toxic materials.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. The waste before processing will be a corrosive liquid, after drying and calcinations the resulting solid will not be corrosive. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its Pu and U content. Process knowledge has been used in this section to establish that waste does not contain any RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by Pu and U processing operations at an estimated rate of 3 ft^3/year TRU waste.
Waste Handling: The waste will be collected in the glovebox where the waste is generated and bagged out of the glovebox. The bagged material will be placed in a drum and transported to the PDCF Waste Management Area. In the Waste Management Area. The waste drum will be analyzed by NDA equipment and shipped to the SRS Waste Solidification Building (WSB) for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Concentrated Liquid Drying Container Waste

Table 1

Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	3 ft^3
Pu Quantity	66 g
HEU Quantity	91 g
Total Nitrate Quantity	~0 g

Concentrated Liquid Drying Container Waste

Table 2

Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Failed Inner Can Waste
Stream 4 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Inner Canning Process.

Physical Description of Waste:

The failed inner canning waste consists of stainless steel failed inner 3013 cans and contaminated convenience cans from the inner canning process. The waste contains no free liquids.

Process or Activity that Generate Waste:

This waste is generated by exposing the can's inner surface to a contaminated glovebox environment. When the can is welded the weld is no good. The can is reopened and the crimped can inside is removed and the inner can is discarded as waste. The waste is collected in a common waste container and transported to the waste management area.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably expected to be Present:

No RCRA regulated material is expected to be present in waste.

Radioactive: Yes: X No:

The waste will contain Pu oxide and its decay products. The concentration of radioactive contaminants is estimated at greater than 100 nCi/g Pu. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:
Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. Battelle mass balance	3. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. 3013 can design.
2. Plutonium content based on Battelle mass balance and expected surface area contamination levels.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The stream contains stainless steel, which contains chromium. However, is in a non-leachable form. The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit. This waste is not RCRA ignitable.
Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its Pu content. Process knowledge has been used in this section to establish that waste does not contain any RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by inner canning operations at an estimated rate of 64 ft^3/year TRU waste.
Waste Handling: The waste will be collected in the glovebox where the waste is generated and transported to the PDCF Waste Management Area via internal transport conveyor system. In the Waste Management Area glovebox the waste will be sorted, inventoried and packed into 55 gal drums with other waste material. The waste drum will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Failed Inner Can Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	64 ft^3
Pu Quantity	576 g
HEU Quantity	~0 g

Failed Inner Can Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
High Activity Waste
Stream 44 (PFD X-M7-F-0054)

Origin of Waste:

PDCF, Laboratory destructive analysis and solutions from decontamination operations (Inner Canning and HEU), collected in HAW tanks, then transferred to the SRS WSB.

Physical Description of Waste:

HAW is expected to be a homogeneous liquid mixture of laboratory reagents and equipment rinse water resulting from destructive analysis of process and waste samples from operations, transfer line flush water, and electrolytic decontamination solutions.

Process or Activity that Generates Waste:

Generated by destructive analysis of plutonium oxide, HEU oxide, process samples, and waste samples. Also expected to include rinse water from equipment, drain flushes, and electrolytic decontamination solutions. The waste will be collected in a common tank.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

Chromium is expected from electrolytic decontamination sludge samples. Barium chloride is used in hydroxide analysis.

Radioactive: Yes: X No:

The waste is expected to contain HEU oxide, weapons-grade plutonium oxide, and their decay products. The concentration of radioactive contaminants is estimated at ~0.12 ppm Pu and ~0.15 ppm HEU. Summary of isotopic distribution is included in Table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents:
Ignitibility: Corrosivity: X Reactivity: Toxicity:

Procedure/Documents Used in Characterization:

1. PFD X-M7-F-0068, sheet 1 of 2 and 2 of 2
2. PFD X-M7-F-0069, sheet 1 of 2 and 2 of 2 (classified)
3. PFD X-M7-F-0071, sheet 1 of 2 and 2 of 2 (classified)
4. PFD X-M7-F-0072, sheet 1 of 2 and 2 of 2 (classified)
5. PFD X-M7-F-0099, sheet 1 of 2 and 2 of 2
6. PFD X-M7-F-0100, sheet 1 of 2 and 2 of 2
7. PFD X-M7-F-0101, sheet 1 of 2 and 2 of 2
8. PFD X-M7-F-0102, sheet 1 of 2 and 2 of 2
9. PFD X-M7-F-0103, sheet 1 of 2 and 2 of 2
10. Sample Management Plan (X-ESR-F-00029, classified)
11. Calculation X-CLC-F-00271 (classified)
12. Procedures L3.6-10108 and L3.6-10085 modified per email by Mike Brisson, 8/30/02.
13. HED Mass Balance, X-CLC-F-00282[a]
14. ICAN Mass Balance, X-CLC-F-00339[b]

Characterization Basis:

1. The waste characterization is based on the laboratory analysis procedures and decontamination mass balances. Reagents used are estimated, with totals determined by the number of samples of that type.
2. In addition to any hazardous components, the waste is expected to contain ~6,550 ppm nitrate, ~360 ppm chloride, ~6 ppm fluoride, and ~180 ppm sulfate, excluding line flush water.
3. The waste is expected to contain ~97 ppb beryllium.
4. Summary of expected constituents are listed in Table 1.
5. Process service water will be used for waste transfer line flush.

a. Calculation Set No. X-CLC-F-00282, *HED Module Mass Balance (U)*, June 2, 2005
b. Calculation Set No. X-CLC-F-00339, *ICAN Module Mass Balance (U)*, May 5, 2005

High Activity Waste

Table 1
Expected Waste Constituents

Parameter	Expected Value (annual)	
	HAW (Average)	Range
Generated Volume	~11,700 gal	~7,250 – 13,500 gal
Pu Quantity	5.3 g	4.3 – 14.0 g
HEU Quantity	6.7 g	6.2 – 15 g
Approximate pH	<1	<1
Total Nitrates Salts Quantity	291 kg	218 – 873 kg
Total Sulfate Quantity	16.1 kg	12.4 – 33 kg
Total Chloride Quantity	8 kg	6 – 24 kg
Total Fluoride Quantity	0.26 kg	0.20 – 0.8 kg
Total Chromium Quantity	1 kg	0.76 – 2.3 kg
Total Barium Quantity	0.12 kg	0.09 – 0.36 kg
Total Beryllium Quantity	0.004 kg	1.3 E-04 – 0.025 kg

High Activity Waste

Table 2
Expected Isotopic Distribution

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996.

Waste Characterization Process Report
Canister HEPA Filter Waste
Stream 1c (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Uranium Glovebox Operation.

Physical Description of Waste:

The waste is a homogeneous mixture of bagged HEPA canisters. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by routine change out of exhaust HEPA filters used in gloveboxes where there is processing of uranium and uranium contaminated materials. The waste is collected in a general-purpose transport container and transported to the waste management area via the internal transport system.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste will contain uranium and its decay products. The concentration of radioactive contaminants is estimated to be greater than detectable, see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:

1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified)
2. Calculation X-CLC-F-00272

Characterization Basis:

1. HEPA filter description is based on manufacture information.
2. Uranium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its U content. Process knowledge has been used in this section to establish that waste contains RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by uranium glovebox operations at an estimated rate of 20 ft^3year LLW.
Waste Handling: When HEPA filters are changed out they will be disconnected from exhaust duct in the glovebox and placed in general purpose transport container and move via the internal transport system to the waste management glovebox. The waste will be packaged in a drum and will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to disposal.

Canister HEPA Filter Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	20 ft^3
Pu Quantity	~0 g
HEU Quantity	~ 115 g

Canister HEPA Filter Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Plenum HEPA Waste
Stream 33 (PFD X-M7-F-0052)

Origin of Waste:

PDCF, room and glovebox operations.

Physical Description of Waste:

The waste is a homogeneous mixture of HEPA filters. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by filtering plenum air. The waste will be bagged out of plenum housing and transported to the waste management area.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste will contain plutonium, uranium and their decay products. The concentration of radioactive contaminants is estimated to be less than 100 nCi/g, see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:

1. PFD X-M7-F-0052, sheet 1 of 2 and 2 of 2
2. Calculation X-CLC-F-00272

Characterization Basis:

1. Quantity basis estimated on operation and other weapons complex facility experience.
2. Plutonium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity
This waste contains stable solids.

This waste is not RCRA reactive.

Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its plutonium content. Process knowledge has been used in this section to establish that waste contains RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by uranium glovebox operations at an estimated rate of 672 ft^3/year LLW.
Waste Handling: When plenum HEPA filter waste is generated it will be bagged out of plenum housing and moved to the waste management area. The waste will be analyzed by NDA equipment and packaged in boxes and shipped to the SRS WSB for final certification and packaging for transport to disposal.

Plenum HEPA Filter Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	672 ft^3
Pu Quantity	Less the 100 nCi/g
HEU Quantity	~ Greater than detectable

Plenum HEPA Filter Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Canister HEPA Filter Waste
Stream 6c (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Plutonium Glovebox Operation.

