ENTERED

Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221

MAY 21 2012

Mr. John Kieling, Acting Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Review of Savannah River Site-Central Characterization Project Waste Stream Profile Form Number SR-RH-FBL.01

Dear Mr. Kieling:

The Department of Energy, Carlsbad Field Office has approved the Waste Stream Profile Form (WSPF) Number SR-RH-FBL.01, *SRS FBL PRE-1986 Remote Handled Debris,* for the Central Characterization Project at the Savannah River Site.

Enclosed is a copy of the WSPF as required by Section C-5a of the Waste Isolation Pilot Plant, Hazardous Waste Facility Permit, No. NM4890139088-TSDF.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have questions, please contact Mr. J. R. Stroble, Director of the Office of the National TRU Program, at (575) 234-7313.

Sincerely,

Jose R. Franco, Manager
Carlsbad Field Office
For

Enclosure

120518

CBFO:NTP:JRS:GL:12-0484:UFC 5900.00

cc: w/enclosure

J. R. Stroble, CBFO	*	ED
N. Castaneda, CBFO		ED
B. Mackie, CBFO		ED
T. Morgan, CBFO		ED
M. Pinzel, CBFO		ED
T. Hall, NMED		ED
S. Holmes, NMED		ED
T. Kliphuis, NMED		ED
CBFO M&RC		

*ED denotes electronic distribution

CBFO:NTP:JRS:GL:12-0484:UFC 5900.00

Attachment 2 – CCP Waste Stream Profile Form

(1) Waste Stream Profile Number: SR-RH-FBL.01					
(2) Generator site name: Savannah River Site			(3) Generator site EPA ID: SC1890008989		
(4) Technical contact: Irene Quintana			(5) Technical contact phone number: 575-499-4579		
(6) Date of audit report approval by New Mexico Environment Department (NMED): April 13, 2012					
(7) Title, version number, and date of documents used for WIPP-WAP Certification: CCP-PO-001, CCP Transuranic Waste Characterization Quality Assurance Project Plan, Revision 20, June 16, 2011 CCP-PO-002, CCP Transuranic Waste Certification Plan, Revision 26, July 14, 2011 CCP-PO-004, CCP/SRS Interface Document, Revision 30, October 17, 2011					
(8) Did your facility generate this waste? YES	X	NO			
(9) If no, provide the name and EPA ID of the original generator: NA					
Waste Stream Information[1]					
(10) WIPP ID: SR-RH-FBL.01			(11) Summary Category Group: S5000		
(12) Waste Matrix Code Group: Heterogeneous Debris Waste			(13) Waste Stream Name: SRS FBL Pre-1986 Remote Handled Debris		
(14) Description from the ATWIR: This waste stream is primarily solids consisting of booties, lab coats, floor sweeping, rags, and other job control waste and silver coated ceramics (burl saddles).					
(15) Defense TRU Waste: YES	X	NO			
(16) Check One: CH		RH	X		
(17) Number of SWBs NA (17a) Number of SLB2 NA		(18) Number of Drums: NA		(19) Number of Canisters: 3[3]	
(20) Batch Data Report numbers supporting this waste stream characterization: See Characterization Information Summary (CIS) Correlation of Container Identification Numbers to Batch Data Report Numbers					
(21) List applicable EPA Hazardous Waste Numbers:[2] D005, D006, D007, D008, D009, D011, D018, D019, D022, D029, D039, D040, D043, F002, F005, U002, U151					
(22) Applicable TRUCON Content Numbers: SR 321					
(23)**Acceptable Knowledge Information**[1]					
(For the following, enter the supporting documentation used [i.e., references and dates])					
Required Program Information					
(23A) Map of site: CCP-AK-SRS-580, Revision 4, January 3, 2012, Attachments 1 and 2					
(23B) Facility mission description: CCP-AK-SRS-580, Revision 4, January 3, 2012, Section 4.1.3					
(23C) Description of operations that generate waste: CCP-AK-SRS-580, Revision 4, January 3, 2012, Section 4.2.2					
(23D) Waste identification/categorization schemes: CCP-AK-SRS-580, Revision 4, January 3, 2012, Section 4.2.3					
(23E) Types and quantities of waste generated: CCP-AK-SRS-580, Revision 4, January 3, 2012, Section 4.2.1					
(23F) Correlation of waste streams generated from the same building and process, as applicable: CCP-AK-SRS-580 Revision 4, January 3, 3012, Sections 1.0, 3.0, 4.2.2, 5.2, 5.4.1.1, and 5.4.3.					

(24) Waste certification procedures: CCP-TP-530, Revision 10, CCP RH TRU Waste Certification and WWIS/WDS Data Entry, April 25, 2011			
(25)Required Waste Stream Information			
(25A) Area(s) and building(s) from which the waste stream was generated: CCP-AK-SRS-580, Revision 4, January 3, 2012, Section 5.1			
(25B) Waste stream volume and time period of generation: CCP-AK-SRS-580, Revision 4, January 3, 2012, Section 5.2			
(25C) Waste generating process description for each building: CCP-AK-SRS-580, Revision 4, January 3, 2012, Section 5.3.			
(25D) Waste Process flow diagrams: CCP-AK-SRS-580, Revision 4, January 3, 2012, Figure 4-1			
(25E) Material inputs or other information identifying chemical/radionuclide content and physical waste form: CCP-AK-SRS-580, Revision 4, January 3, 2012, Section 5.4			
(25F) Waste Material Parameter Weight Estimates per unit of waste: See table entitled Waste Stream SR-RH-FBL.01 Waste Material Parameter Estimates in Summation of Aspects of AK Summary Report SR-RH-FBL.01.			
(26) Which Defense Activity generated the waste:			
	Weapons activities including defense inertial confinement fusion		Naval Reactors development
	Verification and control technology	X	Defense research and development
	Defense nuclear waste and material by products management	X	Defense nuclear material production
	Defense nuclear waste and materials security and safeguards and security investigations		
(27)Supplemental Documentation:			
(27A) Process design documents: See D019 and D037 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27B) Standard operating procedures: See D037, P012, P014, P015, P016, and P017 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27C) Safety Analysis Reports: See D013 and D020 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27D) Waste packaging logs: NA			
(27E) Test plans/research project reports: See D033 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27F) Site databases: See D008 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27G) Information from site personnel: See C018, C021, C022, C024, C025, C026, C027, C028, C029, C031, C032, C053, C054, C055, C056, C067, C071, and C088 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27H) Standard industry documents: See C050 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27I) Previous analytical data: See M005 and M025 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27J) Material safety data sheets: See M030 in Summation of Aspects of AK Summary Report SR-RH-FBL.01, AK Source Documents.			
(27K) Sampling and analysis data from comparable/surrogate Waste: NA			
(27L) Laboratory notebooks: NA			
Confirmation Information[2]			
For the following, when applicable, enter procedure title(s), number(s) and date(s)			
(28)	Radiography: CCP-TP-053, Revision 11, July 20, 2011, CCP Standard Real-Time Radiography (RTR) Inspection Procedure		
	Visual Examination: NA		

(29) Comments: For a list of the waste characterization procedures used and date of respective procedures see the list of procedures on the attached CIS.

Reviewed by AK Expert:	**YES** [X]		**Date:** 4-19-12
Reviewed by STR (if necessary):	**YES** [X]	**N/A** [ ]	**Date:** 4-19-12

Waste Stream Profile Form Certification:

I hereby certify that I have reviewed the information in this Waste Stream Profile Form, and it is complete and accurate to the best of my knowledge. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

[signature]	Irene Quintana	5/4/12
Signature of Site Project Manager	Printed Name	Date

NOTE: (1) Use back of sheet or continuation sheets, if required.
(2) If, radiography, visual examination were used to confirm EPA Hazardous Waste Numbers, attach signed Characterization Information Summary documenting this determination.
(3) This waste stream consists of 9 55-gallon drums that will be loaded into 3 RH canisters. Nine containers were headspace gas sampled.

CHARACTERIZATION INFORMATION SUMMARY

WSPF # SR-RH-FBL.01

Lot 1

TABLE OF CONTENTS

CCP Characterization Information Summary Cover Page

Waste Stream #: SR-RH-FBL.01   Lot #: 1

AK Expert Review: Kevin Peters   Date: 4/13/2012

SPM Review: Laura Nelson   Date: 4/13/12

SPM signature certifies that through Acceptable Knowledge testing and/or analysis that the waste identified in this summary is not corrosive, ignitable, reactive, or incompatible with the TSDF.

A summary of the Acceptable Knowledge regarding this waste stream containing specific information about the corrosivity, reactivity, and ignitability of the waste stream is included as an attachment to the Waste Stream Profile Form. By reference, that information is included in this lot.

List of procedures used:

Headspace Gas Sampling and Analysis (HSG):

CCP-TP-093	Rev. 16	9/7/2011	CCP Sampling of TRU Waste Containers
CCP-TP-106	Rev. 7	12/29/10	CCP Headspace Gas Sampling Batch Data Report Preparation
CCP-TP-173	Rev. 1	09/30/09	CCP Analysis of Gas Samples for VOCs by GC/FID
CCP-TP-175	Rev. 3	08/02/11	CCP Analysis of Gas Samples for VOCs by GC/MS

Real-Time Radiography (RTR)

CCP-TP-053	Rev. 11	07/20/11	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 10	03/04/11	CCP Standard Real-Time Radiography (RTR) Inspection Procedure

Visual Examination (VE):

NA	NA	NA

Project Level Data Validation / DQO Reconciliation:

CCP-TP-001	Rev. 19	12/29/10	CCP Project Level Data Validation and Verification
CCP-TP-002	Rev. 24	12/28/11	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-003	Rev. 18	12/29/10	CCP Data Analysis for S3000, S4000, and S5000 Characterization
CCP-TP-005	Rev. 24	11/28/11	CCP Acceptable Knowledge Documentation
CCP-TP-530	Rev. 10	04/25/11	CCP RH TRU Waste Certification and WWIS/WDS Data Entry

WAP Certification:

CCP-PO-001	Rev. 20	06/18/11	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-004	Rev. 30	10/17/11	CCP/SRS Interface Document

WAC Certification:

CCP-PO-002	Rev. 26	7/14/2011	CCP Transuranic Waste Certification Plan

CIS-002

CCP Correlation of Container Identification Numbers to Batch Data Report Numbers

Waste Stream: # SR-RH-FBL.01 Lot # 1

Container ID Number	Historical Container ID	NDA BDR or Radiological Characterization BDR (CH only)	RTR BDR	VE BDR	Solids Sampling BDR	Solids Analytical BDR	Load Management/ Overpack Yes	Permit Required Headspace Gas BDR			Transportation Flammable Gas Analysis BDR
								Sample	Analysis		
SR513217A	NA	SRSRHDTC11001	SRSRTR0425	N/A	N/A	N/A		SRHSG1104	ECL11022M	ECL11022G	NA
SR501028	NA	SRSRHDTC11002	SR4RTR0173	N/A	N/A	N/A		SRHSG1105	ECL11021M	ECL11021G	SR12FG3010
SR504242	NA	SRSRHDTC11002	SR4RTR0173	N/A	N/A	N/A		SRHSG1105	ECL11021M	ECL11021G	SR12FG3010
SR512002	NA	SRSRHDTC11002	SR4RTR0173	N/A	N/A	N/A		SRHSG1105	ECL11021M	ECL11021G	SR12FG3010
SR526627	NA	SRSRHDTC11001	SRSRTR0425	N/A	N/A	N/A		SRHSG1104	ECL11022M	ECL11022G	NA
SR510588	NA	SRSRHDTC11002	SR4RTR0173	N/A	N/A	N/A		SRHSG1105	ECL11021M	ECL11021G	NA
SR504233	NA	SRSRHDTC11002	SR4RTR0173	N/A	N/A	N/A		SRHSG1105	ECL11021M	ECL11021G	NA
SR118870	NA	SRSRHDTC11001	SRSRTR0425	N/A	N/A	N/A		SRHSG1104	ECL11022M	ECL11022G	NA
SR504196*	NA	NA	NA	NA	NA	NA		SRHSG1104	ECL11022M	ECL11022G	NA

*Container is only included for HSG data analysis purposes only and is not eligible to ship to WIPP at this time.

