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

JUL 17 2012

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

Subject: Review of Savannah River Site - Central Characterization Project Waste Stream Profile Form Number *SR-W027-FB-Pre86-C, Revision 2*

Dear Mr. Kieling:

The Department of Energy, Carlsbad Field Office has approved the Waste Stream Profile Form (WSPF) Number *SR-W027-FB-Pre86-C, Revision 2; Pre-1986 Waste from FB-Line* for the Central Characterization Project at the Savannah River Site.

The WSPF was originally approved on October 29, 2002. This WSPF was revised in accordance with criteria developed to comply with the Hazardous Waste Facility Permit (HWFP) Attachment C, Section C-1d. Revision 2 of Waste Stream SR-W027-FB-Pre86-C was prepared to make updates to Revision 1. TRUPACT-II and TRUPACT-III Content Code Numbers SR 425 and SQ 154 were added to Waste Stream SR-W027-FB-Pre86-C; and the waste stream generation date was expanded to include 48 containers that were generated after March 6, 1986. The hazardous waste number assignment was not changed.

Enclosed is a copy of the WSPF as required by Section C-5a of the Waste Isolation Pilot Plant HWFP, 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,

E. Ziemianski for

Jose R. Franco, Manager
Carlsbad Field Office

Enclosure

CBFO:NTP:JRS:PG:12-0536:UFC 5900.00

120719

cc: w/enclosure

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Attachment 2 – CCP Waste Stream Profile Form

(1) Waste Stream Profile Number: SR-W027-FB-Pre86-C, Revision 2	
(2) Generator site name: Savannah River Site	(3) Generator site EPA ID: SC1890008989
(4) Technical contact: Beverly Schrock	(5) Technical contact phone number: 575-234-7444
(6) Date of audit report approval by New Mexico Environment Department (NMED): May 23, 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	
(10) WIPP ID: SR-W027-FB-Pre86-C	(11) Summary Category Group: S5000 – Debris Waste
(12) Waste Matrix Code Group: Combustible Waste	(13) Waste Stream Name: Pre-1986 Waste from FB-Line
(14) Description from the ATWIR: This waste stream is primarily solids consisting of booties, lab coats, floor sweeping, labware, rags, and other job control waste. Small HEPA filters, sludges, resins, absorbed liquids, and metal equipment is also present in the waste stream.	
(15) Defense TRU Waste: YES X NO	
(16) Check One: CH X RH	

(17) Number of SWBs[1]: (17a) Number of SLB2[1]:	(18) Number of Drums: 6,933 55-gallon drums	(19) Number of Canisters: NA

(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, F001, F002, F003, F005, U002 and U151
(22) Applicable TRUCON Content Numbers: SR 125/225, SR 133/233, SR 425 and SQ 154
(23)**Acceptable Knowledge Information**
(For the following, enter the supporting documentation used [i.e., references and dates])
Required Program Information
(23A) Map of site: CCP-AK-SRS-2, Revision 14, April 30, 2012, Figures 1, 2, and 3
(23B) Facility mission description: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 4.1
(23C) Description of operations that generate waste: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 4.3
(23D) Waste identification/categorization schemes: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 4.4
(23E) Types and quantities of waste generated: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 4.2.1
(23F) Correlation of waste streams generated from the same building and process, as applicable: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 4.2.2

(24) Waste certification procedures: CCP-TP-030, Revision 30, May 21, 2012			
(25)Required Waste Stream Information			
(25A) Area(s) and building(s) from which the waste stream was generated: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 5.1			
(25B) Waste stream volume and time period of generation: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 5.2			
(25C) Waste generating process description for each building: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 5.3			
(25D) Waste Process flow diagrams: CCP-AK-SRS-2, Revision 14, April 30, 2012, Figures 5 and 6			
(25E) Material inputs or other information identifying chemical/radionuclide content and physical waste form: CCP-AK-SRS-2, Revision 14, April 30, 2012, Section 5.4			
(25F) Waste Material Parameter Weight Estimates per unit of waste: See table entitled "Waste Stream SR-W027-FB-Pre86-C Waste Material Parameter Estimates" in Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C			
(26) Which Defense Activity generated the waste:			
	Weapons activities including defense inertial confinement fusion		Naval Reactors development
	Verification and control technology		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 D047 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, AK Source Documents.			
(27B) Standard operating procedures: See D037, P012, P014, P015, P016 P020, P025, P026, P027, P029, P030, P031 and P032 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, AK Source Documents.			
(27C) Safety Analysis Reports: NA			
(27D) Waste packaging logs: See M027 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, AK Source Documents.			
(27E) Test plans/research project reports: See D033 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, AK Source Documents.			
(27F) Site databases: See D001, M029, M031, M032 and M057 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, 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, C076, C082 and C088 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, AK Source Documents.			
(27H) Standard industry documents: See C050 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, AK Source Documents.			
(27I) Previous analytical data: See D031, D050, DR008 and DR012 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, AK Source Documents.			
(27J) Material safety data sheets: See C004 and M030 in the Summation of Aspects of AK Summary Report: Waste Stream SR-W027-FB-Pre86-C, AK Source Documents.			
(27K) Sampling and analysis data from comparable/surrogate Waste: NA			
(27L) Laboratory notebooks: NA			
Confirmation Information			
For the following, when applicable, enter procedure title(s), number(s) and date(s)			
(28)	Radiography: CCP-TP-053, Revision 11, July 20, 2011		
	Visual Examination: CCP-TP-113, Revision 16, April 25, 2011		

(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:** 6/7/2012
Reviewed by STR (if necessary):	**YES** [X]	**N/A** [ ]	**Date:** 5/31/2012

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] for	Beverly Schrock	7/6/12
Signature of Site Project Manager	Printed Name	Date

NOTE: (1) Also in this waste stream are 8 Black Boxes (also known as carbon steel boxes or large steel boxes) which will be repacked into SWBs and/or SLB2s.