Physical Description of Waste:

The waste is a homogeneous mixture of bagged HEPA canisters. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by routine change out of glovebox exhaust HEPA filters used in gloveboxes where there is processing of plutonium and plutonium contaminated materials. The waste is collected in a general-purpose transport container and transported to the waste management area via the internal transport system.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste will contain uranium, plutonium and their decay products. The concentration of radioactive contaminants is estimated to be greater than 100 nCi/g, see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. Calculation X-CLC-F-00272	3. Calculation X-CLC-F-00272

Characterization Basis:

1. HEPA filter description is based on manufacture information.
2. Plutonium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is a RCRA hazardous waste. The waste is radioactive due to its Pu content. Process knowledge has been used in this section to establish that waste contains RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by plutonium glovebox operations at an estimated rate of 33 ft^3/year TRU waste.
Waste Handling: When HEPA filters are changed out they will be disconnected from exhaust duct in the glovebox and placed in general purpose transport container and move via the internal transport system to the waste management glovebox. The waste will be packaged in a drum and will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP for disposal.

Canister HEPA Filter Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	33 ft^3
Pu Quantity	190 g
HEU Quantity	~0 g

Canister HEPA Filter Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
HEU Electrolytic Decontamination Sludge Filter Waste
Stream 1b (PFD X-M7-F-0051)

Origin of Waste:

PDCF, HEU Decontamination System.

Physical Description of Waste:

The HEU electrolytic decontamination sludge filter waste is a heterogeneous mixture of plastics (housing and media). The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by filtering decontamination solution containing metal sulfate sludge. The waste will be bagged out of the glovebox and collected in a 55-gallon drum and transported to the waste management area. Absorbent may be added to absorb any residual moisture.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated material is expected to be present in waste.

Radioactive: Yes: X No:

The waste will contain uranium and weapon grade Plutonium and its decay products. The concentration of radioactive contaminants is estimated at greater than detectable U and greater than 100 nCi/g Pu, see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:
Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. LANL-AE-08L-003-D18-0007	3. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. Filter description is based on GFD design.
2. Plutonium and uranium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its Pu and U content. Process knowledge has been used in this section to establish that waste does not contain any RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by sanitization operations at an estimated rate of 1.2 ft^3/yr TRU waste.
Waste Handling: The waste will be collected at the glovebox where the waste is generated and packaged in a 55-gallon drum and transported to the PDCF Waste Management Area via drum dolly. The waste drum will be analyzed by NDA equipment and shipped to the SRS waste Solidification Building for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

HEU Decontamination Sludge Filter Waste

Table 1

Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	1.2 ft^3
Pu Quantity	Greater than 100 nCi/g (included in HEU quantity)
HEU Quantity	~15 g

HEU Decontamination Sludge Filter Waste

Table 2

Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Hydrogen Process Crucible Waste
Stream 7 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Hydrogen Process.

Physical Description of Waste:

The Hydrogen Process Crucible waste is a heterogeneous mixture of broken magnesium oxide crucibles in plastic bags resulting from the Hydrogen Pu separation process. The crucibles will be processed through the Aux Uranium DMO for Pu removal. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by separating Plutonium from other metals. The waste is collected in a common waste container and transported to the waste management area.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated material is expected to be present in waste.

Radioactive: Yes: X No:

The waste will contain weapon grade Plutonium and its decay products. The concentration of radioactive contaminants is estimated at greater than 100 nCi/g Pu. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:
Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. Battelle mass balance 3. LANL-AE-08L-003-D18-0008	4. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. Crucible description is based on GFD design.
2. Plutonium content based on Battelle mass balance.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not contain any RCRA toxic materials.

This waste is not RCRA toxic.

Ignitibility This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit. This waste is not RCRA ignitable.
Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its Pu content. Process knowledge has been used in this section to establish that waste does not contain any RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by Pu processing operations at an estimated rate of CV ft^3/year TRU waste – see Appendix C.
Waste Handling: The waste will be collected in the glovebox where the waste is generated (Aux Uranium) and transported to the PDCF Waste Management Area via internal transport conveyor system. In the Waste Management Area glovebox the waste will be sorted, inventoried and packed into 55 gal drums with other waste material. The waste drum will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Hydrogen Process Crucible Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume*	CV ft^3
Pu Quantity*	CV g
HEU Quantity*	CV g

* - see Appendix C

Hydrogen Process Crucible Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Inner Canning Drying Container Waste
Stream 10 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Inner Canning Process.

Physical Description of Waste:

The Inner Canning Drying Container waste consists of 304 stainless steel containers with dried inner canning decontamination sludge from the inner canning process. Waste will be in vented PVC bag. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by concentrating by filtration and drying inner canning decontamination solution. The waste will be bagged out of the glovebox and collected in a common waste container and transported to the waste management area.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated material is expected to be present in waste.

Radioactive: Yes: X No:

The waste will contain Pu oxide and its decay products. The concentration of radioactive contaminants is estimated at greater than 100 nCi/g Pu. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. Battelle mass balance 3. GFD Design	4. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. Crucible description is based of GFD design.
2. Plutonium content based on Battelle mass balance.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity The waste contains chromium (Cr), a RCRA toxic material. The TCLP toxicity limit for chromium is 5.0 milligrams per liter (mg/l). *Determine if the waste is RCRA hazardous for Cr.* The chromium comes from the electrolytic decontamination of inner cans. Estimate of chromium content in the final waste stream is approximately 0.32 g of Chromium in a waste mass of 1.7 kg resulting 188 ppm. This is above the TCLP toxicity limit. The stream also contains stainless steel, which contains chromium. However, it is in a non-leachable form. This waste is RCRA toxic.
Ignitibility This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit. This waste is not RCRA ignitable.
Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream has been identified as hazardous for TCLP, code D007. The waste is also identified as TRU to its Pu content. Process flow sheets and material balances have been reviewed. Process knowledge used in this section is adequate to establish that the chromium levels exceed the RCRA limit.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by Pu processing operations at an estimated rate of 42 ft^3/year MTRU waste.
Waste Handling: The waste will be collected in the glovebox where the waste is generated and bagged out of the glovebox. The bagged material will be placed in a drum and transported to the PDCF Waste Management Area. In the Waste Management Area it will be introduced into the waste management glovebox and will be sorted, inventoried and packed into 55 gal drums with other waste material. The waste drum will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Inner Canning Drying Container Waste

Table 1

Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	42 ft^3
Pu Quantity	~840 g
HEU Quantity	~0 g
Total Sulfates Quantity	~0.8 k g
Total Chromium Quantity	~99 g

Inner Canning Drying Container Waste

Table 2

Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Inner Canning Electrolytic Decontamination Sludge Filter Waste
Stream 6d (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Inner Canning System.

Physical Description of Waste:

The Inner Canning electrolytic decontamination sludge filter waste is a heterogeneous mixture of plastics (housing and media). The waste contains no free liquids.

Process or Activity that Generates Waste:

Filtering decontamination solution containing metal sulfate sludge generates this waste. The waste will be bagged out of the glovebox and collected in a 55-gallon drum and transported to the waste management area. Absorbent mat be added to absorb any residual moisture.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

Chromium is expected to be above RCRA regulated limits.

Radioactive: Yes: X No:

The waste will contain uranium and weapons grade plutonium and its decay products. The concentration of radioactive contaminants is estimated at greater than 100 nCi/g Pu (see Table 1). Summary of isotopic distribution is listed in Table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity: X

Procedure/Documents Used in Characterization:

1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified)
2. LANL-AE-08L-003-D18-0004
3. Specification G-SPC-F-00003 Section 15360
4. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. Filter description is based on GFD design.
2. Plutonium and chromium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity The waste contains chromium (Cr) a RCRA toxic material. The TCLP toxicity limit for chromium is 5.0 mg/l. *Determine if the waste is RCRA hazardous for Cr.* The chromium comes from the electrolytic decontamination of inner cans. The estimate of chromium content in the sludges is 0.06 g Cr/g of sludge. The final waste form will have greater than 5 ppm chromium, which is above the TCLP toxicity limit. This waste is RCRA toxic.
Ignitibility This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140°F. This waste is not RCRA ignitable.
Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: This waste stream has been identified as RCRA hazardous (for TCLP, code D007). Process knowledge has been used to establish that the waste is expected to be radioactive due to its Pu content and RCRA toxic for TCLP.
Characterization Summary: The waste is a solid hazardous waste contaminated with radioactive constituents. This waste will be generated by inner canning decontamination operations at an estimated rate of 2 ft^3/year MTRU waste.
Waste Handling: The waste will be bagged out of the Inner Canning Fluid Supply box and packaged in 55-gallon drum, then transported to the PDCF Waste Management Area via drum dolly. Absorbent may be added to absorb any residual moisture. The waste drum will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Inner Canning Electrolytic Decontamination Sludge Filter Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	2 ft^3
Pu Quantity	~5 g
HEU Quantity	~0 g
Cr Quantity	Less than 5 ppm

Inner Canning Electrolytic Decontamination Sludge Filter Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Low Activity Waste (LAW)
Stream 10 (PFD X-M7-F-0097)

Origin of Waste:

PDCF, various sources within the PDCF process building: mop water, safety shower water, chemical sump wash down, LVCW blowdown, Process cooling water blowdown, and DI water blowdown (stored in LAW tank which will be transferred to SRS WSB).

Physical Description of Waste:

The waste is water with small amounts of soap (mop water) and sodium sulfate (from tank flush). The waste is a liquid.