Laura Nelson
Signature of Site Project Manager

Laura Nelson — Printed Name
5-1-12 — Date

CIS-003

CCP Headspace Gas UCL$_{90}$ Evaluation Form

WSPF #: SR-RH-FBL.01 **Waste Stream Lot Number** 1 through 1

ANALYTE	Transform Data Used (No, Data-Log, SQRT, other)	# Samples above MDL (1)	# Samples	Maximum (ppmv)	Mean (ppmv)	SD (ppmv)	UCL90 (ppmv)	PRQL (ppmv)	Transformed PRQL (N/A or Value)	UCL90 > PRQL Yes	EPA HWN
Benzene	Log	9	9	2.77	-0.33	1.77	0.49	10	2.30		
Bromoform	Log	0	9	-2.25	-3.71	0.95	-3.27	10	2.30		
Carbon tetrachloride	Log	0	9	-1.24	-2.73	0.95	-2.29	10	2.30		
Chlorobenzene	Log	2	9	-0.76	-2.67	1.16	-2.13	10	2.30		
Chloroform	sqrt	6	9	1.34	0.72	0.41	0.91	10	3.16		
Cyclohexane [a]	Log	0	9	-0.86	-2.34	0.95	-1.90	10	2.30		
1,1-Dichloroethane	Log	1	9	-0.14	-1.69	1.06	-1.20	10	2.30		
1,2-Dichloroethane	Log	3	9	0.64	-1.79	1.22	-1.22	10	2.30		
1,1-Dichloroethylene	Log	0	9	-1.33	-2.81	0.95	-2.37	10	2.30		
cis-1,2-Dichloroethylene[c]	Log	1	9	-0.87	-2.58	1.10	-2.07	10	2.30		
trans-1,2-Dichloroethylene	Log	0	9	-1.09	-2.58	0.95	-2.14	10	2.30		
Ethyl benzene	Log	1	9	-0.30	-2.52	1.22	-1.95	10	2.30		
Ethyl ether	Log	0	9	-0.36	-1.85	0.95	-1.40	10	2.30		
Methylene chloride	sqrt	7	9	1.84	1.04	0.66	1.35	10	3.16		
1,1,2,2-Tetrachloroethane	Log	0	9	-1.61	-3.10	0.95	-2.65	10	2.30		
Tetrachloroethylene	Log	0	9	-1.54	-3.02	0.96	-2.57	10	2.30		
Toluene	Log	4	9	4.87	-0.28	2.76	1.01	10	2.30		
1,1,1-Trichloroethane	Log	0	9	-1.26	-2.74	0.95	-2.30	10	2.30		
Trichloroethylene	Log	2	9	0.96	-2.32	1.56	-1.59	10	2.30		
1,1,2-Trichloro-1,2,2-trifluoroethane	Log	0	9	-1.77	-3.26	0.95	-2.81	10	2.30		
1,2,4-Trimethylbenzene[a]	Log	0	9	-1.35	-2.83	0.95	-2.39	10	2.30		
1,3,5-Trimethylbenzene[a]	Log	0	9	-1.26	-2.75	0.95	-2.31	10	2.30		
m-p-Xylene[b]	Log	1	9	-0.12	-2.58	1.28	-1.98	10	2.30		
o-Xylene	Log	1	9	-0.67	-2.56	1.13	-2.03	10	2.30		
Acetone	sqrt	9	9	7.55	4.36	2.01	5.29	100	10.00		
Butanol	Log	5	9	1.25	-0.91	1.63	-0.15	100	4.61		
Methanol	non	0	9	14.00	13.61	0.22	13.71	100	FALSE		
Methyl ethyl ketone	log	7	9	4.04	0.26	1.96	1.17	100	4.61		

CCP Headspace Gas UCL_{90} Evaluation Form

WSPF #: SR-RH-FBL.01 **Waste Stream Lot Number** 1 through 1

ANALYTE	Transform Data Used (No, Data-Log, SQRT, other)	# Samples above MDL (1)	# Samples	Maximum (ppmv)	Mean (ppmv)	SD (ppmv)	UCL90 (ppmv)	PRQL (ppmv)	Transformed PRQL (N/A or Value)	UCL90 > PRQL Yes	EPA HWN
Methyl isobutyl ketone	log	1	9	-0.51	-1.89	0.97	-1.44	100	4.61		
Chloromethane[c]	Log	9	9	4.54	1.68	1.72	2.48	10	2.30	Yes	none[2]
Carbon Disulfide[a]	Log	0	9	-1.29	-2.78	0.95	-2.34	10	2.30		
1,2-Dichloropropane[a]	Log	1	9	-0.78	-2.39	1.07	-1.89	10	2.30		
Trichlorofluoromethane[c]	No	0	9	-1.16	-2.64	0.95	-2.19	10	N/A		

[a] These compounds are from the TRAMPAC and or CH TRUCON Appendix B and are flammable VOCs that do not appear in the QAPjP or the WIPP WAP. These are not part of the target analyte list, but samples may be analyzed for these compounds.

[b] These xylene isomers cannot be resolved by the analytical methods employed in the program. m-Xylene and p-Xylene will be reported as "Total m-p-Xylene."

[c] Noted analytes are not required but are reported by the Environmental Chemistry Laboratory at Idaho and are included on the UCL90 for completeness.

Comments:

(1) For analytes where there were no samples measured above the MDL value, 1/2 of the MDL value was used. (Per section C4 of the WAP, 1/2 of the MDL value is used in calculating the mean concentration.)

(2) There is no documentation in AK indicating that waste stream SR-RH-FBL.01 contains discarded commercial chemical products, off-specification species, container residues, or spill residues thereof. This waste stream is therefore not a U-listed hazardous waste as defined in 40CFR261 and U045 is not assigned for Chloromethane (CAS 74-87-3)

Irene Quintana
Signature of Site Project Manager

Irene Quintana
Printed Name

5/4/12
Date

015_005

CCP Headspace Gas Summary Data

Waste Stream Number SR-RH-FBL.01 Lot Number (s) 1

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	% Detected
None	NA	NA	NA

Data Supports EPA Hazardous Waste Numbers Assigned by AK? Yes ☑ No ☐

If no, describe the basis for assigning the EPA Hazardous Waste Numbers:

SPM Signature [signature] Date 5/4/12

CCP RTR/VE Summary of Prohibited Items and AK Confirmation

Waste Stream Number: SR-RH-FBL.01 Lot #: 1

Container Number	RTR Prohibited Items [ab]	Visual Examination Prohibited Items [ab]
See correlation of container ID numbers for list of remaining drum numbers in this Lot.	None of the containers in this Lot had prohibited items identified during Real Time Radiography Examination.	None of the containers in this Lot were characterized by the Visual Examination technique.

a. See Batch Data Reports
b. If AK has assigned U134 to this waste stream, then any liquids in these containers are prohibited items (not acceptable by the TSDF).

Justification for the selection of RTR and/or VE: RTR was selected as the characterization method for this lot because the waste containers were previously packaged and RTR is an acceptable characterization method to meet the applicable Data Quality Objectives for previously packaged debris in waste stream SR-RH-FBL.01.

[signature] Site Project Manager Signature | Irene Quintana Printed Name | 5/4/12 Date

C15-007

CCP Reconciliation with Data Quality Objectives

WSF# SR-RH-FBL.01 Lot # 1

Sampling Completeness

VE

Number of Valid Samples: NA Number of Total Samples Analyzed: NA
Percent Complete: NA (QAO is 100%)

RTR

Number of Valid Samples: 8 Number of Total Samples Analyzed: 8
Percent Complete: 100 (QAO is 100%)

NDA

Number of valid samples: 8 Number of Total Samples Analyzed: 8
Percent Complete: 100 (QAO is 100%)

HSG

Number of Valid Samples: 9* Number of Total Samples collected: 9*
Percent Complete: 100 (QAO is ≥90%)

Total VOC

Number of Valid Samples: NA Number of Total Samples collected: NA
Percent Complete: NA (QAO is ≥90%)
Number of Valid Samples: NA Number of Total Samples analyzed: NA
Percent Complete: NA (QAO is ≥90%)

Total SVOC

Number of Valid Samples: NA Number of Total Samples collected: NA
Percent Complete: NA (QAO is ≥90%)
Number of Valid Samples: NA Number of Total Samples analyzed: NA
Percent Complete: NA (QAO is ≥90%)

Total Metals

Number of Valid Samples: NA Number of Total Samples collected: NA
Percent Complete: NA (QAO is ≥90%)
Number of Valid Samples: NA Number of Total Samples analyzed: NA
Percent Complete: NA (QAO is ≥90%)

CCP Reconciliation with Data Quality Objectives

WSF# SR-RH-FBL.01 Lot # 1

	Y/N/NA	Reconcilliation Parameter
1	Y	Waste Matrix Code.
2	Y	Waste Material Parameter Weights.
3	Y	The waste matrix code identified is consistent with the type of sampling and analysis used to characterize the waste.
4	Y	The TRU activity reported in the BDRs for each container demonstrates with a 95% probability that the container of waste contains TRU radioactive waste.
5	N	AK Sufficiency. Is there an approved AK sufficiency Determination for this waste stream?
6	Y	Mean concentrations, UCL90 values for the mean concentration, standard deviations, and the number of samples collected for each VOC in the HSG of each container were calculated and compared with the program required quantitation limits, as reported in CCP-TP-003 Attachment 3, and additional Environmental Protection Agency (EPA) Hazardous Waste Numbers were assigned as required. Samples were randomly collected (when appropriate).
7a	NA	Mean concentrations, UCL90 values for the mean concentration, standard deviations, and the number of samples collected for solids VOCs were calculated and compared with the program required quantitation limits and regulatory thresholds, as reported in the Characterization Information Summary, CCP-TP-003 Attachment 4, and additional EPA Hazardous Waste Numbers were assigned as required. Samples were randomly collected.
7b	NA	Mean concentrations, UCL90 values for the mean concentration, standard deviations, and the number of samples collected for solids SVOCs were calculated and compared with the program required quantitation limits and regulatory thresholds, as reported in the Characterization Information Summary, CCP-TP-003 Attachment 5, and additional EPA Hazardous Waste Numbers were assigned as required. Samples were randomly collected.
7c	NA	Mean concentrations, (UCL90) values for the mean concentration, standard deviations, and the number of samples collected for total metals were calculated and compared with the program required quantitation limits and regulatory thresholds, as reported in the Characterization Information Summary, CCP-TP-003 Attachment 6, and additional EPA Hazardous Waste Numbers were assigned as required. Samples were randomly collected.