(2) If, radiography, visual examination were used to confirm EPA Hazardous Waste Numbers, attach signed Characterization Information Summary documenting this determination.

CHARACTERIZATION INFORMATION SUMMARY

WSPF #: SR-W027-FB-Pre86-C Rev. 2

Lot #: 162

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CCP Characterization Information Summary Cover Page

Waste Stream #	SR-W027-FB-Pre86-C	Lot #:	162
AK Expert Review:	N/A	Date:	N/A
SPM Review:	Joshua Houghton	Date:	6/22/2012

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:

Radiography (RTR/NDE):

CCP-TP-011	Rev. 15	03/08/04	CCP Radiography Inspection Operating Procedure
CCP-TP-011	Rev. 16	05/02/05	CCP Radiography Inspection Operating Procedure
CCP-TP-011	Rev. 17	11/16/06	CCP Radiography Inspection Operating Procedure
CCP-TP-053	Rev. 2	07/15/04	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 3	03/21/05	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 4	12/22/05	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 5	11/16/06	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 6	03/04/08	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 7	10/21/09	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 8	06/30/10	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 9	09/30/10	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 10	03/04/11	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-053	Rev. 11	07/20/11	CCP Standard Real-Time Radiography (RTR) Inspection Procedure
CCP-TP-136	Rev. 0	09/20/04	CCP Standardized Prohibited Item Remediation
CCP-TP-136	Rev. 1	01/13/05	CCP Standardized Prohibited Item Remediation
CCP-TP-136	Rev. 2	05/24/07	CCP Standardized Prohibited Item Remediation

Headspace Gas Sampling and Analysis (HSG):

CCP-TP-007	Rev. 16	02/03/03	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Procedure
CCP-TP-007	Rev. 17	07/29/03	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Procedure
CCP-TP-007	Rev. 18	10/31/03	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Procedure
CCP-TP-007	Rev. 19	03/01/04	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Procedure
CCP-TP-007	Rev. 20	10/19/04	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Procedure
CCP-TP-007	Rev. 21	03/11/05	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Procedure
CCP-TP-007	Rev. 22	11/16/06	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Procedure
CCP-TP-009	Rev. 11	02/05/03	CCP Single Sample Manifold Data Handling Procedure
CCP-TP-009	Rev. 12	09/01/03	CCP Single Sample Manifold Data Handling Procedure
CCP-TP-009	Rev. 13	10/31/03	CCP Single Sample Manifold Data Handling Procedure
CCP-TP-009	Rev. 14	10/21/04	CCP Single Sample Manifold Data Handling Procedure
CCP-TP-009	Rev. 15	11/16/06	CCP Single Sample Manifold Data Handling Procedure
CCP-TP-029	Rev. 11	02/12/03	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Methods and Equipment Calibration
CCP-TP-029	Rev. 12	09/25/03	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Methods and Equipment Calibration
CCP-TP-029	Rev. 13	06/22/04	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Methods and Equipment Calibration
CCP-TP-029	Rev. 14	10/21/04	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Methods and Equipment Calibration
CCP-TP-029	Rev. 15	04/25/05	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Methods and Equipment Calibration
CCP-TP-029	Rev. 16	11/16/06	CCP Single Sample Manifold Headspace Gas Sampling and Analysis Methods and Equipment Calibration
CCP-TP-032	Rev. 10	02/03/03	CCP Single Sample Manifold Data Validation Procedure
CCP-TP-032	Rev. 11	12/03/03	CCP Single Sample Manifold Data Validation Procedure
CCP-TP-032	Rev. 12	05/23/06	CCP Single Sample Manifold Data Validation Procedure
CCP-TP-032	Rev. 13	05/25/06	CCP Single Sample Manifold Data Validation Procedure
CCP-TP-032	Rev. 14	11/16/06	CCP Single Sample Manifold Data Validation Procedure

Data Generation Review (SRS):

WP-AP-0016		02/15/01	WIPP Disposal Program Data Generation Level Review for Visual Examination

Project Level Data Validation / DQO Reconciliation:

CCP-TP-001	Rev. 7	01/13/03	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 8	02/03/03	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 9	07/10/03	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 10	08/28/03	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 11	03/23/05	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 12	05/25/06	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 13	07/21/06	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 14	11/16/06	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 15	11/22/06	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 16	04/26/07	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 17	09/24/07	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 18	08/09/10	CCP Project Level Data Validation and Verification
CCP-TP-001	Rev. 19	12/29/10	CCP Project Level Data Validation and Verification
CCP-TP-002	Rev. 12	04/30/03	CCP Reconciliation of DQOs and Reporting Characterization Data