Process or Activity that Generates Waste:

The LAW is a homogeneous mixture of wash water and blowdown as a result of washdown of floors, sumps, and personnel and equipment blowdown. Other off normal sources of LAW are Firewater Collection System and laboratory sink waste. The LAW is collected in a common tank.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste may contain HEU oxide, weapons grade Plutonium oxide and their decay products. This material will be from floor wash down and expected to be in very low concentrations. The concentration of radioactive contaminants is estimated at less than 0.0001 ppm Pu 239 equivalent. Summary of isotopic distribution is included in attached Table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:

1. Calculation X-CLC-F-00276[a]

Characterization Basis:

1. The waste characterization is based on anticipated housekeeping, equipment maintenance and personnel decontamination shower testing.
2. In addition to any hazardous components the waste will contain approximately: ~3 ppm Sulfate.
3. Summary of constituents are list in the attached table 1.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not contain RCRA toxic materials.

This waste is not RCRA toxic.

Ignitibility This waste is not a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit. This waste is not RCRA ignitable.
Reactivity This waste contains stable liquids. This waste is not RCRA reactive.
Corrosivity This waste is a liquid and with a pH of approximately ll.2, which outside of the RCRA hazardous limits of pH of less than 2 or greater than 12.5. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: This waste is not a RCRA hazardous waste.
Characterization Summary: The waste is characterized as water with low levels of radioactive. This waste will also contain small amounts of sodium sulfate, corrosion inhibitor, and soap. It is anticipated the waste will be generated at an estimated rate of ~22,239 gal/year with a specific gravity of ~1.0.
Waste Handling: The waste will be collected from various operations through a common drain system to one of two 1000-gallon collection tanks. The waste will be batch transferred via pipeline to the ETF approximately every two weeks.

a. Calculation Set No. X-CLC-F-00276, *LAW Mass Balance*, Rev 0, August 5, 2003

Low Activity Waste

Table 1

Waste Characteristic Summary

Parameter	Expected Value (annual)	
	LAW (Average)	Range
Generated Total Volume	~24,041 gal (~84,510L)	~13,700 – 33,800 gal (~ 52,100 – 128,450 L)
Pu Quantity	0.011g	0 - .03g
Approximate pH	11.2	7 –11.9
Total Sulfate Quantity	~2.0 lb.	0 – 67 lb.
Total Simple Green, contains 2-butoxyethanol (Volume included above)	~150 gal	30 – 300 gal.
Total Corrosion Inhibitor* (non-chromate based)	~6.6 lb.	3.3 – 9.9 lb.
Total Chloramine-T	~0.6 lb.	0.3 – 0.9 lb.

* - The specific corrosion inhibitor will be selected during Title III based upon recommendation from the vendor.

Low Activity Waste

Table 2

Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Leaded Glove Waste
Stream 8 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Plutonium Glovebox Operation.

Physical Description of Waste:

The lead lined glove waste is a heterogeneous mixture of Hypalon and lead. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by routine change out of gloves used in the processing of plutonium and plutonium contaminated materials (including Aux Uranium). The waste is collected in a general-purpose transport container and transported to the waste management area via the internal transport system.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

Lead is expected to be in the waste above the RCRA regulated limit.

Radioactive: Yes: X No:

The waste will contain uranium and weapon grade Plutonium and its decay products. The concentration of radioactive contaminants is estimated at greater than 100 nCi/g Pu see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:
Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified)
2. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. Glove description is based on manufacture information (North Safety Products).
2. Plutonium content based on expected contamination levels.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste contains lead (Pb) a RCRA toxic materials. The TCLP toxicity limit for Lead is 5.0 mg/l.

Determine if the waste is RCRA hazardous for Pb.
The lead lines the gloves to provide the worker radiation protection. It is estimated that 200 g of lead will be in each glove and each glove will weigh approximately is 2 kg. Resulting in a final waste form with 100,000 ppm Pb. This is above the TCLP toxicity limit.

This waste is RCRA toxic.

Ignitibility This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit. This waste is not RCRA ignitable.
Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is a RCRA hazardous waste due to lead content. The waste is radioactive due to its Pu and U content from handling plutonium and aux uranium.
Characterization Summary: The waste is characterized as exhibiting the characteristic of toxicity D008 and the waste is a solid waste contaminated with radioactive constituents. This waste will be generated by glovebox operations at an estimated rate of 1,936 ft^3/year MTRU waste.
Waste Handling: When gloves are changed out they will be pushed into the glovebox and placed in general purpose transport container and move via the internal transport system to the waste management glovebox. The waste will be packaged in a drum and the drum will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Leaded Glove Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	1,936 ft^3
Pu Quantity	~3200 g
HEU Quantity	>0 g
Lead Quantity	~950 kg

Leaded Glove Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Non Leaded Glove Waste
Stream 18 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Lab Glovebox Operation.

Physical Description of Waste:

The non-lead lined glove waste is a homogeneous mixture of Hypalon gloves. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by routine change out of gloves used in the lab gloveboxes that process plutonium. The waste is collected in a drum with other TRU waste and transported to the waste management area via drum cart.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste will contain uranium and its decay products. The concentration of radioactive contaminants is estimated to be greater than 100 nCi/g see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:

1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified)
2. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. Glove description is based on manufacture information (North Safety Products).
2. Plutonium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is a RCRA hazardous waste. The waste is radioactive due to its Pu content. Process knowledge has been used in this section to establish that waste contains RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by lab glovebox operations at an estimated rate of 25 ft^3/year TRU waste.
Waste Handling: When gloves are changed out they will be pushed into the glovebox and bagged out and put into a drum with other TRU waste. The drum will be moved to the waste management area. The waste drum will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Non Leaded Glove Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	25 ft^3
Pu Quantity	~45 g
HEU Quantity	Greater than detectable

Non Leaded Glove Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Non Leaded Glove Waste
Stream 3 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Uranium Glovebox Operation.

Physical Description of Waste:

The non-lead lined glove waste is a homogeneous mixture of Hypalon gloves. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by routine change out of gloves used in the processing of uranium and uranium contaminated materials. The waste is collected in a general-purpose transport container and transported to the waste management area via the internal transport system.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste will contain uranium and its decay products. The concentration of radioactive contaminants is estimated to be greater than detectable levels see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:
Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified)
2. Calculation X-CLC-F-00272

Characterization Basis:

1. Glove description is based on manufacture information (North Safety Products).
2. Uranium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is a RCRA hazardous waste. The waste is radioactive due to its Pu content. Process knowledge has been used in this section to establish that waste contains RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by uranium gloveboxes operations at an estimated rate of 3,029 ft^3/year LLW.
Waste Handling: When gloves are changed out they will be pushed into the glovebox and placed in general purpose transport container and move via the internal transport system to the waste management glovebox. The waste drum will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and disposal.

Non Leaded Glove Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	3,029 ft^3
Pu Quantity	~0 g
HEU Quantity	~5450 g

Non Leaded Glove Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Room Waste
Stream 32 (PFD X-M7-F-0052)

Origin of Waste:

PDCF, operations within the Pu Processing Building.

Physical Description of Waste:

The waste is a heterogeneous mixture of protective clothing, swipes, wipes, hand tools, etc. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by operation within the Pu Processing Building. The waste will be bagged at the contamination area step off pads. The bag will be transported to the waste storage are and placed into a waste box.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste will contain trace quantities of uranium and plutonium.

Detailed Waste Evaluations:
Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified)
2. Calculation X-CLC-F-00272

Characterization Basis:

1. Quantity basis estimated on operation and other weapons complex facility experience.
2. Plutonium and uranium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its plutonium content. Process knowledge has been used in this section to establish that waste contains RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by operations with in the Pu Processing Building at an estimated rate of 16,555 ft^3t/year LLW.
Waste Handling: This waste is generated by operation within the Pu Processing Building. The waste will be bagged at the step off pads to the contamination areas. The bag will be transported to the waste storage are and placed into a box. The waste box will be analyzed by portable NDA equipment and shipped to the SRS WSB for final certification and disposal.

Room Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	16,555 ft^3
Pu Quantity	~ 0 g
HEU Quantity	~ 0 g

* See Classified Table

Room Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Sanitization Crucible/Ingot Waste
Stream 14 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, Sanitization System.

Physical Description of Waste:

The Sanitization Crucible/Ingot waste is a heterogeneous mixture of broken crucibles (fused silica, graphite plates, graphite crucible, high-purity alumina) and metal ingots resulting from the sanitization process. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by the melting of stainless steel, aluminum, and beryllium. The waste is collected in a double-lidded 55-gallon drum attached to the sanitization glovebox and transported to the waste management area.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated material is expected to be present in waste.

Radioactive: Yes: X No:

The waste will contain uranium and weapon grade Plutonium and its decay products. The concentration of radioactive contaminants is estimated at greater than 100 nCi/g Pu see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. LANL-AE-08L-003-D18-0007	3. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. Crucible description is based on GFD design.
2. During design stage, plutonium content based on process knowledge. During process operations, characterization of the plutonium content on the beryllium pieces will be provided by the FMD as the pieces are introduced into the glove box and/or based on historical information from LANL design and testing activities regarding the amount of plutonium on beryllium pieces for different pit

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity The stream contains stainless steel, which contains chromium. However, is in a non-leachable form. The waste does not exhibit any RCRA toxic characteristic. This waste is not RCRA toxic.
Ignitibility This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit. This waste is not RCRA ignitable.
Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its Pu and U content. Process knowledge has been used in this section to establish that waste does not contain any RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by sanitization operations at an estimated rate of 1,455 ft^3/year TRU waste.
Waste Handling: The waste will be collected at the sanitization glovebox where the waste is generated and packaged in a double lidded 55-gallon drum with rigged poly liner and transported to the PDCF Waste Management Area via drum dolly. Beryllium waste drums will contain no greater than 100 kg of beryllium. The waste drum will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Sanitization Crucible/Ingot Waste

Table 1

Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	1,455 ft^3
Pu Quantity	~570 g*
HEU Quantity	Greater than detectable

* This quantity of plutonium may change based on forthcoming information requested through Request for Information (RFI) 353-2, Sanitization Waste Characterization.