CCP Reconciliation with Data Quality Objectives

WSF# SR-RH-FBL.01 Lot # 1

8	Y	The data demonstrates whether the waste stream exhibits a toxicity characteristic under Title 40 Code of Federal Regulations (CFR), Part 261, Identification and Listing of Hazardous Waste, Subpart C, Characteristics of Hazardous Waste.		
9	Y	Does the waste stream contain listed waste found in 20.4.1.200 NMAC incorporating 40 CFR Part 261, Subpart D, Lists of Hazardous Wastes.		
10	Y	Waste stream can be classified as hazardous or nonhazardous at the 90-percent confidence level.		
11	Y	Appropriate packaging configuration and Drum Age Criteria (DAC) is applied and documented in the headspace gas sampling documentation, and the drum age met prior to sampling.		
12	Y	TICs were appropriately identified and reported in accordance with the requirements of Section C3-1 of the QAPjP.		
13	Y	The PRQLs for headspace gas VOCs were met for all analyses as evidenced by the analytical batch data reports.		
14		The overall completeness, comparability, and representativeness QAOs were met for each of the analytical and testing procedures as specified in CCP-PO-001 Sections C3-2 through C3-9 prior to submittal of a waste stream profile form for a waste steam or waste stream lot.		
			Completeness	**Comparability**	**Representativeness**
	Radiography		Y	Y	Y
	VE		NA	NA	NA
	Headspace Gas Analysis		Y	Y	Y
	Solids Sampling		NA	NA	NA
	Solids VOCs		NA	NA	NA
	Solids SVOCs		NA	NA	NA
	Solids Metals		NA	NA	NA

Comments: * This waste stream consists of a total of 9 containers.

[signature] Irene Quintana 5/4/12

Signature of Site Project Manager Printed Name Date

SUMMATION OF ASPECTS OF AK SUMMARY REPORT: SR-RH-FBL.01

Overview:

Remote-Handled (RH) waste stream SR-RH-FBL.01 was generated during plutonium separations activities performed in the FB-Line activities at the Savannah River Site (SRS). Routine operational activities (e.g., housekeeping/cleaning, process equipment adjustments, radiological surveys), construction, and preventive and corrective maintenance were the major waste producers. Other waste production activities include glovebox entry (weekly in both wet and dry), glove replacement (every 30 days on the mechanical line; otherwise, annually or when contaminated), window replacement on process cabinets and gloveboxes, facility modifications, construction of new cabinets, decontamination, sump cleanout, spill cleanups, various mechanical and electrical equipment repairs, Special Recovery campaigns, and change outs of process equipment, piping, cabinet panels, and other equipment. This waste stream is stored at SRS.

Waste stream SR-RH-FBL.01 was contaminated with or generated by operations in support of defense nuclear materials production and defense research and development (R&D). Therefore, this waste stream is defense related waste.

This summation of the Acceptable Knowledge (AK) Summary Report includes information to support Waste Stream Profile Form (WSPF) number SR-RH-FBL.01 for mixed heterogeneous waste from SRS. The primary source of information for this summation is CCP-AK-SRS-580, Central Characterization Project Acceptable Knowledge Summary Report For Savannah River Site, Remote-Handled Transuranic Waste, Waste Streams: SR-RH-FBL.01, Revision 4, January 3, 2012.

Waste Stream Identification Summary:

Waste Stream Name:	SRS FBL Pre-1986 Remote Handled Debris
Waste Stream Number:	SR-RH-FBL.01
Waste Stream Volume, Current:	3 canisters*

*This waste stream is comprised of approximately 9 55-gallon drums that will be packaged into 3 RH canisters.

Waste Stream Volume, Projected:	0 canisters
Generation Dates:	January 1975 – December 1984
Summary Category Group:	S5000, Debris Waste
Waste Matrix Code Group:	Heterogeneous Debris Waste

Waste Matrix Code: S5400, Heterogeneous Debris

Remote-Handled Transuranic Waste Content
Code (RH-TRUCON): SR 321

Annual Transuranic Waste Inventory Report
Identification Number: SR-RH-FBL.01

Waste Stream Description and Physical Form:

Waste stream SR-RH-FBL.01 was generated by glovebox operations, decontamination, housekeeping, maintenance, and construction activities. The waste consists mainly of dry heterogeneous organic debris. Organic debris include plastic, personnel protective equipment (e.g., shoe covers, lab coats, plastic suits), wipes, labware, plastic bottles, wood, rubber gaskets, rubber gloves, plastic bags, plastic sheeting, cloth, tape, absorbed oil, paper, and other job control type waste. The waste may also include small amounts of inorganic debris such as metal components, metal cans, glass, floor sweepings, and absorbent materials (such as diatomaceous earth, oil dry and soda ash). In addition, small quantities of poly bottles containing immobilized liquids (such as hydraulic oil) are also present. The waste matrix will also include absorbents added during repackaging to absorb any water from condensation or dewatering.

Waste stream SR-RH-FBL.01 meets the definition of waste materials that have common physical form, that contain similar hazardous constituents, and that are generated from a single process or activity. The waste was generated from a single process (FB-Line operations and maintenance).

Point of Generation:

Location

Waste stream SR-RH-FBL.01 was generated at SRS, South Carolina, in the FB-Line gloveboxes.

Area and/or Building of Generation

Waste stream SR-RH-FBL.01 was generated in the 200-F Separations Area, H-Canyon, FB-Line.

Generating Processes:

Description of Waste Generating Processes

Waste stream SR-RH-FBL.01 was generated by glovebox operations, decontamination, housekeeping, maintenance, and construction activities in the FB-Line in support of a process involving concentration and refinement of dilute plutonium solutions to solid plutonium buttons usable in weapons production. The descriptions below are summaries of the production processes in FB-Line.

Primary Processes

Plutonium isotopes were separated from uranium isotopes, fission products (primarily Cesium [Cs]-137, Strontium [Sr]-90, Zirconium [Zr]-95, Niobium [Nb]-95, Ruthenium [Ru]-103 and Ru-106) and chemical impurities (primarily iron [Fe^{+3}], aluminum [Al^{+3}], sodium [Na^{+}], sulfate [SO_4^{-2}] and sometimes fluoride [F^{-}]) in the 221-F Building processes. Purified plutonium isotopes contained in a dilute nitric acid and hydroxylamine nitrate solution were transferred to the FB-Line where they were processed to either plutonium metal or plutonium oxide form.

Underlying principles of FB-Line finishing processes are explained in terms of extractive metallurgy. The initial unit operations (i.e., concentration of plutonium nitrate by cation exchange, precipitation of plutonium as a trifluoride, filtration, and washing) are best described as hydrometallurgical operations. The remaining unit operations (i.e., warm air drying, oxidation, and reduction with calcium metal to purified plutoniium metal form) are pyrometallurgical operations. The operations are divided into the process steps listed below. A detailed discussion for each step follows in the sections indicated below.

Cation Exchange

The purpose of cation exchange is to concentrate plutonium product solution from the warm canyon second plutonium solvent extraction cycle. Before receiving the solution, the FB-Line operator verifies that analytical results for the canyon plutonium solution are within specified chemical and isotopic composition range and that the plutonium concentration is less than an established value. Solutions containing greater than the established plutonium concentration may be processed by special procedure.

Bulk chemicals used include the following: dilute plutonium-hydroxylamine nitrate (HAN) solution; n-paraffin hydrocarbon used for diluent washing; dilute sulfuric acid-HAN solution for additional purification to remove cationic impurities; dilute nitric acid/HAN solution to displace residual sulfuric acid from columns; strong nitric/sulfamic acid solution to elute plutonium from columns; and dilute nitric acid/HAN solution to recondition the cation exchange columns. The eluted plutonium solution is transferred to a product hold tank for sampling and analysis. After analysis, the plutonium is transferred to a concentrate feed tank for subsequent precipitation.

The primary cation exchange equipment consisted of numerous tanks, four exchange columns, and four filters. Each vessel was constructed of Type 304 stainless-steel. The tanks ranged in capacity from 20 to 2,500 liters. The four cation exchange columns each consisted of two cylindrical segments connected in series. Each segment was approximately ten inches in diameter and five inches high. A neutron-absorbing shield was located between the two segments of each column and on top of each segment. Each column had a resin capacity of about 12 liters. The resin may contain gases (nitrogen oxides [NO_x]), generated by nitric acid decomposition. These gases normally escape through the process vent system. Sometimes it is necessary to remove the gases by passing a refrigerated solution of dilute nitric acid and HAN down through the column.

Precipitation and Filtering

Precipitation and filtration are the unit operations that bridge the gap between hydrometallurgical and pyrometallurgical operations. Precipitation and filtration produce plutoonium trifluoride cake from the plutonium solution eluted from the cation exchange columns. There were two stages of precipitators, with each stage containing two precipitators. Each stage was housed in a separate wet-chemical cabinet connecting to one of two filtration stations.

Precipitation Equipment: Each first-stage precipitator was cylindrical in shape and constructed of polyethylene. Second-stage precipitators were slab designs fabricated from polyethylene supported by Hastelloy; these had capacities of about 80 liters. The first stage later contained the "C" and "D" precipitators that were constructed in the mid-1980s, but were not used until 1986.

Filtration Equipment: Plutonium product solution was transferred from the second-stage precipitator through a filter boat where the plutonium product material was captured on filter frits. Filter boats were cylindrical with filter frits made from Kynar® material. The filtration head and piping were constructed of polyvinyl chloride (PVC). Outlet tubing is Nylobrade® material. The filter station sump was fabricated from 304L stainless-steel.

Bulk chemical use includes the following: sulfamic and ascorbic acid solutions to reduce any tetravalent plutonium; ascorbic acid to reduce plutonium in the precipitator feedstock if the precipitation stage does not immediately follow cation exchange; dilute hydrofluoric acid for precipitation of plutonium trifluoride; dilute hydrofluoric acid solution for removing excess nitrate; aluminum nitrate/nitric acid solution to dissolve plutonium trifluoride solids in filtrate and wash solutions and to clean precipitation equipment; and sodium hydroxide solution to neutralize waste solutions. The precipitator filtrate and washes are sampled and analyzed for plutonium in the liquid and solid form to determine the total plutonium concentration. If the plutonium content exceeds an established value, the filtrate is treated and transferred to recovery. If the plutonium content is less than the established value, the filtrate and wash solution are neutralized and disposed as waste.