CIS-002

CCP-TP-002	Rev. 13	06/27/03	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 14	03/29/05	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 15	08/16/05	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 16	06/06/06	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 17	10/10/06	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 18	11/16/06	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 19	12/22/06	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 20	08/18/08	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 21	08/04/09	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 22	06/30/10	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 23	12/29/10	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-002	Rev. 24	12/28/11	CCP Reconciliation of DQOs and Reporting Characterization Data
CCP-TP-003	Rev. 11	01/20/03	CCP Sampling Design and Data Analysis for RCRA Characterization
CCP-TP-003	Rev. 12	01/25/03	CCP Sampling Design and Data Analysis for RCRA Characterization
CCP-TP-003	Rev. 13	06/28/03	CCP Sampling Design and Data Analysis for RCRA Characterization
CCP-TP-003	Rev. 14	09/03/03	CCP Sampling Design and Data Analysis for RCRA Characterization
CCP-TP-003	Rev. 15	11/16/06	CCP Data Analysis for S3000, S4000, and S5000 Characterization
CCP-TP-003	Rev. 16	10/02/07	CCP Data Analysis for S3000, S4000, and S5000 Characterization
CCP-TP-003	Rev. 17	11/09/09	CCP Data Analysis for S3000, S4000, and S5000 Characterization
CCP-TP-003	Rev. 18	12/29/10	CCP Data Analysis for S3000, S4000, and S5000 Characterization
CCP-TP-005	Rev. 11	02/05/03	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 12	03/26/03	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 13	11/18/03	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 14	11/19/04	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 15	03/31/05	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 16	02/27/06	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 17	06/06/06	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 18	11/16/06	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 19	07/06/10	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 20	11/01/10	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 21	12/29/10	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 22	04/21/11	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 23	06/30/11	CCP Acceptable Knowledge Documentation
CCP-TP-005	Rev. 24	11/28/11	CCP Acceptable Knowledge Documentation
CCP-TP-030	Rev. 7	01/08/03	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 8	03/26/03	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 9	09/19/03	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 10	12/17/03	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 11	03/29/04	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev 12	08/23/04	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 13	11/22/04	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 14	01/26/05	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 15	03/14/05	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 16	04/22/05	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 17	12/29/05	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 18	05/01/06	CCP TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 19	11/16/06	CCP CH TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 20	02/07/07	CCP CH TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 21	05/21/07	CCP CH TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 22	07/24/07	CCP CH TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 23	03/12/08	CCP CH TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 24	08/20/08	CCP CH TRU Waste Certification and WWIS Data Entry
CCP-TP-030	Rev. 25	01/22/09	CCP CH TRU Waste Certification and WWIS/WDS Data Entry
CCP-TP-030	Rev. 26	05/27/09	CCP CH TRU Waste Certification and WWIS/WDS Data Entry
CCP-TP-030	Rev. 27	12/14/09	CCP CH TRU Waste Certification and WWIS/WDS Data Entry
CCP-TP-030	Rev. 28	05/12/10	CCP CH TRU Waste Certification and WWIS/WDS Data Entry
CCP-TP-030	Rev. 29	04/26/11	CCP CH TRU Waste Certification and WWIS/WDS Data Entry
CCP-TP-030	Rev. 30	05/21/12	CCP CH TRU Waste Certification and WWIS/WDS Data Entry

WAP Certification:

CCP-PO-001	Rev. 5	02/05/03	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 6	06/11/03	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 7	01/08/04	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 8	03/15/04	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 9	01/14/05	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 10	02/24/05	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 11	03/10/05	CCP Transuranic Waste Characterization Quality Assurance Project Plan
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CCP-PO-001	Rev. 14	03/28/07	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 15	08/10/07	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 16	10/31/07	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 17	06/22/09	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 18	06/30/10	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 19	12/29/10	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-001	Rev. 20	06/16/11	CCP Transuranic Waste Characterization Quality Assurance Project Plan
CCP-PO-002	Rev. 5	02/12/03	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 6	06/11/03	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 7	11/20/03	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 8	01/08/04	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 9	03/15/04	CCP Transuranic Waste Certification Plan

CIS-003

CCP-PO-002	Rev. 10	11/15/04	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 11	02/24/05	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 12	03/10/05	CCP Transuranic Waste Certification Plan
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CCP-PO-002	Rev. 14	12/29/05	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 15	03/22/06	CCP Transuranic Waste Certification Plan
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CCP-PO-002	Rev. 17	11/15/06	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 18	11/16/06	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 19	05/22/07	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 20	11/02/07	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 21	01/26/09	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 22	01/12/10	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 23	04/07/10	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 24	06/30/10	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 25	12/29/10	CCP Transuranic Waste Certification Plan
CCP-PO-002	Rev. 26	07/14/11	CCP Transuranic Waste Certification Plan
CCP-PO-004	Rev. 12	04/08/03	CCP/SRS Interface Document
CCP-PO-004	Rev. 13	08/04/03	CCP/SRS Interface Document
CCP-PO-004	Rev. 14	10/09/03	CCP/SRS Interface Document
CCP-PO-004	Rev. 15	05/24/04	CCP/SRS Interface Document
CCP-PO-004	Rev. 16	09/20/04	CCP/SRS Interface Document
CCP-PO-004	Rev. 17	10/27/04	CCP/SRS Interface Document
CCP-PO-004	Rev. 18	02/09/05	CCP/SRS Interface Document
CCP-PO-004	Rev. 19	03/14/05	CCP/SRS Interface Document
CCP-PO-004	Rev. 20	11/02/05	CCP/SRS Interface Document
CCP-PO-004	Rev. 21	03/31/06	CCP/SRS Interface Document
CCP-PO-004	Rev. 22	11/16/06	CCP/SRS Interface Document
CCP-PO-004	Rev. 23	01/31/07	CCP/SRS Interface Document
CCP-PO-004	Rev. 24	06/28/07	CCP/SRS Interface Document
CCP-PO-004	Rev. 25	05/20/08	CCP/SRS Interface Document
CCP-PO-004	Rev. 26	08/26/08	CCP/SRS Interface Document
CCP-PO-004	Rev. 27	05/22/09	CCP/SRS Interface Document
CCP-PO-004	Rev. 28	12/29/10	CCP/SRS Interface Document
CCP-PO-004	Rev. 29	07/05/11	CCP/SRS Interface Document
CCP-PO-004	Rev. 30	10/17/11	CCP/SRS Interface Document