Sanitization Crucible/Ingot Waste

Table 2

Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Swipes, Wipes, and Rags Waste
Streams 1a and 2 (PFD X-M7-F-0051)

Origin of Waste:

PDCF, main uranium glovebox operations.

Physical Description of Waste:

The waste is a heterogeneous mixture of swipes, wipes, and rags. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by the cleaning of parts, gloveboxes, or taking smears. The waste will be bagged and placed in a general-purpose transport container and transported to the waste management glovebox via the internal transport system.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste will contain uranium and its decay products. The concentration of radioactive contaminants is estimated to be greater than detectable, see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. Calculation X-CLC-F-00272	3. Calculation X-CL-F-00268[a]

Characterization Basis:

1. Quantity basis estimated on operation and other weapons complex facility experience.
2. Uranium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its uranium content. Process knowledge has been used in this section to establish that waste does not contain RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by uranium glovebox operations at an estimated rate of 79 cu ft/year LLW.
Waste Handling: When swipe, wipe, or rag waste is generated it will be bagged and placed in general purpose transport container and move via the internal transport system to the waste management glovebox. The waste will be packaged in a drum and will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and disposal.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Swipes, Wipes, and Rags Waste

Table 1
Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	79 ft^3
Pu Quantity	~ 0 g
HEU Quantity	~ 1260 g

Swipes, Wipes, and Rags Waste

Table 2
Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

Waste Characterization Process Report
Swipes, Wipes, and Rags Waste
Streams 5 and 6a (PFD X-M7-F-0051)

Origin of Waste:

PDCF, plutonium glovebox operations.

Physical Description of Waste:

The waste is a heterogeneous mixture of swipes, wipes, and rags. The waste contains no free liquids.

Process or Activity that Generates Waste:

This waste is generated by the cleaning of parts, gloveboxes, or taking smears. The waste will be bagged and placed in a general-purpose transport container and transported to the waste management glovebox via the internal transport system.

Characterization Method:

Process Knowledge: X Sample & Analysis:

RCRA Regulated Materials Reasonably Expected to be Present:

No RCRA regulated materials are expected to be in the waste.

Radioactive: Yes: X No:

The waste will contain plutonium and its decay products. The concentration of radioactive contaminants is estimated to be greater than 100 nCi/g, see table 1. Summary of isotopic distribution is included in attached table 2.

Detailed Waste Evaluations:

Listing: None
Underlying Hazardous Constituents: None
Ignitibility: Corrosivity: Reactivity: Toxicity:

Procedure/Documents Used in Characterization:	
1. PFD X-M7-F-0051, sheet 1 of 2 and 2 of 2 (sheet 2 is classified) 2. Calculation X-CLC-F-00272	3. Calculation X-CLC-F-00268[a]

Characterization Basis:

1. Quantity basis estimated on operation and other weapons complex facility experience.
2. Plutonium content based on process knowledge.

Methodology:

Listed Waste
The waste does not contain any RCRA-listed contaminants.

This waste is not RCRA listed.

Toxicity
The waste does not exhibit any RCRA toxic characteristic.

This waste is not RCRA toxic.

Ignitibility
This waste is a solid and is not an oxidizer and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes. The waste flash point is greater than 140 degrees Fahrenheit.

This waste is not RCRA ignitable.

Reactivity This waste contains stable solids. This waste is not RCRA reactive.
Corrosivity This waste is a solid and will not have a pH exceeding the RCRA corrosivity limit. This waste is not RCRA corrosive.
Underlying Hazardous Constituents: The waste stream is not a RCRA hazardous waste. The waste is radioactive due to its plutonium content. Process knowledge has been used in this section to establish that waste does not contain RCRA constituents.
Characterization Summary: The waste is a solid waste contaminated with radioactive constituents. This waste will be generated by uranium glovebox operations at an estimated rate of 121.6 ft^3t/year TRU waste.
Waste Handling: When swipe, wipe, or rag waste is generated it will be bagged and placed in general purpose transport container and move via the internal transport system to the waste management glovebox. The waste will be packaged in a drum and will be analyzed by NDA equipment and shipped to the SRS WSB for final certification and packaging for transport to WIPP for disposal.

a. Calculation Set No. X-CLC-F-00268, *Estimate of TRU Waste Drum Weight and Activity (U)*, Rev P-1, October 31, 2003

Swipes, Wipes, and Rags Waste

Table 1

Waste Characteristic Summary

Parameter	
	Average as generated
Generated Volume	121.6 ft^3
Pu Quantity	~2600 g
HEU Quantity	Greater than detectable (included in the Pu quantity)

Swipes, Wipes, and Rags Waste

Table 2

Isotopic Distribution Summary

Parameter	Isotope	Percent
Plutonium	238	0.05
	239	92.35
	240	6.50
	241	0.00
	242	0.10
Americium	241	1.00

Parameter	Isotope	Percent
Uranium	232	0.00
	234	1.00
	235	93.1
	236	0.5
	238	5.40

Source: Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, Vol. 1, Table G.1-1, June, 1996

APPENDIX C. CLASSIFIED APPENDIX

APPENDIX D. COMPLIANCE WITH PDCF SDD AND FDD REQUIREMENTS

This appendix summarizes the environmental requirements contained in the Pit Disassembly and Conversion Facility (PDCF) System Design Descriptions (SDDs) and Facility Design Description (FDD), Rev 5 (WSRC 2005).

Some of the requirements below are written for worker protection as well as public and environmental exposure. The synopsis presented in this appendix addresses only those aspects of the requirements that pertain to the public and the environment.

D.1 SDD Requirements (Sanitization System)

R.2.9.6.C Sanitized waste shall be capable of meeting Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC).

Basis: WSRC 1S Manual, SRS Waste Acceptance Criteria, Procedure 3.06. All waste out of Sanitization is assumed to be TRU waste and must comply with WIPP WAC requirements.

Status: It is expected that waste generated from the Sanitization System of the PDCF will comply with all waste characteristic requirements of Section B of WSRC 1S, *SRS Waste Acceptance Criteria*, Procedure 3.06.

D.2 FDD REQUIREMENTS AT THE FUNCTIONAL LEVEL

F-0.0 Convert Surplus Pu Pits/Metal To Pu Oxide

R-0.0-11 The facility shall be designed, constructed, and operated consistent with U.S. Department of Energy (DOE) requirements for maintaining public and worker exposures at as low as reasonably achievable (ALARA) levels and providing for safe operation of the facilities.

Basis: The PDCF must meet federal and state requirements to maintain ALARA exposures and to provide for safe operations. 10 CFR 835, Occupational Radiation Protection; and DOE Order 5400.5 chg 2, Radiation Protection for the Public and the Environment.

Status: The PDCF has been designed to meet all applicable DOE/NNSA requirements as well as federal and state requirements. As demonstrated in Section 4.5 of this plan, air pollutant releases to the environment will be far below regulatory concentrations. All liquid releases will occur through permitted outfalls or recycled if the opportunity exists. See Table 5-4 of this plan for a summary of the disposition pathways for PDCF liquids. All solid wastes will be disposed of in facilities permitted for the applicable waste types. See Sections 4.1 through 4.4 for details of the solid waste estimates and disposition pathways.

F-1.0 Perform Programmatic Functions

F-1.15: Protect the Environment During the PDCF Life Cycle

R-1.15-1 The PDCF shall be designed, constructed, maintained, and operated in a manner that ensures protection of the environment.

Basis: The requirements related to Environmental Protection (EP) activities emanate from various environmental-related DOE/NNSA orders/directives, implementation instructions, and federal/state environmental regulations.

Status: The design portion of the PDCF life cycle has included environmental protection and is designed to meet all applicable environmental regulations. As demonstrated in Section 4.5 of this plan, air pollutant releases to the environment will be far below regulatory concentrations. All liquid releases will occur through permitted outfalls or recycled if the opportunity exists. See Table 5.4 of this plan for a summary of the disposition pathways for PDCF liquids. All solid wastes will be disposed of by facilities permitted for the applicable waste types. See Sections 4.1 through 4.4 for details of the solid waste estimates and disposition pathways.

F-3.0 Perform Balance of Plant to Support Process Functions

R-3.1-3 The PDCF shall be designed to handle the following types of waste streams:

- TRU solid waste
- MTRU solid waste
- Solid LLW
- Solid MLLW
- Hazardous solid and liquid waste
- Nonhazardous solid waste
- High activity liquid waste (HAW) and mixed high activity liquid waste
- Low activity liquid waste (LAW)

Basis: The Waste Volume Summary (Table 3-1) from the PDCF Waste Management Study, SRR-354-99-001. (Waste volumes are specified in the Waste Management SDD.)

Status: The basis for this requirement is the PDCF *Waste Management Study*, which was last updated in February 2002. While there have been numerous changes since that time, the intent of the requirement is the same. The PDCF has been designed to manage each of the anticipated waste types that will be generated. The PDCF waste types are discussed

throughout this plan, and summary-level information is presented in the Executive Summary.