Drying and Conversion

The plutonium trifluoride filter cake from the precipitation stage was transferred to the Mechanical Line air drying station. Warm, dry air was drawn through the cake to remove residual moisture. Air drying of the cake ensured conversion without excessive hydrolysis during the subsequent roasting step. The dried cakes from two filtrations were then combined in a roasting pan and charged in a roasting furnace, where residual water and other volatile materials were removed, and the plutonium trifluoride powder was oxidized to a mixture of plutonium tetrafluoride and plutonium oxide powder.

Drying Station: Plutonium product (in the form of filter cake), contained in a filter boat was transferred to one of four drying stations where warm, dry air was drawn through the cake. Each drying station was fabricated using Hastelloy® C material.

Conversion (Roasting) Station: After drying, plutonium product was dumped from the filter boat into a roasting pan. Roasting pans were cylindrical, open-topped vessels constructed of Hastelloy® C. The roasting pan was then transferred to one of two roasting furnaces. Each furnace was heated by three 5,000-watt heaters.

The atmosphere of the Mechanical Line was kept dry to prevent sorption of moisture into the cake and subsequent hydrolysis of calcium metal during the reduction step. The cake was exposed to the Mechanical Line atmosphere while being transferred to the reduction furnace.

Reduction

In this step, the plutonium tetrafluoride/plutonium oxide mixture was reduced to yield plutonium metal, followed by the physical separation of the reduced metal from the residue. The prepared powder was mixed with metallic calcium and placed in a reduction vessel (stainless-steel pressure chamber containing a magnesium oxide crucible). The void space between the pressure chamber walls and the crucible was filled with magnesium oxide sand. The crucible was covered with a stainless-steel lid and the reduction vessel was sealed and placed in one of two reduction furnaces. All of these operations were conducted in gloveboxes or hoods.

Dumping Stations: Three dumping stations were used in the Mechanical Line to dump intermediate powders from one container to another:

- “Boat Dumper” dumped from the filter boat to the roasting pan
- “Pan Dumper” dumped from the roasting pan to the mix-and-weigh station
- “Mixer-Dumper” mixed the reactants in the mix-and-weigh vessel

The Boat Dumper and Pan Dumper were similar. The Mixer-Dumper was essentially the same as the others except that it was equipped with a chain-drive system for rotating the equipment to mix the reactants in the reduction charge. Each had a frame with latch plates, funnel with a plugcock valve assembly, two shafts, a vibrator, extension handles to engage latch plate cams or valve stems, and a hand wheel for rotating the dumper.

Weighing Station: A weighing station was located in the roasting pan dumping cabinet. The device used a pressure-sensitive transducer sandwiched into the head of a hydraulic lift. The hydraulic lift raised the load cell to support the weighing vessel.

Reduction Vessel (Pressure Chamber): The pressure chamber was cylindrical and fabricated of Type 316 stainless-steel. The chamber was sized to receive a magnesium oxide crucible. After placement in the chamber, the crucible was covered with a Type 304L stainless-steel lid. The pressure chamber sealed to the reduction furnace with a copper gasket. A stainless-steel diaphragm was attached to the gasket to protect the furnace head during firing.

Vacuum System: Two mechanical pumps were connected in parallel and used for evacuating pressure chambers. Vacuum systems were refurbished and new connections were added in the 1980s.

Reduction Furnace: Two reduction furnaces in the Mechanical Line heated the charge contained in the reduction vessel. The furnace heating units were water-cooled induction coils with power supplied by a common motor generator set. Induction coils were fabricated from copper. The reduction vessel was placed inside an induction coil and was sealed against the furnace head by a hydraulic lift. During the operation, the reduction vessel was pressurized with argon. The furnace was constructed of Hastelloy® C.

Heating the plutonium tetrafluoride/plutonium oxide/calcium metal mixture initiated exothermic reactions. The mixture separated into a more dense plutonium liquid and a calcium fluoride/calcium oxide mixture that forms a "slag." The plutonium metal product was physically separated from the slag and crucible (S&C) waste. Slag remaining after the reduction step was largely composed of calcium fluoride, calcium oxide, unreacted calcium metal, unreduced plutonium fluoride and oxide, and small plutonium metal droplets. After reduction, the regulus was dumped from the reduction vessel, marked for identification, pickled, drilled to obtain an analytical sample, weighed, and packaged for storage.

Because the molten plutonium penetrates several millimeters into the wall of the magnesium oxide crucible, both slag and used crucibles were packaged, stored, and reprocessed in recovery. The pressure chamber and magnesium oxide sand were reused.

Plutonium Metal Finishing

The plutonium metal product from the reduction step was pickled to remove any adhering slag and then rinsed in water to remove the acid. The nitric acid pickling step dissolves the slag. After water rinsing, the plutonium metal was allowed to air dry and then sampled using a drill press. After sampling and weighing, the plutonium metal was placed inside a tinned steel can that was subsequently crimp-sealed. The sealed can was marked for identification and removed from the glovebox in a polyethylene bag. The bag was sealed with a portable bag sealer. Canned plutonium metal product was placed inside a shipping container and stored in the vaults until needed. If the product purity and isotopic specifications were satisfied, the product was later shipped off-site for defense program use (i.e., fabrication into weapons shapes). Any product not meeting the specifications would be recovered.

Recovery

A continuing task is the recovery of valuable nuclear materials from various forms of scrap, some originating from SRS operations and some from other sites. Scrap recovery was used not only to salvage valuable materials, but also to reduce the amount of such materials in wastes. Recovery includes dissolution (e.g., of S&C waste, metal turnings, floor sweepings), filtration, anion exchange feed adjustment, and anion exchange processing. Plutonium is purified and concentrated by anion exchange after dissolving and filtering.

Two types of special recovery facilities were used: one for metal dissolution (Cabinets 1-5) and one for oxide dissolution (Cabinets 6-8). Installation and start-up of Cabinets 6-8 in "New" Special Recovery occurred during the mid-1980s. The special recovery equipment consisted of two slab dissolvers, two beaker dissolvers, six filters, and several process tanks. The metal line was suspended around late 1985. Recovery waste generated after 1984 is not included in this waste stream.

The three processing steps (solid scrap dissolution, feed adjustment, and anion exchange), used in the recovery process are discussed below. Recovered plutonium solution is transferred to the 221-F Canyon Building for recycling.

Solid Scrap Dissolution: Solid scrap consists of S&C waste, Mechanical Line cabinet/glovebox floor sweepings, and metal turnings (from analytical samples).

<u>Slag and Crucible</u>

Aluminum nitrate nonahydrate, nitric acid, and heat are used to dissolve S&C waste and sweepings. The solution is then digested and passed through primary filters. The filters are cleaned by back-flushing with hot caustic sodium hydroxide.

<u>Mechanical Line Cabinet/Glovebox Floor Sweepings</u>

Plutonium powders are handled inside the Mechanical Line in preparation for reduction with calcium. In the process of handling these powders, some are spilled onto process equipment and the floor of the glovebox. These powders (plutonium fluoride and oxide compounds), are collected using a brush and scoop or hand-held vacuum cleaner, screened, and placed into a standard S&C stainless-steel container. S&C containers (maximum of four), are removed from the glovebox and stored in five-gallon pails.

Metal Turnings from Plutonium Metal Product Sampling

Analytical samples consist of drill turnings removed from finished plutonium metal product. Sample material not consumed in the analyses is collected and returned to the FB-Line for recovery. Returned sample material is partially oxidized to plutonium oxide. Returned sample material is similar to S&C residue (i.e., unreduced plutonium oxide and uncoalesced plutonium metal shot). Unused sample material is dissolved along with S&C material.

Solution Recycle

Solutions are generated in various FB-Line unit operations that contain plutonium concentrations in excess of discard limits. These solutions are transferred to the recovery process and adjusted as necessary to prepare them as feed to the anion exchange columns.

Boat Flush Solution

After air drying, the contents of filter boats are dumped into roasting pans. Residual plutonium trifluoride is removed by dissolution with a flush of aluminum nitrate and nitric acid. Following the flush, boats are thoroughly rinsed with hydrofluoric acid to prevent possible contamination of future product with aluminum. Both solutions are returned to the recovery process for recycle.

Precipitator Flush Solution

Precipitators are flushed on a routine basis with a mixture of aluminum nitrate and nitric acid to remove plated plutonium trifluoride deposits. This flush is followed by nitric acid and water rinses. Used precipitator flush solutions are routed to the anion column feed adjustment tank.

Sump Solutions

Sumps are provided under each process tank to catch and contain any overflow solution leaking from the tank or process lines. When solution is found in sumps, it is sampled for the presence of solids and analyzed for plutonium content, pH, and other chemical constituents. Depending upon sample analysis results, the solution is routed to either waste or anion feed adjustment tanks. If solids are present, they are either dissolved or removed and stored until a procedure is developed for dissolution.

Process Vessel Vent System Solution

All process vessels are vented through a system designed to prevent carryover of entrained liquids. Scrub tanks are periodically drained and the solutions sampled and routed to waste collection as appropriate based on sample results.

Plutonium Metal Pickling and Rinse Water Solution

After being separated from S&C residues, plutonium metal is pickled in nitric acid to remove any slag. Following pickling, the metal is rinsed with water to remove residual acid.

Recycle Solutions

Solutions containing recoverable plutonium are generated during both laboratory quality control and research and development activities. Solutions are handled on an individual basis depending on their constituents. In general, solutions that do not contain any of the halogens (chlorine, bromine, or iodine), can be dissolved during an S&C dissolution cycle. Solutions containing halogens other than fluoride must have the halogen removed prior to processing in the recovery process.

Solution Collection

Liquid solutions generated within FB-Line that require anion exchange processing are sampled, analyzed, and transferred to the recovery process. The solutions are adjusted as necessary to prepare them as feed for anion exchange purification and recovery. S&C dissolution solutions are also processed through anion exchange.

Feed Adjustment for Anion Exchange Processing
Filtrate solutions may be chemically adjusted by adding ferrous sulfamate to reduce any hexavalent or tetravalent plutonium. This adjustment would be followed by the addition of sodium nitrite to reoxidize all of theplutoniumu as needed for anion exchange, without the addition of ferrous sulfamate. Normal operation does not require this adjustment step. The solution is filtered and then transferred to the ion-exchange columns.

Operation of the Anion Exchange System
Anion exchange is a separation process used to separate desirable from undesirable anions. In the recovery process, dissolver solution is fed to the anion exchange columns cycle. After any solution adjustment (as described above), a plutonium solution batch is pumped through filters to the anion exchange columns, where the plutonium nitrate anion complex is absorbed on the resin. Column effluent is sampled and analyzed to determine whether the plutonium concentration is within discard limits; if so, the effluent is managed as waste. For additional purification, remaining impurities are washed from the column using a wash solution of nitric acid. This solution is also managed as waste.

Spent resin to be discarded is treated to convert any remaining nitrate to sulfate form. The conversion is accomplished by treating the used resin with sodium sulfate solution so that the nitrate ion is replaced by the sulfate ion. Following the sulfate wash, the resin is washed with water to remove residual sulfate and packaged as waste. Resin that is not mixed with other job control waste is not part of this waste stream.