CIS-004

CCP Correlation of Container Identification Numbers to Batch Data Report Numbers

Waste Stream # SR-W027-FB-Pre86-C Lot # 162

Container ID Number	NDA BDR	RTR BDR	VE BDR	HSG Sampling BDR	HSG Analytical BDR	Load Management/ Overpack Yes
SR109998**	SRNDA1025	SRRTR1870	N/A	N/A[1]	080806A1	N/A
SR152770**	SRNDA1219	SRRTR2004	N/A	N/A[1]	021407B1	N/A
SR153163**	SRNDA1097	SRRTR1932	N/A	N/A[1]	091707A1	N/A
SR159982**	SRNDA401	SRRTR0482	N/A	N/A[1]	042403B	N/A
SR170254**	SRNDA1012	SRRTR1844	N/A	N/A[1]	060506B1	N/A
SR182646**	SRNDA284	SRRTR0480	N/A	N/A[1]	042403B	N/A
SR193773**	SRS-NDA-030127	SRRTR0404	N/A	N/A[1]	013103A	N/A
SR193812**	SRS-NDA-030123	SRRTR0403	N/A	N/A[1]	012903B	N/A
SR513217**	SRNDA1611	SRSRTR0298	N/A	N/A[1]	122005A1	N/A
SR514321**	SRNDA1381	SRSRTR0129	N/A	N/A[1]	121707A1	N/A
SR514733**	SRNDA1530	SRSRTR0225	N/A	SRHSGS080004	ECL08017M,G	N/A
SR518619**	SRNDA1068	SRRTR1802	N/A	N/A[1]	050106A1	N/A
SR523969**	SRNDA1091	SRRTR1710	N/A	N/A[1]	100906B1	N/A
SR526763**	SRLBC0180	SRSRTR0271	N/A	SRHSGS080003	ECL08020M,G	N/A
SR529039**	SRNDA1396	SRSRTR0080	N/A	N/A[1]	121707B1	N/A
SR530309**	SRNDA1023	SRRTR1857	N/A	N/A[1]	062006B1	N/A
SR530310**	SRNDA1517	SRSRTR0217	N/A	SRHSGS080004	ECL08018M,G	N/A
SR87396**	SRNDA401	SRRTR0241	N/A	N/A[1]	031903B	N/A
SR95463**	SRNDA1025	SRRTR1867	N/A	N/A[1]	080506B1	N/A
SR96426**	SRNDA1010	SRRTR1856	N/A	N/A[1]	062006A1	N/A
SR15025901	SRLBC0421	SRLBR0016	N/A	N/A	N/A	N/A
SR51977701	SRLBC0455	SRLBR0019	N/A	N/A	N/A	N/A

**Note: All containers presented on the CIS, except SR15025907 and SR51977701, are randomly selected containers for RCRA validation after the permit modification in November 2006 and are included for completeness.

[1] No sampling BDR is listed because the Agilent On-Line GC/MS system was utilized and a sampling BDR is not Generated