F-4.0 Process MFFF and PDCF Waste

R-4.0-3 The Waste Solidification Building (WSB) shall be capable of processing PDCF laboratory liquid waste within a range of 4,800 to 18,200 gallons per year at an average rate of 10,600 gallons per year, plus 1,700 gallons of flush liquids per year.

Basis: Specified amounts are based on data provided by G-FDD-F-00007, *Facility Design Description, Waste Solidification Building*, Appendix E, "Waste Stream Input to the WSB."

Status: While this requirement is directed to the WSB, it also requires coordination between the WSB and the PDCF to ensure that design changes affecting PDCF liquid waste volume estimates can be accommodated by the WSB. The latest revision to the HAW *Waste Characterization Process Report* indicates that the range of HAW generated will be 7,250 to 13,500 gallons per year, with an average rate of 11,700 gallons per year.

R-4.0-4 The TRU waste form produced by the WSB shall meet the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC).

Basis: WIPP is the defined disposal path for TRU waste. The WAC defines the characteristics to which the waste must conform. WIPP WAC, DOE/WIPP-02-3122, "Contact Handled TRU Waste Acceptance Criteria for WIPP."

Status: While this requirement is directed to the WSB, it also requires coordination between the WSB and PDCF. The WIPP WAC for contact-handled TRU waste (DOE 2005) were utilized during design of the PDCF to ensure compliance with each criterion.

D.2 FDD REQUIREMENTS AT THE PROGRAM LEVEL

2.0 Program Requirements

2.1 Programmatic

2.1.9 The PDCF shall be designed and constructed so as to ensure adequate protection for the public, workers, and environment in accordance with DOE Order 420.1A, Facility Safety.

Basis: DOE Order 420.1A, Facility Safety, specifies general nuclear design requirements applicable to the design of the PDCF plant for all phases of the life of a project. Also, DOE Order 430.1A, Life Cycle Asset Management, Section 1.

Status: The design portion of the PDCF life cycle has included environmental protection and is designed to meet all applicable environmental regulations. As demonstrated in Section 4.5 of this plan, air pollutant releases to the environment will be far below regulatory concentrations. All liquid releases will occur through permitted outfalls or recycled if the opportunity exists. See Table 5.4 of this plan for a summary of the disposition pathways for PDCF liquids. All solid wastes will be disposed of by facilities permitted for the applicable waste types. See Sections 4.1 through 4.4 for detail of the solid waste estimates and disposition pathways.

2.1.10 The PDCF plant shall be designed to integrate principles of pollution prevention. The following fundamental pollution prevention goals and opportunities shall be analyzed and, to the extent practicable, shall be integrated into the PDCF design:

- Minimize waste generation through source reduction, reuse, recycling, and treatment for radioactive, mixed, TRU, hazardous, sanitary, construction, and normal building/administrative waste types;
- Purchase environmentally preferable products as designated by the U.S. Environmental Protection Agency (EPA);
- Incorporate energy efficiency and water conservation techniques;
- Meet all applicable effluent release criteria/regulatory standards, (i.e. Clean Water Act, Clean Air Act); and
- Utilize ALARA principles to minimize exposure to workers, the public, and the environment from pollutants.

Basis: The PDCF design is required to follow: (a) DOE Good Practice Guide, GPG-FM-025A, Waste Minimization/Pollution Prevention; and (b) Pollution Prevention Design Assessment for the Facility Design, B-PDCF-1-01-059, Chapter 4.0 – Pollution Prevention Requirements.

Status: Section 6.0 of this plan provides a summary of the pollution prevention opportunities that developed and are included in the reference section of this Plan: Pollution Prevention Design Assessment (PPDA) (WGI 2003n) and Pollution Prevention Opportunity Assessment (WGI 2003p). The DOE *Good Practice Guide*, although an older guidance, was considered during design.

2.1.14 The PDCF design, construction, and operations shall comply with WSRC Manual 1S, *SRS Waste Acceptance Criteria Manual*, and WSRC Manual 19Q, *Transportation Safety*.

Basis: The PDCF will be constructed and operated at the Savannah River Site (SRS). It will be required to interface with existing SRS infrastructure and be compatible with existing SRS processes. These key manuals provide the guidance for waste disposal and transportation. The WSRC Manual 1S is based in part on DOE Order 435.1, chg 1, Radioactive Waste Management.

Status: The WSRC Manual 1S, SRS WAC Manual, was used extensively during the design of the PDCF. The design allows for full compliance with the 1S Manual. See Sections 4.1.3, 4.2.3, and 4.3.4 of this plan for more information.

2.2 Regulatory Requirements

2.2.3 Environmental Regulations

2.2.3.1 PDCF design, construction, commissioning, and operations shall comply with applicable federal, state, and local environmental protection regulations.

Basis: State and federal laws require the PDCF to comply with applicable regulations. Civil and/or criminal penalties may result from noncompliance with these regulations. Sources for these requirements include EPA environmental regulations, State of South Carolina environmental regulations, Council on Environmental Quality regulations, Executive Orders, Congressional Acts, and South Carolina Department of Health and Environment Control (SCDHEC) consent orders and compliance agreements.

Status: The design portion of the PDCF life cycle has included environmental protection and is designed to meet all applicable environmental regulations. As demonstrated in Section 4.5 of this plan, air pollutant releases to the environment will be far below regulatory concentrations. All liquid releases will occur through permitted outfalls or recycled if the opportunity exists. See Table 5.4 of this plan for a

summary of the disposition pathways for PDCF liquids. All solid wastes will be disposed of by facilities permitted for the applicable waste types. See Sections 4.1 through 4.4 for detail of the solid waste estimates and disposition pathways.

2.2.3.2 The PDCF shall not impact any drinking water supplies. Drinking water shall comply with the standards contained in 40 CFR 141, National Primary Drinking Water Regulations (Safe Drinking Water Act); 40 CFR 142, National Primary Drinking Water Regulations Implementation; and 40 CFR 143, National Secondary Drinking Water Regulations. Specifically, in accordance with 40 CFR 141.66, Maximum Contaminant Levels for Radionuclides, and DOE Order 5400.5 chg 2, Radiation Protection of the Public and the Environment, the average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem (mrem) per year.

Basis: It is DOE/NNSA policy to provide a level of protection equivalent to the public community drinking water standards of 40 CFR 141, Safe Drinking Water Act, for persons consuming water from a public drinking water supply operated by DOE, either directly or through a DOE contractor. 40 CFR 141, National Primary Drinking Water Regulations (Safe Drinking Water Act), prescribes radionuclide concentration limits for public drinking water. 40 CFR 142, National Primary Drinking Water Regulations Implementation, and 40 CFR 143, National Secondary Drinking Water Regulations, provide further requirements with which the PDCF will comply.

Status: The design portion of the PDCF has included protection of drinking water sources and is designed to meet all applicable environmental regulations. All liquid releases will occur through permitted outfalls or recycled if the opportunity exists. See Table 5.4 of this plan for a summary of the disposition pathways for PDCF liquids.

2.2.3.4 The PDCF shall comply with the requirements of 40 CFR 401, Effluent Guidelines and Standards: General Provisions.

Basis: 40 CFR 401, Effluent Guidelines and Standards: General Provisions, provides regulations applicable to PDCF liquid effluent monitoring.

Status: All liquid releases will occur through permitted outfalls or recycled if the opportunity exists. See Table 5.4 of this plan for a summary of the disposition pathways for PDCF liquids.

2.2.3.5 The PDCF shall comply with the requirements of South Carolina Regulation R.72 Article 3, Standards for Stormwater Management and Sediment Reduction.

Basis: South Carolina R.72 Article 3, Standards for Stormwater Management and Sediment Reduction, includes regulations applicable to the design of PDCF stormwater SSCs.

Status: Stormwater in the vicinity of PDCF will be managed through the use of two stormwater retention basins. See Table ES-1 of this plan for size and relative location of these basins.

2.2.3.6 The PDCF shall comply with the requirements of the Resource Conservation and Recovery Act (RCRA) contained in the following Codes of Federal Regulations: 40 CFR 260, Hazardous Waste Management System: General; 40 CFR 262, Standards Applicable to Generators of Hazardous Waste; 40 CFR 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; 40 CFR 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; 40 CFR 268, Land Disposal Restrictions; and 40 CFR 270, EPA Administered Permit Programs: The Hazardous Waste Permit Program.

Basis: These regulations are part of a regulatory scheme implementing RCRA set forth in different parts of the CFR. The RCRA permit program has separate additional regulations containing technical requirements. These separate regulations are used by permit-issuing authorities to determine which requirements must be placed in permits that are issued. These separate regulations are located in the referenced CFRs.

Status: RCRA has been considered during the design for each of the systems that will generate RCRA-regulated waste. Under the current design, a RCRA permit for treatment or storage will not be required. Less than one drum of solid hazardous waste per year is expected to be generated in the Analytical Laboratory. PDCF will have two 1,000 gallon tanks for LAW that will be pumped to the ETF or WSB at least once per month and two 1,000 gallon tanks for HAW that will be pumped to the WSB at least once per month for disposal. These tanks would not be allowed to accumulate waste for more than 90 days without a RCRA storage permit. See Section 4.3 of the Waste Management Plan for a related discussion, and drawing M-PG-F-0085 (WGI 2004b) for the location of these tanks.

2.2.3.7 The PDCF shall comply with the requirements of 40 CFR 50, National Primary and Secondary Ambient Air Quality Standards.