Maintenance activities conducted on FB-Line included the following:

- Sump cleaning
- Glove repair or removal
- Equipment repair
- Construction – new cabinets
- Furnace, hydraulic lift, lighting fixture/bulb, and dumper station repair/changeout
- Transfer/conveyor trolley repair/lubrication
- Cabinet window replacement
- Cabinet glove changeout
- Drying/roasting filter or pan replacement
- Electrical repairs
- Cabinet exhaust pre-filter and High Efficiency Particulate Air (HEPA) filter replacement
- Plastic sleeve replacement from bag-out and bag-in operations
- Cabinet sweeping in dry cabinets
- Sump flushes/clean-outs
- Cabinet wipe downs in both the dry and pickling cabinets
- Spills cleanups of material contained by the cabinet and sump
- Material releases from the cabinet – cleanup and decontamination efforts
- Lead-lined glove replacements (periodically and as needed)
- Repair of leaks on a weekly or more frequent basis
- Changing panels on cabinets and huts
- Equipment repair (valve replacement, etc.)
- Inspection and cleaning of exhaust ducts to remove any plutonium accumulation

Routine housekeeping activities conducted by operators included the following:

- Absorption of liquids
- Construction, breakdown, and disposal of huts adjacent to cabinets
- Bagging trash out of gloveboxes and cabinets

All of these activities generated transuranic (TRU) and low-level waste during the waste generation time period. Construction generated relatively large amounts of TRU waste from 1980-1987. Some examples of waste-generating maintenance and housekeeping activities are provided below.

Hydraulic Sump Cleanup

Sump cleaning was mostly conducted by Operations but maintenance would often remove filter boats, bolts, gloves, or other objects that had fallen into the sump. Spills in the cabinets would not need to be cleaned up because the sumps could catch the liquids for recycle after manual clean up of the sump. Mechanical Line sumps located outside of process cabinets were periodically cleaned out. Operators placed plastic and absorbent paper in front of the sumps and pumped any collected liquid oil into one-gallon containers filled to 66 percent capacity with oil dry or other absorbent materials. Bottles were agitated until all oil was absorbed. Procedures governing this activity noted that no free liquids were to be placed in drums or sent to the burial ground. When all of the liquid oil was removed, the sump was wiped clean. Operators then placed strips of clean paper over the sump, reinstalled the panels, and restarted the pump to check for leaks that would drip onto the paper. When all leaks were repaired, the paper, absorbed oil, panels, and other waste was collected and removed. Wet cabinet sumps were cleaned in a similar manner, but with the added feature that acid or caustic spills were neutralized with soda ash or Celite.

Floor Sweeping Cleanup

Sweepings of dry cabinets generated mostly recoverable scrap such as sand, S&C fragments, calcium chips, plutonium oxide, and plutonium-bearing dust. In the Mechanical Line, powder spilled in dry cabinets was collected by sweeping or vacuuming. In addition to sieving sweepings to remove trash, trash was inspected to remove plutonium-bearing material. Sweepings exposed to liquid were handled separately. Both trash and collected material were also inspected for calcium, which was placed in a separate "calcium waste container" if located. Up to 1,000 grams of sweepings could be bagged out of the line as waste, in an S&C can. Calcium waste (oxidized or loose), was segregated from other trash, placed in a one-gallon metal pail, and covered with Celite or sand. This calcium waste is not part of this waste stream.

Special Recovery

A continuing task is the recovery of valuable nuclear materials from various forms of scrap, some originating from the SRS operations and some from other sites. Scrap recovery was used not only to salvage valuable materials but also to reduce the amount of such materials in wastes.

RCRA Determinations – Hazardous Waste Determinations

Historical Waste Management

Since at least 1997, SRS has applied the following hazardous waste numbers to FB-Line waste which includes SR-W027-FB-Pre86-C and this waste stream, which is the RH counterpart to SR-W027-FB-Pre86-C :

- F001, F002, F003, and F005 – spent solvents
- D001, D003 – ignitable and reactive waste
- D005 – barium
- D006 – cadmium

- D007 – chromium
- D008 – lead
- D009 – mercury
- D011 – silver
- D018, U019 – benzene
- D019, U211 – carbon tetrachloride
- D022, U044 – chloroform
- D029, U078 – 1,1-dichloroethylene
- D039, U210 – tetrachloroethylene (perchloroethylene)
- D040, U228 – trichloroethylene
- D043, U043 – vinyl chloride
- U002 – acetone
- U079 – 1,2-dichloroethylene
- U108 – 1,4-dioxane
- U133 – hydrazine
- U134 – hydrofluoric acid
- U151 – mercury
- U209 – 1,1,2,2-tetrachloroethane
- U226 – 1,1,1-trichloroethane
- U239 – xylene

The list provided above has been used on container labels and is derived from early SRS documents attempting to comply with RCRA and the assignment of applicable hazardous waste numbers to waste retrievably stored at the SRS Burial Grounds. SRS Solid Waste Management stated that many codes (hazardous waste numbers) were conservatively applied, but that all concerned parties understood that a more definitive assignment and basis was needed, including the state regulator. Further, these codes were applied per a Solid Waste Division procedure used beginning in the late 1980s, which required that "virtually any chemical that was or might be present in a feed or process or maintenance material" should have a code applied, regardless of how the chemical was used. This approach categorized all waste generated at SRS together with essentially the same hazardous waste numbers, despite the fact that the waste generating processes and chemicals used by each differed substantially. In one particular instance, all TRU and low-level waste generated prior to January 25, 1990 was characterized as potentially contaminated with F001, F002, F003, and F005 in addition to other listed wastes identified for the waste containers due to the possible presence of solvent contamination of the waste (Reference D011).

The current HWN assignment for this waste stream is:

- F001, F002, F003, and F005 – spent solvents
- D005 – barium
- D006 – cadmium
- D007 – chromium
- D008 – lead

- D009 – mercury
- D011 – silver
- D018 – benzene
- D019 – carbon tetrachloride
- D022 – chloroform
- D029 – 1,1-dichloroethylene
- D039 – tetrachloroethylene (perchloroethylene)
- D040 – trichloroethylene
- D043 – vinyl chloride
- U002 – acetone
- U151 – mercury

With the exception of F001 and F003, Central Characterization Project (CCP) has maintained the hazardous waste number assignment originally determined for the Contact-Handled (CH) portion of this waste stream by SRS. This waste stream pre-dates the implementation of the Resource Conservation and Recovery Act (RCRA) at the site. SRS made preliminary hazardous waste number assignments. SRS identified that "the hazardous characteristics of the waste are limited to toxicity, acutely hazardous and toxic waste, as defined by the South Carolina Hazardous Waste Regulations for the subject waste stream. Over time, SRS reevaluated the hazardous waste designations to more accurately reflect the hazardous constituents in the waste. Because of the age of the waste and previous waste management practices at the site, many hazardous waste numbers are assigned to the waste stream in absence of documentation which would show that the constituent would not be present.

Toxicity Characteristic and Listed Constituents in Waste Stream SR-RH-FBL.01

Chemical/Material	Use/Description/Location	AK Source	EPA HWNs
Acetone	Cleaning and degreasing (Magnaflux, Scene Spray Cleaner, solvents).	C021, C024, C025, C026, C028, C029, C032, C056, C071, D011, D014, M030, P003, P017	U002
Barium	Expected to be contained in Job Control waste.	D011, P003, P017	D005
Benzene	Decontamination agent, process chemical. Detected in soil samples.	C028, C029, C032, D011, D014, M025, P003, P017	D018, F005
Cadmium	Neutron shielding in the cation exchange columns.	C004, C021, C024, C025, C026, C028, C029, C032, C035, C056, C068, C071, D011, D014, D033, P003, P017	D006
Carbon tetrachloride	Historically assumed to be present in Job Control waste.	D011, D014, D048, P003, P017	D019

Chemical/Material	Use/Description/Location	AK Source	EPA HWNs
Chloroform	Potentially used as a cleansing agent or metal degreaser.	D011, D014, D048, P003, P017	D022
Chromium	Corrosion inhibitor in chiller water.	C021, C022, C026, C028, D011, D014, M025, P003, P017	D007
1,1-Dichloroethylene	Expected to be contained in Job Control waste.	D011, D048, P003, P017	D029
Isobutanol (butyl alcohol)	Decontamination agent, cleaning.	C022, C029, D011, P003, P017	F005
Lead	Present in leaded gloves, leaded windows, fluorescent light bulbs, lead bricks, acrylead shielding.	C004, C021, C022, C024, C025, C026, C028, C029, C031, C032, C035, C056, C067, C068, C071, D010, D011, D014, D020, D046, D048, P003, P017	D008
Magnaflux	Decontamination agent. Contains 1,1,1-trichloroethane.	C021, C022, C026, C028, C029, C032, C068, C071, M030, P003, P017	F002
Mercury	Manometers and gauges. Identified on some flowsheets.	C004, C006, C024, C025, C028, C031, C032, C035, C071, D010, D011, D014, D037, D048, M025, P003, P017	D009, U151
Methylene chloride	Adhesives (ingredient in MOR-AD B32 and Raycohesive B-84), polyvinyl chloride (PVC) Cement.	C014, C026, C029, C032, C056, D011, M030, P003, P017	F002
Methyl ethyl ketone	PVC Cement.	C026, C032, C056, P003, P017	F005
Raycohesive	Adhesive to seal liner and gaskets to drums. Contains 1,1,1-trichloroethane and methylene chloride.	C022, C029, C056, P009, P010, M030, P003, P017	F002
Silver	Solder component in electrical equipment. Precipitant for chlorine solutions.	C021, C024, C025, C026, C029, C067, D011, D014, D048, M025, P003, P017	D011
SKC-NF Cleaner Remover	Contains 1,1,1-trichloroethane.	M030, P003, P017	F002
Tetrachloroethylene	Identified as present in FB-Line process waste.	D011, D048, P003, P017	D039, F002
1,1,1-trichloroethane	Magnaflux, Spot Check Dye Penetrant Adhesives, Raycohesive B84, MOR-AD, SKC-NF Cleaner-Remover.	C024, C025, C026, C029, C056, C071, D011, M300, P003, P017	F002

Chemical/Material	Use/Description/Location	AK Source	EPA HWNs
Trichloroethylene	Cleaning and degreasing. Adhesive (ingredient in MOR-AD and Raycohesive B-32). Pipe patch.	C014, C021, C025, C029, C032, C056, D011, P003, P017	D040, F002
Toluene	Decontamination agent, solvent.	C021, C024, C026, P003, P017	F005
Vinyl Chloride	Expected to be contained in Job Control waste.	D011, D048, P003, P017	D043

Ignitability, Corrosivity, Reactivity

Ignitability

The waste material in waste stream SR-MD-HET does not meet the definition of ignitability as defined in 40 CFR 261.21. The material is not a liquid, an ignitable compressed gas, or an oxidizer, and is not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change.