Signature of Site Project Manager

Joshua Houghton — Printed Name

6/22/2012 — Date

RS-005

CCP Headspace Gas UCL_{90} Evaluation Form

WSPF #: SR-W027-FB-Pre86-C Rev. 2

Waste Stream Headspace Gas Lot Number 1 through 3

ANALYTE	Transform Data Used (No, Data-Log, SQRT, other)	# Samples above MDL (1)	# Samples	Maximum (ppmv)	Mean (ppmv)	SD (ppmv)	UCL_{90} (ppmv)	PRQL (ppmv)	Transformed PRQL (N/A or Value)	UCL_{90} > PRQL Yes	EPA Code
Benzene	Log	3	20	3.43	0.31	0.91	0.58	10	2.30		
Bromoform	No	0	20	1.18	0.72	0.38	0.83	10	N/A		
Carbon tetrachloride	No	1	20	2.84	1.36	0.77	1.59	10	N/A		
Chlorobenzene	No	1	20	2.65	1.49	0.60	1.67	10	N/A		
Chloroform	No	1	20	3.00	1.29	0.62	1.48	10	N/A		
Cyclohexane[a]	Log	0	3	-1.20	-1.94	0.67	-1.20	10	2.30		
1,1-Dichloroethane	Log	3	20	4.51	0.58	1.19	0.93	10	2.30		
1,2-Dichloroethane	No	1	20	3.74	1.85	1.00	2.15	10	N/A		
1,1-Dichloroethylene	Log	1	20	2.45	0.08	1.07	0.40	10	2.30		
trans-1,2-Dichloroethylene	SQRT	0	20	1.69	1.11	0.41	1.23	10	3.16		
Ethyl benzene	No	0	20	2.55	1.39	0.72	1.60	10	N/A		
Ethyl ether	No	0	20	2.50	1.49	0.67	1.69	10	N/A		
Methylene chloride	Log	4	20	2.20	0.54	0.70	0.75	10	2.30		
1,1,2,2-Tetrachloroethane	No	0	20	2.80	1.59	0.74	1.81	10	N/A		
Tetrachloroethylene	SQRT	0	20	1.87	1.11	0.50	1.25	10	3.16		
Toluene	Log	8	20	3.00	1.01	1.20	1.37	10	2.30		
1,1,1-Trichloroethane	Log	5	20	6.43	0.14	2.03	0.74	10	2.30		
Trichloroethylene	Log	1	20	2.54	0.19	1.35	0.59	10	2.30		
Trichlorofluoromethane[a]	Log	0	3	-1.14	-1.87	0.67	-1.14	10	2.30		
1,1,2-Trichloro-1,2,2-trifluoroethane	No	0	20	1.94	1.27	0.58	1.44	10	N/A		
1,2,4-Trimethylbenzene[a]	Log	0	3	-1.16	-1.91	0.69	-1.15	10	2.30		
1,3,5-Trimethylbenzene[a]	Log	0	3	-1.12	-1.86	0.68	-1.12	10	2.30		
m,p-Xylene[b]	No	0	20	2.57	1.33	0.67	1.53	10	N/A		
o-Xylene	SQRT	0	20	1.59	1.06	0.40	1.18	10	3.16		
Acetone	Log	13	20	5.33	3.06	1.14	3.39	100	4.61		
Butanol	SQRT	4	20	7.75	3.13	2.11	3.75	100	10.00		
Methanol	Log	1	20	3.88	1.91	0.55	2.07	100	4.61		

CIS-006

CCP Headspace Gas UCL_{90} Evaluation Form

WSPF #: SR-W027-FB-Pre86-C Rev. 2 **Waste Stream Headspace Gas Lot Number** 1 through 3

ANALYTE	Transform Data Used (No, Data-Log, SQRT, other)	# Samples above MDL (1)	# Samples	Maximum (ppmv)	Mean (ppmv)	SD (ppmv)	UCL_{90} (ppmv)	PRQL (ppmv)	Transformed PRQL (N/A or Value)	UCL_{90} > PRQL Yes	EPA Code
Methyl ethyl ketone	SQRT	3	20	3.87	2.58	0.55	2.74	100	10.00		
Methyl isobutyl ketone	No	1	20	11.51	6.78	3.92	7.94	100	N/A		
Chloromethane[e]	Log	3	3	3.76	2.58	1.10	3.78	10	2.30	Yes	(2)
Carbon Disulfide[e]	Log	1	3	-1.12	-1.60	0.44	-1.11	10	2.30		
1,2-Dichloropropane[e]	Log	1	3	-0.65	-1.88	1.09	-0.69	10	2.30		
Formaldehyde[c]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hydrazine[d]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[a] These compounds are from CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC) and are flammable VOCs that do not appear in CCP-PO-001. 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] Required only for homogenous solids and soil/gravel waste from Savannah River Site.

[d] Required only for homogenous solids and soil/gravel waste from Oak Ridge National Laboratory and Savannah River Site.

[e] These compounds are not required per the permit, but samples may be analyzed for these compounds and are reported to maintain BDR 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

(2) There is no documentation in AK indicating that waste stream SR-W027-FB-Pre86-C 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).

Signature of Site Project Manager | Joshua Houghton — Printed Name | 6/22/2012 — Date

CIS-087

CCP Headspace Gas Summary Data

Waste Stream # SR-W027-FB-Pre86-C Lot Number (s) 162

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	% Detected
2-Propanol, 2-methyl	59.36	3	15.00%

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

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

SPM Signature [signature] Date 6/22/2012

CIS-008

CCP RTR/VE Summary of Prohibited Items and AK Confirmation

Waste Stream #: SR-W027-FB-Pre86-C Lot #: 162

Container Number	RTR Prohibited Items [a,b]	Visual Examination Prohibited Items [a,b]
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 RTR.	VE was not used to certify any containers in this Lot.

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 all containers in this lot were previously packaged and RTR meets all the Data Quality Objectives for NDE for the waste.

[signature] Joshua Houghton 6/22/2012
Site Project Manager Signature Printed Name Date

CIS-009

CCP Reconciliation with Data Quality Objectives

Waste Stream #: SR-W027-FB-Pre86-C   Lot #: 162

Sampling Completeness

RTR/VE

Number of Valid Samples: 22   Number of Total Samples Analyzed: 22
Percent Complete: 100 (QAO is 100%)

NDA

Number of Valid Samples: 22   Number of Total Samples Analyzed: 22
Percent Complete: 100 (QAO is 100%)

HSG

Number of Valid Samples: 20   Number of Total Samples Collected: 20
Percent Complete: 100 (QAO is ≥90%)
Number of Valid Samples: 20   Number of Total Samples Analyzed: 20
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%)

CIS-010

CCP Reconciliation with Data Quality Objectives

Waste Stream #: SR-W027-FB-Pre86-C Lot #: 162

	Y/N/NA	Reconciliation 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, UCL_{90} 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 U.S. Environmental Protection Agency (EPA) Hazardous Waste Numbers were assigned as required. Samples were randomly collected (when appropriate).
7a	NA	Mean concentrations, UCL_{90} 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 HWNs were assigned as required. Samples were randomly collected.
7b	NA	Mean concentrations, (UCL_{90}) 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 HWNs were assigned as required. Samples were randomly collected.
7c	NA	Mean concentrations, (UCL_{90}) 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 HWNs were assigned as required. Samples were randomly collected.