Basis: 40 CFR 50, National Primary and Secondary Ambient Air Quality Standards, specifies regulations applicable to PDCF air emissions. National primary ambient air quality standards define levels of air quality that the EPA Administrator judges are necessary, with an adequate margin of safety, to protect the public health. National secondary ambient air quality standards define levels of air quality that the EPA Administrator judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Status: The estimated PDCF emissions are well below the comparable ambient air quality standards. See Section 4.5.1 of this plan for this comparison.

2.2.3.8 The PDCF shall comply with the requirements of 40 CFR 82, Protection of Stratospheric Ozone.

Basis: 40 CFR 82, Protection of Stratospheric Ozone, implements the Montreal Protocol on Substances that Deplete the Ozone Layer and appropriate sections (including 604) of the Clean Air Act Amendments of 1990. The Protocol and Section 604 impose limits on the production and consumption of certain ozone-depleting substances. 40 CFR 82 Subpart D requires federal agencies to maximize substitution of safe alternatives to Class I (CFCs, halons, CCl4, C2H3Cl3, CH3Br, and CHFBr compounds) and Class II (HCFCs) ozone-depleting substances and develop procurement regulations to conform to Clean Air Act requirements for phaseout of ozone-depleting substances.

Status: PDCF will not have any inventories of ozone-depleting substances and, thus, does not fall under the purview of this regulation.

2.2.3.9 The PDCF shall comply with the requirements of 40 CFR 110, Discharge of Oil.

Basis: 40 CFR 110, Discharge of Oil, provides regulations applicable to the discharge of oil to surface waters by the PDCF.

Status: The requirements of 40 CFR 110 were considered during the design of the PDCF. Refer to Structural Drawings C-CC-F-3219 (WGI 2005o) and C-CC-F-3220 (WGI 2005p) for information related to the discharge of oil.

2.2.3.10 The PDCF shall comply with the requirements of 40 CFR 112, Oil Pollution Prevention.

Basis: 40 CFR 112, Oil Pollution Prevention, establishes procedures, methods, equipment, and other requirements for equipment to prevent the discharge of oil from non-transportation-related facilities into or upon the navigable waters of the United States. It includes requirements for oil (e.g., fuel) spill prevention, control, and countermeasures, including secondary containment for tanks, etc., and applies to emergency diesel fuel tanks, etc. 40 CFR 112 applies to owners or operators of non-transportation-related facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing, or consuming oil and oil products, and which, due to their location, could reasonably be expected to discharge oil in harmful quantities into or upon the navigable waters of the United States. 40 CFR 112 provides for the preparation and implementation of Spill Prevention Control and Countermeasure Plans.

Status: The requirements of 40 CFR 112 were considered during the design of the PDCF. Refer to Structural Drawings C-CC-F-3219 (WGI 2005o) and C-CC-F-3220 (WGI 2005p) for information related to spill control.

2.2.3.12 The PDCF shall comply with the requirements of 40 CFR 60, Standards of Performance for New Stationary Sources.

Basis: 40 CFR 60, Standards of Performance for New Stationary Sources, contains regulations applicable to the management of new stationary sources. A stationary source is any building, structure, facility, or installation that emits or may emit any air pollutant as defined in the regulations. 40 CFR 60, Standards of Performance for New Stationary Sources, includes, in Subpart Kb, performance requirements for large (>75 m^3) volatile organic liquid storage vessels (e.g., fuel tanks).

Status: This standard does not apply to PDCF. There is one PDCF diesel tank that is large enough (>100 m^3) to be regulated under 40 CFR 60, Subpart Kb. However, the vapor pressure of the diesel fuel is far below the threshold for this regulation.

2.2.3.13 The PDCF shall comply with the requirements of 40 CFR 61, National Emission Standards for Hazardous Air Pollutants (NESHAPs).

Basis: 40 CFR 61, National Emission Standards for Hazardous Air Pollutants, includes regulations applicable to PDCF air emissions, specifically: construction, startup, and operation of facilities expected to emit regulated pollutants; and monitoring, reporting, and recordkeeping requirements. Subpart H of this regulation includes limits for radioactive air emissions and associated monitoring, while Subpart C includes limits

for beryllium air emissions and associated monitoring. Subpart A contains general provisions applicable to all sources subject to the requirements of 40 CFR 61.

Status: A review of the PDCF emissions revealed that a NESHAPs permit would be required due to potential releases of beryllium. An Alternative Source Term Calculation has been prepared and submitted to the SCDHEC. A draft permit has also been prepared and will be submitted to SCDHEC for review at a time to be determined.

2.2.3.16 The PDCF shall comply with South Carolina Regulation 61-79 (SC R.61-79), Hazardous Waste Management System.

Basis: SC R.61-79, Hazardous Waste Management System, is applicable to the design of the PDCF. SC R.61-79 includes requirements that parallel federal RCRA requirements and are applicable to accumulation, storage, and treatment of hazardous and mixed waste.

Status: The discussion regarding accumulation in FDD requirement 2.2.3.6 applies to this requirement as well. There are no planned PDCF activities that will require a RCRA permit for storage or treatment.

2.2.3.18 The PDCF shall comply with the requirements of SC R.61-62, South Carolina Air Pollution Control Regulations and Standards.

Basis: SC R.61-62, South Carolina Air Pollution Control Regulations and Standards, implements provisions of the federal Clear Air Act and applicable state statutes in South Carolina, and includes requirements for air pollution control applicable to PDCF. These regulations apply to systems that emit air pollutants. Most requirements would be applied in the context of construction permits or exemption requests. For now, all sources of air pollutants from the PDCF should be considered subject, including diesel engines, fuel and chemical tanks, lab and process area hoods, HVAC, sewer vents, etc. Construction sources (fugitive dust, batch plant) are also subject to this regulation.

Status: The estimated PDCF emissions are well below the comparable standards for ambient air quality, prevention of significant deterioration, and toxic air pollutants. PDCF is seeking a permit under NESHAPs and has initiated that process. See Section 4.5 of this plan for more information.

2.2.3.20 The PDCF shall comply with the requirements of SC R.61-68, South Carolina Water Classification and Standards.

Basis: SC R.61-68, South Carolina Water Classification and Standards, provides water quality standards for PDCF wastewater receiving streams that must be considered in design. R.61-68 sets water quality standards

for surface and groundwater that may not be exceeded. SCDHEC uses these standards to set NPDES permit limits.

Status: The PDCF has been designed to comply with NPDES permit limits. See Section 4.4 of this plan for information related to the management of PDCF effluents and the provisional limits as identified in the FDD.

2.2.3.21 The PDCF shall comply with the requirements of SC R.61-9, South Carolina Water Pollution Control Permits.

Basis: SC R.61-9, South Carolina Water Pollution Control Permits, implements provisions of the federal Clean Water Act and applicable state statutes in South Carolina, and includes requirements for water pollution control applicable to the PDCF. R.61-9 regulations are SCDHEC's NPDES (wastewater discharge) permit regulations, which impose requirements on industrial wastewater and stormwater collection, treatment, and discharge.

Status: It is expected that the PDCF will comply with all NPDES permit limits for discharges of LAW to the Effluent Treatment Facility (ETF) (see Section 4.2.3 of the Waste Management Plan), blowdown and condensates to Upper Three Runs Creek permitted outfall (see Section 4.4 of the Waste Management Plan), and stormwater to dedicated stormwater retention basins prior to discharge through a new permitted outfall adjacent to the PDCF at the unnamed tributary (see Section 4.6 of the Waste Management Plan).

2.2.3.24 The PDCF shall comply with the requirements of SC R.61-107, Solid Waste Management Regulations.

Basis: SC R.61-107, Solid Waste Management Regulations, imposes requirements for solid wastes (construction debris, industrial waste, and municipal-type waste) generated by PDCF. In general, the PDCF design must consider provisions to enable appropriate waste segregation (e.g., to exclude any prohibited materials from the waste stream) and provide appropriate collection facilities for transport to permitted disposal facility.

Status: The design of the PDCF allows for the segregation of all identified waste types. See Section 4.0 of this plan for a description of the waste types and Section 4.4 for information on nonhazardous waste.

2.2.3.27 The PDCF shall comply with the requirements of 40 CFR 355, Emergency Planning and Notification; 40 CFR 370, Hazardous Chemical Reporting: Community Right-To-Know; and 40 CFR 372, Toxic Chemical Release Reporting: Community Right to Know.

Basis: 40 CFR 355, Emergency Planning and Notification; 40 CFR 370, Hazardous Chemical Reporting: Community Right-to-Know; and 40 CFR 372, Toxic Chemical Release Reporting: Community Right-to-Know are Emergency Planning and Community Right-to-Know (EPCRA) regulations. To comply, the PDCF must be designed and operated to enable inventory and tracking of toxic and hazardous chemicals and releases (i.e., amounts received, used, released; storage locations, etc.).

Status: This plan provides, or references, the chemical inventories that were used for design purposes. During operations, these inventories will be tracked through the use of a bar coding system.

D.3 FDD REQUIREMENTS AT THE DESIGN LEVEL

3.2.5 Environmental Constraints

3.2.5.1 The PDCF shall be designed to enable implementation of an environmental monitoring program. This program shall include effluent monitoring, environmental surveillance, meteorological monitoring, radiological monitoring, and groundwater monitoring.