The 1976 revision of the procedure Du Pont Standard Operating Procedure (DPSOP) 40 stipulated that plastic bags were used to package all wet materials such as rags, glass wool, and paper, after pressed free of excess liquid. Wet solid waste from the mechanical line and dry cabinets were to be handled by a special procedure (and may have been recycled into Recovery). Many ignitable liquids were used in FB-Line, including acetone, xylene, ethanol, cyclohexanone, methyl ethyl ketone, n-butanol, and toluene. By 1977, any liquids disposed from the FB-Line as TRU waste were to be absorbed on appropriate media, such as soda ash, Celite, and Oil-Dri in a 3-to-1 ratio of absorbent to liquid. In addition, ignitable liquids such as Magnaflux Spot Check may not have been prohibited from disposal in TRU waste if in aerosol cans (Reference C029). Although not anticipated, any containerized liquids present in TRU waste containers may be ignitable. However, Real-Time Radiography (RTR) and/or Visual Examination (VE) are performed to ensure the absence of prohibited liquids. The materials in this waste stream are, therefore, not ignitable (D001) wastes.

Corrosivity

The materials in this waste stream do not meet the definition of corrosivity as defined in 40 CFR 261.22. The materials are not liquid and operators ensured liquids were not present in the waste during packaging. The materials in the waste streams are therefore not corrosive wastes. FB-Line (formerly JB-Line), personnel were directed by 1976 to rinse waste to remove all acid or caustic-exposed combustibles and package them with enough "Celite" (diatomaceous earth), to absorb any excess liquid. Wet solid waste from the mechanical line and dry cabinets were to be handled by a special procedure (and may have been recycled into Recovery). By 1977, any free liquids disposed from the FB-Line as TRU waste were to be absorbed on appropriate media, such as soda ash, celite, and Oil-Dri in a 3-to-1 ratio of absorbent to liquid. However, one FB-Line engineer did remember an incident with un-neutralized acid in waste before 1980. Although not anticipated, any containerized liquids present in TRU waste drums may be corrosive. Radiography or visual examination will be performed to ensure prohibited items are not included in the waste, any prohibited item identified will be segregated or remediated prior to shipment. The materials in this waste stream are, therefore, not corrosive (D002) wastes.

Reactivity

The materials in this waste stream do not meet the definition of reactivity as defined in 40 CFR 261.23. The materials are stable and will not undergo violent chemical change. The materials will not react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors, or fumes when mixed with water. The materials are not capable of detonation or explosive reaction. No potential sources for cyanides or sulfides were identified. The materials are not liquid and operators ensured reactive materials were not added to containers during packaging. he only reactive materials used in FB-line were calcium and hydrazine/hydrazine mononitrate. As described in the AK Summary, unspent liquid hydrazine is not expected to be present in this waste stream. Plutonium metal is also reactive but was usually recovered as scrap rather than going into TRU waste. RTR is performed to ensure the absence of prohibited items.

<u>Calcium</u>

Numerous sources suggest that calcium was used in FB-Line and may be present in TRU waste containers. Calcium was stored in the F-Canyon building (not in a Contamination Area with other radioactive materials), mixed with reagents in the Canyon building, and used as a process chemical to remove water near the end of the plutonium production process. The calcium used was in the form of small irregular pellets or pieces from about one half the size of a pencil eraser down to slightly smaller than the size of a "BB" pellet. FB-Line did have plutonium button quality problems with calcium contamination, so calcium was periodically removed (about six times during the 1970s), from the FB-Line, possibly ending up in "Low Level Waste" or TRU waste containers, consistent with descriptions of the accumulation of fines in the glovebox in which calcium is used to reduce plutonium fluoride salts. One other possible source of calcium in waste containers (with a "very high likelihood"), was from cleanup of calcium spills in the dry (Mechanical Line), glovebox. However, calcium was usually either recycled in S&C cans or, if not radioactive (i.e., stored outside of the cabinets), disposed as hazardous waste, rather than as TRU waste. If recycled, calcium material was stored in a metal S&C can, overpacked in plastic in another can, and then overpacked again in a grey pail, followed by storage in the vault and ultimate recovery starting in the D1 dissolver. This procedure was formalized. As a result, only very small amounts of calcium are likely to be present in red pail waste. One FB-Line generator also noted that the calcium used likely would have oxidized over the 20 years of its storage and burial in waste drums, which is consistent with calcium's chemical behavior, in that "complete oxidation of even a massive piece of calcium metal eventually occurs." Also, SRS has not applied a hazardous waste number (HWN) for this contaminant based on an analysis presented in a white paper. In 2002, SRS evaluated the granular form of calcium metal used in FB-Line and determined that it does not meet the definition of ignitability or reactivity (References C029, D048, P010).

The materials in the waste stream are therefore not reactive wastes (D003).

Toxicity Characteristic

Toxicity characteristic compounds listed in 40 CFR 261.24 have been identified in waste stream SR-RH-FBL.01 based on review of AK relative to chemicals used or present in the FB-Line and supporting operations. Where a constituent has been identified and there is insufficient quantitative data available to demonstrate that the concentration of a constituent is below regulatory threshold levels, the applicable EPA HWN is applied to the waste stream.

Waste stream SR-RH-FBL.01 is contaminated with toxicity characteristic metal compounds. Barium, cadmium, chromium, lead, mercury, and silver have been assigned by SRS. Historic assignment of Environmental Protection Agency (EPA) HWNs based on SRS policy has established the assignment of these HWNs. For this reason, EPA HWNs D005, D006, D007, D008, D009, and D011 are assigned to waste stream SR-RH-FBL.01.

SRS has historically applied the following EPA HWNs: D018 (benzene), D019 (carbon tetrachloride), D022 (chloroform), D029 (1,1-dichloroethylene), D039 (tetrachloroethylene), D040 (trichloroethylene) and D043 (vinyl chloride). These EPA HWNS are retained based on historical application. EPA HWNs F005 and F002 are also assigned to the waste stream for benzene (F005), (F005), tetrachloroethylene (F002) and trichloroethylene (F002). Because the more specific F-listed EPA HWNs have been assigned for these compounds, assignment of the corresponding toxicity characteristic HWNs D018, D035, D039, and D040 is not necessary. However, the SRS has historically applied both the toxicity characteristic and listed EPA HWNs are therefore both are retained for waste stream SR-RH-FBL.01. Because the more specific F-listed EPA HWNs have been assigned for methyl ethyl ketone, assignment of the corresponding toxicity characteristic HWNs D035 is not necessary.

F-Listed Waste

Based on review of AK relative to chemicals historically used or present in the FB-Line, waste stream SR-RH-FBL.01 contains or is mixed with F-listed hazardous wastes from non-specific sources listed in 40 CFR 261.31. F002 and F005-listed solvents were used in the FB-Line and are therefore applied based on AK and historical application to the waste stream.

F003 constituents were also identified in the waste stream, including acetone, butyl alcohol, cyclohexanone, and xylene and are listed solely because these solvents are ignitable in the liquid form. The waste stream does not exhibit the characteristic of ignitability because is not liquid; therefore, F003 is not assigned.

Although F001-listed solvents were identified in the AK record (i.e., 1,1,1-trichloroethane, Freon, carbon tetrachloride, methylene chloride, and trichloroethylene), EPA has provided a regulatory clarification that the F001 listing is only appropriate when the listed solvents are used in a "large-scale" degreasing operation such as cold cleaning or vapor degreasing on an industrial scale. Large-scale degreasing operations were not conducted in FB-Line, and therefore, EPA HWN F001 is not assigned to this waste stream.

Several of the solvents were used during FB-Line cleaning and degreasing activities or identified as common ingredients in products (e.g., adhesives, dye penetrants, and developers), were used in the building and could be present as spent solvents in the waste. For this reason, waste stream SR-RH-FBL.01 is assigned F-listed EPA HWNs F002 for 1,1,1-trichloroethane, methylene chloride, tetrachloroethylene, and trichloroethylene and HWN F005 for benzene, methyl ethyl ketone, isobutanol, and toluene. Because the more specific F-listed EPA HWN has been assigned for methyl ethyl ketone, assignment of the corresponding toxicity characteristic HWN D035 is not necessary.

U, K, P-Listed Chemicals

Review of the AK record did not identify any specific source or incident where the waste was mixed with or contaminated with discarded commercial chemical product, an off-specification commercial chemical product, or a container residue or spill residue thereof as defined in 40 CFR 261.33. No listed chemicals were identified in the container-specific documentation. However, U-listed EPA HWNs have been assigned by SRS to this waste stream.

Beryllium was present in off-site scrap introduced in scrap recovery. Any beryllium that was dissolved was transferred to the Canyon facility. From 1976 through 1982, beryllium was mechanically separated from plutonium/beryllium scrap using common tools (e.g., hammers). Leftover beryllium materials were discarded. Beryllium powder (P015) as a pure chemical has not been identified in the process that generated this waste and is not applied to the waste stream.

Hydrofluoric acid (U134) was used during sample dissolution; however, there is no indication that unused acid or materials from spills of the acid were disposed of in the waste stream.

Process chemicals such as hydrazine were used in FB-Line in the 1972-1986 time period. Hydrazine (or hydrazine mononitrate), was used in Special Recovery prior to 1986 as a catalyst for dissolution and was even on an experimental process flow sheet from 1984 to 1986. The material was piped in, therefore would only be present in solid waste as a spill residue. One FB-Line engineer believed it might be present in TRU waste due to spills or presence in sump crud. This possibility is consistent with information regarding leaks in Special Recovery and precipitation units in October 1979 and a 1980 boil-over incident in Special Recovery that resulted in chemical spills. However, an SRS analysis of the FB-Line "wet" cabinets including dissolvers, precipitations, and Special Recovery, found that spilled chemicals in these areas would have ended up in sumps designed to catch liquids. All wet chemistry cabinets have sump alarms equipped with conductivity probes that alarm when "every minor amount of liquid" is present. The sumps are then emptied by a vacuum transfer system either to high-level liquid waste or plutonium recovery systems. Because of the way these sumps worked, it is not likely that pure hydrofluoric acid or hydrazine or their spill residues would have been disposed in TRU waste. As a result, U-numbers are not be assigned for these chemicals (Reference D020).

There is no documentation in AK indicating that waste stream SR-RH-FBL.01 contains discarded commercial chemical products, off-specification species, container residues, or spill residues thereof. This waste stream is therefore not a U-listed hazardous waste as defined in 40 CFR 261 and U045 is not assigned for Chloromethane.

In the case of acetone, SRS staff could not rule out the possibility that pure acetone might have been used in FB-Line as a non-aerosol containerized liquid, so the HWN U002 is applied. Also, SRS performed an evaluation of hazardous waste number assignments and did not remove the HWN for mercury, which could be present in spill cleanup materials; as a result, the HWN U151 is also applied to the subject waste stream. In summary, the HWNs U002 and U151 are assigned to this waste stream.

The materials in waste stream SR-RH-FBL.01 are not hazardous waste from any of the sources specified in 40 CFR 261.32. Therefore, waste stream SR-RH-FBL.01 is not assigned a K-listed HWN.