CIS-011

CCP Reconciliation with Data Quality Objectives

Waste Stream #: SR-W027-FB-Pre86-C Lot #: 162

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 the WAP 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: None

[signature] Signature of Site ~~Project~~ Manager | Joshua Houghton — Printed Name | 6/22/2012 — Date

CIS-012

SUMMATION OF ASPECTS OF AK SUMMARY REPORT: WASTE STREAM SR-W027-FB-Pre86-C

Overview:

Waste stream SR-W027-FB-Pre86-C was generated during plutonium separations defense activities performed in the FB-Line (formerly JB-Line or FJB-Line), in the F-Canyon and stored at the E-Area at 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; glove replacement; 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 summation of the Acceptable Knowledge (AK) Summary Report includes information to support Waste Stream Profile Form (WSPF) SR-W027-FB-Pre86-C for mixed heterogeneous waste from SRS. The primary source of information for this summation is CCP-AK-SRS-2, Central Characterization Project Acceptable Knowledge Summary Report For Savannah River Site, SR-W027-FB-Pre86-C, Revision 14, April 30, 2012.

Waste Stream Identification Summary:

Waste Stream Name:	Pre-1986 Waste From FB-Line
Waste Stream Number:	SR-W027-FB-Pre86-C
Waste Stream Volume, Current:	6,933 55-gallon drums (some of which are in 85-gallon overpacks), and eight Black Boxes (also known as carbon steel boxes or large steel boxes)
Waste Stream Volume, Projected:	No future generation except as a result of repackaging.
Generation Dates:	August 16, 1973 and March 6, 1986 (this waste stream includes 48 containers generated from March 9, 1986 to June 9, 1986 assigned in 2002 and since emplaced at WIPP)
Summary Category Group:	S5000, Debris Waste
Waste Matrix Code Group:	Combustible Waste

Waste Matrix Code:	S5300, Organic Debris
TRUPACT-II Content Code (TRUCON):	SR 125/225, SR 133/233, SQ 154
TRUPACT-III Content Code	SR 425
Annual Transuranic Waste Inventory Report Identification Number:	SR-W027-FB-Pre86-C

Waste Stream Description and Physical Form:

Waste stream SR-W027-FB-Pre86-C was generated by glovebox operations, decontamination and removal (D&R), housekeeping, maintenance, and construction activities. The waste consists mainly of dry heterogeneous organic debris. Organic debris constituents include plastic, personnel protective equipment (e.g., shoe covers, lab coats, plastic suits), wipes, labware, wood, absorbed oil, paper, and other job control type waste. The waste may also include small amounts of inorganic debris such as metal components (e.g., hand tools, motors, small equipment, plutonium/beryllium neutron sources), glass, floor sweepings, and absorbent materials. In addition, small quantities of poly bottles (100 milliliters, 500 milliliters, 2 liters), containing immobilized liquids are also present. The waste matrix will also include absorbents added during repackaging to absorb any water from condensation or dewatering.

Waste stream SR-W027-FB-Pre86-C meets the Waste Isolation Pilot Plant Waste Analysis Plan (WIPP-WAP) waste stream definition. The waste stream consists of waste materials that have common physical form (heterogeneous debris), that contain similar hazardous constituents, and that are generated from a single process or activity (glovebox operations, D&R, housekeeping, maintenance, construction, and repackaging activities).

Point of Generation:	Savannah River Site, South Carolina, FB-Line gloveboxes
Area and/or Building of Generation:	200-F Separations Area, F-Canyon, FB-Line

Generating Processes:

<u>Description of Waste Generating Processes</u>
The waste stream under consideration was generated in the FB-Line in 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, aluminum, sodium, sulfate, and sometimes fluoride) 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 (References D013, D020, D033, and D037).

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 plutonium 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 (References D013, D020, D033, and D037).

Cation Exchange

The purpose of cation exchange (coupling) 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 (References D013, D020, D033, and D037).

Bulk chemicals used include the following: dilute plutonium-hydroxylamine nitrate solution (additional hydroxylamine nitrate may be used for additional reduction); n-paraffin hydrocarbon used for diluent washing; dilute sulfuric acid-hydroxylamine nitrate solution for additional purification to remove cationic impurities (+2 charge and lower); dilute nitric acid/hydroxylamine nitrate solution to displace residual sulfuric acid from columns; strong nitric/sulfamic acid solution to elute plutonium from columns; and dilute nitric acid/hydroxylamine nitrate solution to recondition the cation exchange columns. The eluted plutonium solution is transferred to a product hold tank C-7 for sampling and analysis. After analysis, the plutonium is transferred to a concentrate feed tank for subsequent precipitation (References D013, D020, D033, and D037).

The resin may contain gases (NOx), 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 hydroxylamine nitrate down through the column (References D013, D020, D033, and D037).

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 (Reference D037).