Basis: DOE Order 5400.1 chg 1, General Environmental Protection Program Requirements, documents mandatory environmental standards, including Executive Orders, DOE Orders, and federal regulations. The DOE Order documents requirements for notification and reporting of environmental incidents and releases. The objectives of DOE Order 5400.1 chg 1, General Environmental Protection Program Requirements, are as follows: (1) demonstrate compliance with legal and regulatory requirements imposed by applicable federal, state, and local agencies; (2) confirm adherence to DOE environmental protection policies; and (3) support environmental management decisions. A critical element of monitoring is quality assurance and verification.

Status: The design of the PDCF incorporates the ability to perform the required monitoring of all radiological and non-radiological air emissions and liquid effluents. With regard to groundwater, the only potential infiltration would occur at the stormwater retention ponds. Prior to PDCF construction, the existing groundwater monitoring wells will be moved to allow for continued monitoring.

3.2.5.2 PDCF facilities shall be designed in accordance with DOE Order 5400.1 chg 1, General Environmental Protection Program; DOE Order 5400.5 chg 2, Radiation Protection of the Public and the Environment; and DOE guidance document DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*.

Basis: DOE Orders 5400.1 chg 1, General Environmental Protection Program, and 5400.5 chg 2, Radiation Protection of the Public and the Environment and DOE guidance document DOE/EH-0173T.

Status: These requirements and guidance were used during the design of the PDCF. There are no planned releases of radiological liquids. The design for monitoring of radiological air emissions is captured by the NESHAPs process with the use of DOE guidance document DOE/EH-0173T.

3.2.5.3 PDCF facilities shall be designed in accordance with WSRC-3Q, Environmental Compliance Manual.

Basis: The WSRC 3Q Manual, Environmental Compliance Manual, provides information concerning procedures and activities required by selected federal, state, and local environmental laws and regulations and by DOE/NNSA orders.

Status: The WSRC 3Q Manual has been used throughout the design process.

3.2.5.4 PDCF facilities shall be designed in accordance with WSRC-RP-2000-00295, PDCF Environmental Permitting and Compliance Plan, and WSRC-IM-91-69, SRS Environmental Permitting "HOW" Manual.

Basis: The PDCF Environmental Permitting and Compliance Plan and the "HOW" Manual provide the plan and schedule for submitting applications and obtaining environmental permits for PDCF construction and operations.

Status: Both the Environmental Permitting and Compliance Plan and the "HOW" Manual have been used to facilitate the PDCF design.

3.2.5.7 The PDCF shall be designed to ensure that areas disturbed, emissions, waste generation, noise levels, and other sources of environmental impact are maintained within the PDCF bounds contained in the Surplus Plutonium Disposition Environmental Impact Statement (EIS) (DOE/EIS-0283).

Basis: The EIS documents expected environmental impacts of construction and operation of the PDCF on the basis of estimated area, emissions, etc., which, if exceeded, may require additional National Environmental Policy Act (NEPA) analysis and documentation.

Status: The SPD EIS is periodically compared to the PDCF design to determine where the design has gone beyond that analyzed in the EIS. The most recent review was conducted in April 2004 and forwarded to NNSA.

3.2.5.8 Control of liquid radioactive waste and effluents, consideration of Derived Concentration Guides in plant design, and implementation of the DOE Environmental ALARA process shall be accomplished in accordance with requirements contained in DOE Order 5400.5 chg 2, Radiation Protection of the Public and the Environment, and DOE guidance document DOE/EH-0173T, Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance.

Basis: It is DOE's objective to operate its facilities and conduct its activities so radiation exposures to members of the public are maintained within limits established in DOE Order 5400.5 chg 2, Radiation Protection of the Public and the Environment, and to control radioactive contamination to ALARA levels. In addition to the requirement to limit dose to members of the public (onsite or offsite) in accordance with the standards established in the order, further controls are imposed on liquid releases to protect resources such as land, surface water, groundwater, and the related ecosystems from undue contamination.

Status: The Derived Concentration Guides have been considered in design, and it is expected that PDCF emissions and effluents will be well below all guides and regulatory standards. The only liquid effluent from PDCF with radiological contaminants will be LAW. This waste stream will be sampled prior to release to the ETF or WSB, where it will undergo treatment. Effluent from the ETF or WSB will be released through a permitted outfall. All air emissions are also well below regulatory standards and DOE/NNSA guides (see Section 4.5 of the Waste Management Plan). Monitoring of effluents and emissions from the PDCF will be included in the site monitoring program. Environmental ALARA has also been considered specifically for design of the PDCF stack and control of all waste streams.

3.2.7 Operating Conditions

3.2.7.7 The PDCF shall be capable of performing sampling in support of environmental analyses to meet the applicable permitting requirements.

Basis: Liquid outfall sampling and air stack emission monitoring are not identified in the sample management plan but are required by environmental regulations. Analysis of samples will be done by existing site environmental laboratory facilities.

Status: All liquid effluents will be discharged through a permitted outfall and will be able to accommodate sampling. Emissions through the stack will monitored in accordance with the NESHAPs permit.

3.2.9 Waste Management

3.2.9.3 The PDCF shall be designed to package all hazardous and radioactive wastes that will be transported onsite or offsite in accordance with WSRC Manual 19Q, Transportation Safety, and WSRC Manual 1S, Waste Acceptance Criteria.

Basis: WSRC Manual 19Q, Transportation Safety, documents the SRS onsite and offsite packaging and transportation program and demonstrates compliance with DOE transportation safety standards. WSRC Manual 1S, Waste Acceptance Criteria, documents additional requirements for packaging, containers, and manifesting of waste shipments.

Status: The PDCF design, through the WSRC 1S Manual, provides for segregation of waste types and packaging in accordance with the associated WAC for each waste type. The gloveboxes accommodate two staff during drum loading operations to aid the development of the manifest. Upon completion of the packaging operations the waste is ready for transportation.

3.2.9.4 The PDCF shall be designed to minimize waste generation in accordance with WSRC Manual 5Q, Chapter 4, Part 4, Solid Radioactive Waste Management; WSRC Manual 3Q, Procedure 6.11, Pollution Prevention Program; and DOE Order 420.1A, Facility Safety.

Basis: WSRC 5Q Manual, Chapter 4, Part 4, Solid Radioactive Waste Management, relates to waste minimization. The SRS Pollution Prevention Program is described in WSRC Manual 3Q, Procedure 6.11, Pollution Prevention Program. In addition, DOE Order 420.1A, Facility Safety, requires facility process systems to be designed to minimize the production of wastes.

Status: The PDCF Pollution Prevention Opportunity Assessment (WGI 2003p) describes the waste minimization effort. This document is summarized in Section 6.2 of this plan.

3.2.9.5 The PDCF shall be designed to segregate wastes and prevent mixing of radioactive and non-radioactive wastes in accordance with the requirements and practices described in WSRC Manual 5Q, Radiological Control Manual; WSRC Manual 1S, Waste Acceptance Criteria Manual; and DOE Order 420.1A, Facility Safety.

Basis: Waste segregation and prevention of radioactive and nonradioactive waste mixing simplifies the waste certification process.

Status: All waste types are segregated throughout the PDCF whether the waste is generated in a glovebox, radiological control area, analytical laboratory, or nonhazardous waste. Information related to segregation is presented in Sections 4.0 and 6.2 of this plan.

3.2.9.6 The PDCF shall be designed to manage waste in accordance with WSRC Manual 1S, Waste Acceptance Criteria Manual; WSRC Manual 3Q, Environmental Compliance Manual; and WSRC-IM-90-138, SRS Waste Disposal Manual. Wastes shall meet the characteristic requirements of the applicable WAC for the designated onsite or offsite receiving facility.

Basis: WSRC Manual 1S provides the requirements for compliance with DOE Order 435.1, Radioactive Waste Management. WSRC Manual 3Q provides procedures that contain requirements for specific waste types. WSRC-IM-90-138, SRS Waste Disposal Manual, provides additional guidance for characterizing and managing wastes at SRS. Wastes for onsite and offsite treatment/disposal must meet the applicable facility WAC.

Status: The WSRC 1S Manual was used extensively in the PDCF design to develop the disposition pathway for each waste type. The results of this effort are presented in various sections of this plan and summarized in the Executive Summary.

3.2.9.12 The PDCF shall be designed to facilitate eventual decommissioning and the related waste disposal in accordance with the requirements of DOE Order 430.1A, Life Cycle Asset Management; DOE Order 420.1A, Facility Safety; DOE Order 435.1 chg 1, Radioactive Waste Management; DOE-STD-1128, Guide of Good Practices for Occupational Radiological Protection in Plutonium Facilities; and DOE-HDBK-1132, Design Considerations.

Basis: DOE Order 430.1A, Life Cycle Asset Management, requires "a method to ensure deactivation, surveillance and maintenance and decommissioning activities are appropriately planned, conducted and documented." Similarly, DOE Order 420.1A and DOE Order 435.1 chg 1 require the facility to be designed to facilitate decommissioning. DOE-STD-1128 and DOE-HDBK-1132 provide specific design guidance. The PDCF design should include the selected approach.

Status: PDCF has incorporated various design features that will facilitate the eventual decommissioning. See Section 4.7 of this plan for additional information and a WGI study referenced in this plan (WGI 2000) for design options.

3.3 Codes, Orders, and Standards Requirements

3.3.1.2 The PDCF site and runoff control shall be designed for the 25-year storm event and to safely handle the 100-year storm event.