Polychlorinated Biphenyls

Based on a review of the container documentation, materials potentially containing polychlorinated biphenyls (PCBs) were not specifically identified (capacitors, ballasts, etc.). FB-Line waste management practices required identification, segregation, and special management of suspect PCB containing material. No other potential sources for PCBs were identified in the AK record that would have been introduced into the waste stream. Therefore, waste stream SR-RH-FBL.01 is not regulated as a Toxic Substances Control Act (TSCA) waste under 40 CFR 761, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution In Commerce, And Use Prohibitions* (C073, C074, and M036).

According to waste generators for the waste stream time period, no capacitors or transformers were inside the FB-Line cabinets. There were PCB-containing capacitors that were part of reduction furnaces, but they were located outside of cabinets and they should not have been disposed of as TRU waste. There may have been electric-induced furnaces and motors disposed of as waste as early as 1986, but extensive efforts were undertaken during the early-to mid-1980s to replace or retro-fill electrical equipment containing PCB material. Electrical equipment that might contain PCBs would have been disposed by special procedures. Although the precise history of FB-Line capacitors is unknown, the annual PCB Inventory Change Report for calendar year 1984 stated that no large capacitors were in service at the SRS. Oils, including hydraulic oils, were commonly used in the FB-Line during this time frame but Arochlor oils (PCB containing oils) were not.

Prohibited Items

The SRS waste segregation and packaging procedures included controls for liquids, compressed gases, explosives, pyrophorics, non-mixed hazardous waste, sealed containers greater than four liters, and incompatible or potentially ignitable, corrosive and reactive materials encountered during waste repackaging operations. Based on waste management practices, procedures, and container-specific documentation, residual liquids should not be present in internal containers in exceedance of permitted volumes . Packaging procedures required absorption or removal of liquids. "Incidental" quantities of liquids were also permitted if an excess of absorbent material was packaged with the liquid. Plastic bottles could be filled to 90 percent capacity and packaged in a container if a "suitable" amount of absorbent was also packed for leakage. No unused chemicals or half-empty chemical bottles were disposed of in the waste. The JB-Line's Handling and Packaging Procedure (1976), provides details as to the proper packaging for wet solid wastes. These wastes were to be rinsed of all acid or caustic-exposed combustibles, packaged in plastic bags with enough "Celite" to absorb any excess liquid, and then placed into drum. If the wet solid waste came from a cabinet, the bagged-out waste was put into another bag that was filled with "sufficient "Celite" (about 250 grams) for absorption, put into a pail and then placed in a drum. Wet solid waste from the mechanical line and dry cabinets were to be handled by a special procedure. By 1977, any free liquids disposed from the FB-Line as TRU waste were to be absorbed on appropriate media, such as soda ash, celite, and Oil-Dri in a 3 to 1 ratio of absorbent to liquid (References P009, P010, and P016)

Some disposed paint cans may have been greater than four liters, but were punctured.

Containers with prohibited waste items identified during RTR and/or visual examination will be segregated then treated and/or repackaged to remove the items prior to certification and shipment.

Method for Determining Waste Material Parameters (WMPs) Weights Per Unit of Waste

Radiography was performed on the nine containers in this waste stream and data was used to establish WMPs. Waste items were categorized into one of the following WMPs: iron based metals/alloys, aluminum based metals/alloys, other metals, other inorganic materials, cellulosics, rubber, plastics (waste materials), inorganic matrix, organic matrix, and soils/gravel. The WMP weights were assessed and an average was determined that was applied to the RH waste stream. The results of the assessment are presented in the table below.

Waste Stream SR-RH-FBL.01 Waste Material Parameter Estimates

Waste Material Parameter	Avg. Weight Percent	Weight Percent Range
Iron-based Metals/Alloys	59.50%	5.28 – 84.47%
Aluminum-based Metals/Alloys	0.60%	0 – 15.96%
Other Metals	<0.1%	0 – <0.1%
Other Inorganic Materials	5.67%	0 – 16.22%
Cellulosics	1.16%	0 – 3.17%
Rubber	8.70%	0 – 54.23%
Plastic (waste materials)	24.38%	0 – 37.18%
Inorganic Matrix	<0.1%	0 – <0.1%
Organic Matrix	<0.1%	0 – <0.1%
Soils/gravel	0.0%	0 – 0.0%
Total Inorganic Waste Avg.	**65.77%**	
Total Organic Waste Avg.	**34.24%**	

List of AK Sufficiency Determinations

There are no AK Sufficiency Determination requests for this waste stream.

Transportation

This waste stream meets TRUCON codes SR 321.

Beryllium

Individual drums may contain greater than 1 percent by weight beryllium in particulate form however, any payload container will contain less than 18.14 kilograms .

Radionuclide Information

Radiological characterization for waste stream SR-W027-FB-Pre86-C has identified the radionuclides suspected to be in waste stream SR-RH-FBL.01. There are 6,884 drums with nondestructive assay data available in WWIS. The results for these drums were averaged to determine the weight percentages for the nuclides. The table below shows the results of those assays.

Radionuclides that have been reported in containers of FB-Line CH waste are included and can be expected to be found in any FB-Line container. Curie percentages are not reported because a few drums contained very high levels of Tl-208 which skewed the statistics to show that Tl-208 accounts for 100 percent of the activity in the 6,884 drums set. CCP has determined the isotopic composition of waste stream SR-RH-FBL.01 and described how that determination was made in CCP-AK-SRS-581, *Central Characterization Project Remote-Handled Transuranic Radiological Characterization Technical Report for Savannah River Site Waste Stream SR-RH-FBL.01*. The information contained in this section is only intended to provide historical AK data related to the management of this waste stream by SRS and to describe previous characterization of CH waste that may identify specific nuclides present in the RH waste stream.

Radionuclides in CH Companion Waste Stream SR-FB-Pre86-C Also Applicable to RH SR-RH-FBL.01 Waste

Radionuclide	Total Radionuclide wt. %	Suspected Present?
Pu-238	0.04	Y
Pu-239	85.33	Y
Pu-240	6.64	Y
Pu-242	0.07	Y
Am-241	0.46	Y
U-233	0.01	Y
U-234	0.03	Y
U-238	5.31	Y
Cs-137	TRACE*	Y
Sr-90	TRACE*	Y
Additional Radionuclides		
H-3	TRACE*	Y
C-14	TRACE*	Y
Na-22	TRACE*	Y
Ni-59	TRACE*	Y
Co-60	TRACE*	Y
Se-79	TRACE*	Y
Tc-99	TRACE*	Y
Ru-106	TRACE*	Y
Sb-125	TRACE*	Y

Radionuclide	Total Radionuclide wt. %	Suspected Present?
Sn-126	TRACE*	Y
I-129	TRACE*	Y
Ba-133	TRACE*	Y
Ba-137m	TRACE*	Y
Cs-134	TRACE*	Y
Ce-144	TRACE*	Y
Pm-147	TRACE*	Y
Eu-152	TRACE*	Y
Eu-154	TRACE*	Y
Tl-208	0.07	Y
Bi-214	TRACE*	Y
Pb-214	TRACE*	Y
Ac-227	TRACE*	Y
Th-232	1.41	Y
U-232	TRACE*	Y
U-235	0.20	Y
U-236	TRACE*	Y
Pu-241	0.24	Y
Am-243	TRACE*	Y
Cm-243	TRACE*	Y
Cm-244	0.06	Y
Cm-245	TRACE*	Y
Np-247	0.14	Y
Cf-249	TRACE*	Y

*TRACE = less than 0.01%

Payload management is not used for RH waste.

AK SOURCE DOCUMENTS

Source Document Number	Title	Document Number	Author	Date
C003	Memo from T.A. Reilly to O.M. Morris re: Nuclear Safety Limits for Various Nuclides in Burial Ground Concrete Culverts	N/A	T.A. Reilly	11/14/1985
C004	Letter from O.M. Morris to Mr. M.G. O'Rear re: TRU Mixed Waste Generation and Characterization	N/A	O.M. Morris	4/8/1988
C006	Fax from D. Gartland to J. Ciucci re: Volumes of Waste at BNFL	N/A	D. Gartland	8/11/1998
C010	Letter from K.W. French to N. Stetson re: Criteria for Transuranic Solid Wastes	N/A	K.W. French	12/6/1973
C011	Letter from W.J. Mottel to Distribution re: Requirements for Packaging Transuranic Waste	N/A	W.J. Mottel	6/4/1974
C012	Memo from D.C. Nichols to Users of Burial Forms OSR 7-375 and OSR 7-375A re: Instructions for Using Revised Burial Forms	N/A	D.C. Nichols	4/12/1979
C014	Memo from J.J. Croley to B.G. Clontz re: A Comparative Evaluation of Raycohesive® B-32 and MOR-AD® B-32 Adhesives	N/A	J.J. Croley	S/1/1979
C015	Store Stock Request from K.O. Darden for Replacing Defective Rings and for 55 gallon Drums	N/A	K.O. Darden	10/1/1979
C016	Letter from J.S. Johnson to A.S. Barab re: Transuranium Waste Packaging Requirements	N/A	J.S. Johnson	2/28/1974
C017	Letter from T.A. Reilly to J.L. Forstner re: Nuclear Criticality Safety in Shipping Radioactive Waste to Building 643-G	N/A	T.A. Reilly	1/20/1982
C018	Estill, W. Record of Communication - Interview with M. P. Rodriquez, FB Line Engineer	N/A	W. Estill	1/10/2002
C019	Memo from N. Kolb re: Integrated Radioactive Waste Management Plan (Updated Sections)	N/A	N. Kolb	4/7/1978
C020	Memo from E.K. Barradale to J. D'Amelio, S. Davis, D. Stewart, and J. Stumbaugh, re: Operational Practices During Emplacement of Transuranic Waste on TRU Pads 1-6 in the SRS Burial Grounds	N/A	E.K. Barradale	8/12/1993
C021	Whitworth, J. Record of Communication - Interview with Chip Harris	N/A	J. Whitworth	1/10/2002
C022	Guerin, D. Record of Communication - Interview with Jeff Overcash	N/A	D. Guerin	1/11/2002
C023	Letter from O. M. Morris, Superintendent Waste Management Technology to M. G. O'Rear re: TRU Mixed Waste Generation and Characterization [For WIPP Part A RCRA Permit]	N/A	O. M. Morris	5/11/1988
C024	Estill, W. Record of Communication - Interview with Joe Stapf, Process Engineer and MC&A Shipping Supervisor at FB-Line, 1978-1982	N/A	W. Estill	1/10/2002
C02S	Whitworth, J. Record of Communication - Ed Moore	N/A	J. Whitworth	1/10/2002
C026	Whitworth, J. Record of Communication - Interview of Les Sonnenberg, FB-Line Engineering Support	N/A	J. Whitworth	1/10/2002
C027	Whitworth, J. Record of Communication - Interview of Ann Gibbs, SRS Solid Waste Management	N/A	J. Whitworth	1/15/2002
C028	Whitworth, J. Record of Communication - Interview of Charley Williams, FB-Line Operator	N/A	J. Whitworth	1/15/2002
C029	Whitworth, J. Record of Communication - Interview of Dorey Rogers, FB-Line Operator/Supervisor	N/A	J. Whitworth	1/15/2002
C031	Estill, W. Record of Communication - Interview of Richard Runnels, FB-Line Process Engineer	N/A	W. Estill	1/16/2002
C032	Whitworth, J. Record of Communication - Interview of John Crim, FB-Line Maintenance	N/A	J. Whitworth	1/17/2002