Precipitation and Filtering

Precipitation and filtration are the unit operations that bridge the gap between hydrometallurgical and pyrometallurgical operations. Precipitation and filtration produce plutonium 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 (References D013, D020, D033, and D037).

Precipitation Equipment: Each first-stage precipitator was cylindrical in shape and constructed of polyethylene and Type 304 stainless steel. Second-stage precipitators were slab designs fabricated from polyethylene supported by Type 304 stainless steel; 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 (References C026, C027, C028, C032, D033, and D037).

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 (Reference D037).

Bulk chemical use includes the following: sulfamic and ascorbic acid solutions to reduce any tetravalent plutonium; ascorbic acid to reduce plutonium (and limit oxidation) 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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 (Reference D037).

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 and many were lined with platinum. The roasting pan was then transferred to one of two roasting furnaces. Each furnace was heated by three 5,000-watt heaters (Reference D037).

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 (References D013, D020, D033, and D037).

Reduction

In this step, the plutonium tetrafluoride/plutonium oxide mixture is reduced to yield plutonium metal, followed by the physical separation of the reduced metal from the residue. The prepared powder is 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 is filled with magnesium oxide sand (References D013, D020, D033, and D037).

Dumping Stations: Three dumping stations were used in the Mechanical Line to dump intermediate powders from one container to another (Reference D037):

- "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 (Reference D037).

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 (Reference D037).

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 (Reference D037).

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 (References C026, C067, D037, and D053).

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 (Reference D037).

Heating the plutonium tetrafluoride/plutonium oxide/calcium metal mixture initiates exothermic reactions. The mixture separates into a denser plutonium liquid and a calcium fluoride/calcium oxide mixture that forms a "slag." The plutonium metal product is physically separated from the slag and crucible (S&C) waste. Slag remaining after the reduction step is largely composed of calcium fluoride, calcium oxide, unreacted calcium metal, unreduced plutonium fluoride and oxide, and small plutonium metal droplets (References D013, D020, D033, and D037)

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 (References D013, D020, D033, and D037).

Plutonium Metal Finishing

The plutonium metal product from the reduction step is 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 is allowed to air dry and then sampled using a drill press. After sampling and weighing, the plutonium metal is placed inside a tinned steel can that is subsequently crimp-sealed. The sealed can is marked for identification and removed from the glovebox in a polyethylene bag. The can is pushed to the sealed end of the bag that is attached to the glovebox. Then the bag is sealed with a portable bag sealer. Canned plutonium metal product is placed inside a shipping container. The loaded shipping containers are stored in the vaults until needed. If the product purity and isotopic specifications are satisfied, the product is later shipped off-site for defense program use (i.e., fabrication into weapons shapes). Any product not meeting the specifications would be recovered (References D013, D020, D033, and D037).

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 (References D013, D016, D020, D033, D037, and P034).

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 (References D013, D020, D033, and D037).

Solid Scrap Dissolution

Solid scrap consists of S&C waste, Mechanical Line cabinet/glovebox floor sweepings, and metal turnings (from analytical samples) (References D013, D020, D033, and D037).

Slag and Crucible
Aluminum nitrate nonahydrate and nitric acid are used along with heat to dissolve S&C waste and other solids. The solution is then digested and passed through primary filters. The filters are cleaned by back-flushing with hot caustic sodium hydroxide (References D013, D020, D033, and D037).

Mechanical Line Cabinet/Glovebox Floor Sweepings
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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037)

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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 (References D013, D020, D033, and D037).

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 the plutonium 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 (References D013, D020, D033, and D037).

Operation of the Anion Exchange System
Anion exchange is a separation process used to separate desirable from undesirable anions. In the FB-Line, the desirable anion is hexanitratoplutonium nitrate complex ion; the undesirable anions are the numerous metallic anion and cation impurities. 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. Plutonium is eluted from the column by a downward flow of weak nitric acid followed by a strong nitric acid reconditioning wash. 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 (References D013, D020, D033, and D037)

Spent resin to be discarded is treated to convert any remaining nitrate to sulfate form or is rinsed with dilute nitric acid (Reference C094). 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 (References D011 and D033).

Maintenance and Decontamination and Removal

Maintenance activities conducted on FB-Line included the following (References C021, C028, C029, C031, C032, C056, C067, C071, D016, D034, and D040):

- 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 (e.g., valve replacement, etc.)
- Cabinet and glovebox repair and replacement
- Inspection and cleaning of exhaust ducts to remove any plutonium accumulation

Routine housekeeping activities conducted by operators included the following (References C022, P014, and P015):

- 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(Reference C029). Some examples of waste-generating maintenance and housekeeping activities are provided below.

Hydraulic Sump Cleanup
Sump cleaning was mostly conducted by Operations (except during maintenance jobs), but maintenance would often remove filter boats, bolts, gloves, or other objects that had fallen into a sump. Also, any spills in the cabinets would not need to be cleaned up because the sumps could catch the liquids and recycle them. Mechanical Line sumps located outside of process cabinets were periodically cleaned out. These cleanout activities typically generated over 20 red pails of waste. 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 Dri or other absorbent materials. Containers with predominantly absorbed liquid contents are excluded from debris waste stream SR-W027-FB-Pre86-C. Bottles were agitated until all oil was absorbed. Procedures governing this activity noted that no liquids were to be placed in containers or sent to the burial ground. An HB-Line packaging procedure also confirms this requirement (operations in H-Canyon are similar to those in F-Canyon). 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 acid or caustic spills were neutralized with soda ash or Celite (References C022, C032, C061, and P009).