Basis: SC R.72-300, *Standards for Storm Water Management and Sediment Reduction*, provides specific regulations for detention systems. Stormwater conveyances will be designed for peak flows from the 25-year storm event. Peak flows from the 100-year storm event will temporarily "back up" in streets gutters and low areas. Stormwater detention basins will be designed to contain the runoff from the 100-year storm via an overflow spillway.

Status: The PDCF design includes two storm water retention basins capable of discharging the volume of stormwater associated with the 100-year storm. MFFF design officials were responsible for the retention basin on the north side of PDCF. The North Basin will provide a total discharge volume of 9.9 acre-feet for a 100-year storm. The North Basin design is supported by calculation DCS01-WEP-DS-CAL-00070 (WGI 2003e). The Southeast Basin will provide a total discharge volume of 6.4 acre-feet for a 100-year storm. SC R. 72-300 (SCDHEC 2002) was used for this design.

3.3.13 Permits

3.3.13.5 The design and operation of the PDCF shall limit releases of pollutants in liquid outfalls to specified monthly average and daily maximum NPDES permit limits. NPDES permit limits for two different PDCF outfall locations are presented in Table 3.3.13.5. Discharges shall be monitored.

Table 3.3.13.5 – PDCF NPDES Permit
Provisional Limits For Discharge to Surface Waters (a)

1. Wastewaters discharged through new permitted outfall adjacent to PDCF at unnamed tributary (ephemeral stream)

Effluent Characteristics	Permit Limits	
	Monthly Average	Maximum Daily
Copper, total	6.0 µg/l	7.0 µg/l
Lead, total	0.83 µg/l	20.0 µg/l
Mercury, total	0.051 µg/l	0.07 µg/l
Zinc, total	--	70 µg/l
Total Suspended Solids (TSS)	20 mg/l	40 mg/l
pH	4.8 – 8.5	--
Flow	Monitor & Report	--

2. Wastewaters sent to H-16 Outfall (Direct to Upper Three Runs Creek)

Effluent Characteristics	Permit Limits	
	Monthly Average	Maximum Daily
Cadmium, total	260 µg/l	690 µg/l
Chromium, total	1710 µg/l	2770 µg/l
Copper, total	1460 µg/l	2070 µg/L
Lead, total	290 µg/l	580 µg/L
Mercury	2.3 µg/l	121 µg/L
Nickel, total	2380 µg/l	3980 µg/l
Silver, total	240 µg/l	430 µg/l
Zinc, total	1480 µg/l	2610 µg/L
Total Suspended Solids (TSS)	30 mg/l	60 mg/L
BOD	20 mg/l	40 mg/l
pH	6.0 – 8.5	--
Flow	Monitor & Report	--

Note: µg/l = micrograms per liter; mg/l = milligrams per liter

Basis: PDCF annual outfall releases shall be limited to levels regulated by the SCDHEC, Permit No. SC0000175, effective December 1, 2003. 40 CFR 125, Subpart A, Criteria and Standards for the National Pollutant Discharge Elimination System, establishes criteria and standards for the imposition of technology-based treatment requirements in permits, including the application of EPA-promulgated effluent limitations and case-by-case determinations of effluent limitations.

Status: The current PDCF design includes piping the condensates and blowdown to the Upper Three Runs Creek. It is expected that the concentrations associated with PDCF releases will be far below the associated NPDES permit limits. PDCF stormwater will be collected in two dedicated retention basins and discharged through a new permitted outfall adjacent to PDCF at the unnamed tributary. These discharges are also expected to be well below the permit limits.

3.3.13.6 The PDCF shall be designed to limit releases of air emissions during operations within the following maximum allowable concentrations at the site boundary, or as otherwise noted:

Air Pollutant		SCDHEC Maximum Allowable Concentration	SRS Approximate % of SCDHEC Limit
Beryllium		0.01 μg/m^3	90.0
Cadmium		0.25 μg/m^3	4.0
Chlorine		75.00 μg/m^3	0.5
Chromium (Compounds)		2.50 μg/m^3	4.0
Cobalt (Compounds)		0.25 μg/m^3	9.2
Gaseous Fluorides (as HF)	12-hour avg. 24-hour avg. 1-week avg. 1-month avg.	3.7 μg/m^3 2.9 μg/m^3 1.6 μg/m^3 0.8 μg/m^3	9.2 5.9 3.8 2.6
Lead	Calendar	1.50 μg/m^3	0.2
Manganese (Compounds)		25.0 μg/m^3	0.4
Nickel		0.50 μg/m^3	96.0
Phosphorus		0.50 μg/m^3	2.0
PM_{10} (particulate matter)	24 hour Annual	150.0 μg/m^3 50.0 μg/m^3	64.7 14.0
Radionuclides		10 mrem/yr dose	0.5

Note: μg/m^3 = micrograms per cubic meter; mrem/yr = millirem per year

Basis: PDCF air emissions will be limited to levels from the EIS and as documented in 40 CFR 50 (National Primary and Secondary Ambient Air Quality Standards); 40 CFR 60 (Standards of Performance for New Stationary Sources); 40 CFR 61 (NESHAPS); and SC R.61-62 (Air Pollution Control Regulations and Standards). These regulations require air emissions from the PDCF to be permitted by SCDHEC. These are the known expected air pollutants from PDCF and are listed in the technical document, *Air Emissions Limits for PDCF*. The selection of pollutants is based on "PDCF – Revised Draft NESHAPS Beryllium Air Permit Application," NNP-PDC-2004-00030. The third column listed is an upper bounding estimate of the percentage of the SCDHEC Maximum Allowable Concentration for each pollutant that exists at the SRS site boundary from all sources of each pollutant onsite, and is based on "Clean Air Act Title V Dispersion Modeling for SRS (Rev. 2)," SRT-NTS-98189. It is presumed that one of the goals of the PDCF design is to minimize, to the extent reasonable, the potential to release these pollutants. The percent of the SCDHEC limit will be helpful when considering the addition of any new sources of such air pollutants at SRS. When the PDCF applies for its operating air permit, the SCDHEC will set specific rate limits for each regulated air pollutant at or near the source.

Status: Section 4.5 of this plan provides the results of the air dispersion modeling for anticipated PDCF emissions. In all cases, the resulting concentration is well below the associated standard.

3.4 Interface Requirements

3.4.1 External Interfaces

3.4.1.16 Permitted releases from the PDCF shall be in compliance with environmental requirements, including NEPA and SCDHEC commitments. PDCF water discharges shall be permitted to an NPDES outfall.

Basis: All discharges from the PDCF will be allowed within all applicable SRS, South Carolina and federal standards/requirements. WSRC 3Q, Environmental Compliance Manuals.

Status: All PDCF liquid discharges will be released through permitted outfalls and are considered to be well within all applicable criteria for such releases.

3.4.1.20 Low activity waste (LAW) from the operation of the PDCF analytical support laboratory shall tie into the active F-area process sewer line for transfer to the ETF.

Basis: The PDCF analytical support laboratory will have liquid LAW that will be processed before going to waste. The ETF facilities have the capability to further process these liquids to make them acceptable for final disposal.

Status: In accordance with NNSA direction, nearly 12,000 gallons of HAW and 24,000 gallons of LAW will be piped to the WSB while approximately 3.6 million gallons/year of liquid nonhazardous waste (blowdown and condensates) will be collected, transferred to a shared connection with the WSB, and then discharged through a permitted outfall. This direction does not pertain to liquid sanitary waste, which will be sent to the existing SRS sanitary waste treatment system. While the current PDCF drawings follow this direction the FDD states that LAW is to be piped to the ETF. This conflict will need to be resolved based on decisions regarding the future of the WSB. This plan recognizes that LAW could be piped to the ETF or WSB. Either facility provides an acceptable disposition.

3.4.1.21 Solid waste from the PDCF (including the WSB) shall be transferred using existing SRS transportation to the SRS Solid Waste Division (SWD) for final disposition. LLW, MLLW, and hazardous waste shall meet the WSRC 1S Manual WAC. TRU waste resulting from WSB processes, along with PDCF and MFFF job control TRU waste, will be stored by the WSB. The other TRU waste resulting from PDCF processes and the TRU waste stored at the WSB shall be transported to WIPP via TRUPACT-II and shall meet the WIPP WAC.

Basis: The SRS SWD will treat, store, and dispose of all waste that meets its WAC. The WIPP will receive and dispose of TRU waste that meets its WAC. SRS Waste Acceptance Criteria Manual, Procedure Manual 1S; Waste Characterization/Waste Treatment Study, SRR-354-99-001, Rev. D, March 2001.

Status: All PDCF TRU solid waste will be packaged and made available for transfer to the WSB to await its final disposition. Solid LLW generated at PDCF will be sent to E-Area for disposal and solid hazardous waste will be taken to the HWSF. The current PDCF design does not anticipate generating waste that is packaged as MLLW for disposal.

3.4.1.26 High activity waste (HAW) collection tanks, which contain HAW generated from the operation of the PDCF analytical support laboratory and other fluid supply systems, shall tie into the WSB.

Basis: The PDCF analytical support laboratory and other fluid supply systems will generate liquid HAW that will be stored and analyzed at PDCF before going to waste. The WSB has the capability to further manage this liquid in compliance with requirements for final disposal.

Status: The PDCF design includes HAW collection tanks, the contents of which will be pumped to the WSB for management and disposition.