Source Document Number	Title	Document Number	Author	Date
C035	Letter from R. G. Garvin to M. B. O'Rear re: SR Information on TRU Waste Characterization in Support of the WIPP No-Migration Variance Petition	N/A	R. G. Garvin	1/4/1990
C039	Letter from J.V. Odum to G.R. Thompson re: TRU Pad Soil Removal and Concentrations of Thallium, Arsenic, and Cresol (U)	N/A	J.V. Odum	4/23/1996
C040	Letter from C.H. Ice to N. Stetson re: Description of Transuranic Solid Waste at Savannah River	N/A	C.H. Ice	4/27/1978
C044	Letter from O.M. Morris to M.G. O'Rear re: TRU Waste Data Update Request Reply	N/A	O.M. Morris	3/6/1985
C045	Letter from O.M. Morris to C.G. Halsted re: TRU Waste Annual Call for Data	N/A	O.M. Morris	5/17/1984
C048	Letter from H.E. Hootman to K.W. French re: Cost-Benefit Evaluation of Compaction for Solid TRU Wastes, DPST-74-485	N/A	H.E. Hootman	9/18/1974
C050	Letter from C.F. Jenkins to O.M. Morris re: TRU Waste Storage Drums - Galvanized Closure Rings and Lids Specifications	N/A	C.F. Jenkins	2/12/1981
C053	Record Of Communication – Interview with Mr. Tom Campbell, Fellow Technical Advisor, re: Isotopic Distribution of Material from JB-Line (FB-Line) 1970-1986	N/A	W. Estill	1/31/2002
C054	Record Of Communication – Interview with Mr. Robert Lynn, FB Line Operator, re: Special Recovery Isotopic Distribution	N/A	W. Estill	1/30/2002
C055	Estill, W. Record of Communication - Interview of Mr. James Satkowski, Data from Mass Spec Logbooks relating to FB-Line weapons-grade material 1982-86	N/A	W. Estill	1/30/2002
C056	Estill, W. Record of Communication: Interview with Supervisor Harry Smiley, FB Line Supervisor, regarding FB-Line Waste from 1970-86	N/A	W. Estill	1/28/2002
C058	Memo from O.W. Mowry and G. L. Albert to TRU Waste Coordinators, Identification of TRU Waste	N/A	O.W. Mowry	8/17/1977
C067	Whitworth, J. Record of Communication – Written Response to Interview Questions by Ron Burns, FB-Line Engineer, 1983-87	N/A	J. Whitworth	1/09/2002
C068	Memo from M.A. Ebra to H. Fincher and J. McClard re: FB-Line TRU Waste Characterization Data	N/A	M.A. Ebra	11/8/1988
C070	Whitworth, J. Record of Communication – Miscellaneous Correspondence on Solvent-Contamination Waste	N/A	J. Whitworth	1990
C071	Interview of FB-Line Personnel by J. Whitworth and J. Harrison,	N/A	J. Whitworth and J. Harrison	1/16/2001
C072	Memo from N. Dienes re: Specifications for Plutonium Shipped to the Rocky Flats	N/A	N. Dienes	3/22/1985
C073	Letter from T. Hendrick to M. Sires re: PCBs Used in Electrical Equipment	N/A	T. Hendrick	5/12/1982
C074	Memo from J. Roberts to R. Whitfield re: PCB Inventory Changes during Calendar Year 1984	N/A	J. Roberts	6/28/1985
C083	Memo from C.V. Lester to C. Gurosik re: Strategy for FB-Line Lead Waste	N/A	C.V. Lester	6/11/1986
C086	Email correspondence with Jeff Lunsford regarding beryllium	N/A	Jeff Lunsford	10/20/2004
C087	Email correspondence from Lee Fox/Jeff Lunsford regarding beryllium	N/A	Lee Fox/Jeff Lunsford	11/16/2004
C088	Interview with Jeff Shade about FB Line, 12/2/04	N/A	J. McTaggart	12/7/2004
C089	Westinghouse Savannah River Company Interoffice Memorandum from W.E. Harris to J.A. D'Amelio. Review of Acceptance Knowledge Summary Report for SWMF Beryllium Issues. OBU-SWI-2005-00036	N/A	W.E. Harris	5/11/2005
D003	Radioactive Waste Burial Grounds	DPST-85-694	W.J. Jaegge, N.L. Kolb, et al.	3/1987
D008	Savannah River TRU Waste Inventory Workoff Plan	DPSP-86-1	N/A	7/15/1986
D010	Application for a Post-closure Permit, Volume XII, Transuranic Waste Pads 1-5, Part 1 (Draft), SRP DOE, Revision 0	N/A	N/A	6/30/1988

Source Document Number	Title	Document Number	Author	Date
D011	Waste Analysis Plan (TRU Waste Storage Pads and ETWAF/WCF), (Draft)	N/A	N/A	4/17/1996
D013	Safety Analysis - 200 Area Savannah River Plant Burial Ground Operations, Science Applications International Corporation (SAIC),	DPSTSA-200-10, SUPP-8	N/A	10/1988
D014	Review Form for TWBIR Rev. 3 Data	N/A	N/A	11/20/1996
D016	History of Du Pont at the Savannah River Plant	N/A	William P. Bebbington	1990
D019	System Plan for the Solid Waste Division, Westinghouse Savannah River Company, Revision 2	WSRC-RP-99-01092	N/A	12/30/1999
D020	200-Area Safety Analysis, SAIC	DPSTSA-200-10 SUPP-9	N/A	4/1988
D024	Savannah River Site Approved Site Treatment Plan, 1997 Annual Update, Revision 5	WSRC-TR-94-0608	N/A	3/20/1997
D029	Savannah River Site Solid Waste Management Facility Safety Analysis Report, Westinghouse Savannah River Company, Revision 2	WSRC-SA-22	N/A	11/25/1998
D030	Savannah River Site Transuranic Waste Program, Revision 0	SWE-SWE-96-0195	J.A. Blankenhorn	5/15/1997
D033	The FB Line Facility - A Training Aid Document, September	DPST-86-449	N/A	1986
D035	The Purex Process	DPSU 77-11-1	J.B. Starks	1/1977
D037	System Analysis - 200 Area Savannah River Plant: JB-Line Operations	DPSTSY-200-10	D.H. Stoddard and R.V. Slates	5/1978
D045	Solid Heterogeneous Job Control Waste Raw Material Characterization, Revision 1	WSRC-RP-95-897	N/A	10/271997
D046	Response to DOE Request for Status on Procurement and Disposal of Yellow Pigmented Items at SRS (U), Revision 1	SRT-WED-93-0222	N/A	8/27/1993
D048	Removal of RCRA waste codes from TRU waste containers generated at FB Line	SWD-SWE-2002-000	N/A	3/18/2002
D054	Works Technical Report for January, February 1977	DPSPs 77-1-1, 77-1-2	N/A	N/A
D056	Works Technical Report for August 1976	DPSP-76-1-8	N/A	8/1976
DR001	Draft Discrepancy Resolution for Culvert Storage Limits, Draft	N/A	D. Guerin	2002
DR003	Discrepancy Resolution: Radionuclides	N/A	J. Whitworth	10/19/2002
DR008	Acceptable Knowledge Source Document Discrepancy Resolution, Calcium Reactivity	N/A	J. Harrison	7/18/2006
M001	SR-W027, DOE Waste Stream Questionnaire from DOE National Core Mixed and TRU Waste Data Requirements, Revision 0	N/A	J. D'Ameilo	12/719/96
M003	History of Transuranic Waste Management at the Savannah River Site	N/A	N/A	N/A
M004	EPA Potential Hazardous Waste Site Preliminary Assessment Part 1 - Site Information and Assessment	N/A	N/A	11/2319/88
M005	Characterization of SRP Retrievably Stored Transuranium Waste,	N/A	N/A	1980
M008	Stock Requests (drums, liners, gaskets)	N/A	N/A	1974
M009	Presentation: Savannah River Site Mixed Waste Streams Data and Photo Catalog	N/A	N/A	3/30/1996
M025	Soil Sampling Data from Retrieval Effort	N/A	N/A	Circa 1999
M030	Material Safety Data Sheets	N/A	N/A	N/A
M036	Notes on WAC Revision 7, Compliance Radioisotope Characterization of FB Line	N/A	Nancy Lowery	11/19/1999
M042	Acceptable Knowledge Beryllium Assessment for CCP-SRS AK Reports 1 through 7	N/A	Blair Becker	11/15/2004
M051	Calculation of WMPs for SRS RH Waste Stream SR-RH-FBL.01	N/A	M. Doherty	3/25/2009
M052	RH Container Data	N/A	N/A	N/A
M054	Revision of the Calculation of WMPs for SRS RH Waste Stream SR-RH-FBL.01	N/A	M.Doherty	5/24/2011

Source Document Number	Title	Document Number	Author	Date
M055	CCP RTR Data to support revised WMP calculation	Various	N/A	4/2001
P003	Drum Retrieval from TRU Pads 2-6 (U), UET Manual SW 15 SWO, Revision 4	643-E-58 Q-R-S-NCSC	N/A	8/13/1997
P006	Separations Department: Waste Handling Facilities: Storage of Transuranium Waste, Revision 3	DPSOL 643-G-2018	N/A	5/1978
P008	Separations Department: Waste Handling Facilities: Storage of Transuranium Waste, Revision 7	DPSOL 643-G-2018	N/A	9/1981
P009	Packing TRU Waste and Sealing in 55-Gallon Drums, Revision 1	DPSOL 241-FH-40	N/A	7/1977
P010	Savannah River Plant Radiation and Contamination Control/Management of Solid Radioactive Waste, unnumbered Revisions from 1976-1977	DPSOP 40	E.I. Du Pont De Nemours and Company	1976-1977
P012	Separations Department: Handling Transuranium Waste 221-H Canyon & 211-H Facility, Revision 0	DPSOL 221-H-8028	N/A	11/1974
P013	Waste Management: Waste Handling Facilities: Storage of Transuranium (TRU) Waste, Revision 5	DPSOL 643-G-2018	N/A	1/1979
P014	Separations Department: Cleaning and Removing a Plastic Hut, Revision 0	DPSOL 221-F-JB-1516	N/A	6/1965
P015	Separations Department: Introducing or Removing Material Through Bag Ports, Revision 1	DPSOL 221-F-JB-1525	N/A	5/1965
P016	Separations Department: Handling and Packaging Radioactive Waste, Revision 3	DPSOL 221-F-JB-1523	N/A	7/1976
P017	Identifying TRU Drums With Missing Container ID Tags (U), Solid Waste Management Facility Operating Procedure, Standard Operating Procedure (U), Revision 3	643-E-88 Q-R-S-NCSC	D.J. Wolfe	8/7/2001
P023	Absorbing Containerized Liquids	221-F-55012	N/A	9/12/2006
P024	TRU Drum Remediation	SP-18-002	N/A	6/12/2006