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 (References C067, D020, and D033).

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 (References D016 and D033).

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 (References C021, C026, C067, D033, and D037).

RCRA Determinations – Hazardous Waste Determinations

Historical Waste Management
The Central Characterization Project (CCP) has maintained the hazardous waste number assignment originally determined for 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.

Prior to 1986, SRS managed the generation of TRU wastes using administrative controls (i.e., procedures and training), developed according to the Atomic Energy Commission (AEC) and the Department of Energy (DOE) guidance and directives. The quantity of plutonium per container was tracked to address criticality concerns and heat generation for radiological decay, as well as the presence of liquid and incompatible chemicals. Administrative controls required that the wastes sent to the TRU pads be properly packaged and documented by the generating operations before transport to the TRU pad facility. From 1981 to May 1987, SRS managed TRU waste to minimize safety concerns and to meet the proposed requirements of the WIPP.

Toxicity Characteristic and F-Listed Constituents

Chemical/Material	Use/Description/Location	AK Source	EPA HWNs
Acetone	Cleaning and degreasing (Magnaflux, Scene Spray Cleaner, solvents); may have been used as pure liquid in FB-Line.	C021, C024, C025, C026, C028, C029, C032, C056, D048, M030, P003	F003, U002
Barium	Expected to be contained in Job Control waste.	D048, P003	D005
Benzene	Decontamination agent, process chemical.	C028, C029, D011, D048, P003	D018, F005
Cadmium	Neutron shielding in the cation exchange columns.	C021, C024, C025, C026, C028, C029, C032, C056, C068, D010, D020, D037	D006
Carbon tetrachloride	Historically assumed to be present in Job Control waste.	D048	D019
Chloroform	Potentially used as a cleansing agent or metal degreaser.	D048	D022
Chromium	Corrosion inhibitor in chiller water.	C021, M025, P003	D007
Cyclohexanone	PVC Cement.	D048, M030, P003	F003
1,1-Dichloroethylene	Expected to be contained in Job Control waste.	D048	D029
Freon	Decontamination agent, cleaning.	C035, D048, M004, P003	F001, F002
Isobutanol	Decontamination agent, cleaning.	C029, D011, D048, P003	F005
Lead	Present in leaded gloves, leaded windows, fluorescent light bulbs, lead bricks, acrylead shielding.	C018, C021, C022, C024, C025, C028, C029, C032, C056, C067, C068, D010, D020, D037, D045, P003	D008

Chemical/Material	Use/Description/Location	AK Source	EPA HWNs
Mercury	Manometers and gauges. Identified on some flowsheets.	C006, C024, C025, C028, C031, D010, D037, D048, M025, P003	D009, U151
Methylene chloride	Adhesives (ingredient in MOR-AD B32 and Raycohesive B-84), PVC Cement.	D048, M030, P003	F002
Methyl ethyl ketone	PVC Cement.	D048, M030, P003	F005
n-Butanol	Decontamination agent, solvent.	D048, M030, P003	F003
Silver	Solder component in electrical equipment. Precipitant for chlorine solutions.	C021, C025, C026, C029, P003	D011
Tetrachloroethylene	Identified as present in FB-Line process waste.	D011, D048, M004, P003	D039, F002
1,1,1-trichloroethane	Magnaflux, Spot Check Dye Penetrant Adhesives, Raycohesive B84, MOR-AD, SKC-NF Cleaner-Remover.	C025, D011, D048, M004, M030, P003	F001, F002
Trichloroethylene	Cleaning and degreasing. Adhesive (ingredient in MOR-AD and Raycohesive B-32). Pipe patch.	D011, D048, M004, M030, P003	D040, F001, F002
Toluene	Decontamination agent, solvent.	C021, C026, D048, M030, P003	F005
Vinyl Chloride	Expected to be contained in Job Control waste.	D048	D043
Xylene	Decontamination agent, solvent.	C021, C026, D048, P003	F003

Ignitability, Corrosivity, Reactivity

Potentially ignitable, corrosive, and reactive chemicals were prohibited during the remediation and repackaging of the waste in FB-Line. The waste material in this waste stream does not meet the definition of ignitable, corrosive, and reactive as defined in 40 CFR 261.

The materials in this waste stream do not meet the definition of ignitability as defined in 40 Code of Federal Regulations (CFR) 261.21. The materials are not liquid and the operators ensured liquids were not present in the container during packaging. This material will not cause fire through friction, absorption of moisture, or spontaneous chemical changes. This material is not a compressed gas or an oxidizer. The materials in the waste stream are therefore not ignitable wastes (D001).

The waste in this waste stream is not liquid and does not contain unreacted corrosive chemicals; therefore, it does not meet the definition of corrosivity (D002) found in 40 CFR 261.22. The materials are not liquid and operators ensured liquids were not present in the waste during packaging. 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 wastes 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. Although not anticipated, any containerized liquids present in TRU waste drums may be corrosive. The hazardous waste number for Corrosivity (D002) does not apply to this waste stream.

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 without detonating. 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. No potential sources for cyanides or sulfides were identified. The waste is not capable of detonation or explosive reaction. The materials are not liquid and operators ensured reactive materials were not added to containers during packaging. The materials in the waste stream are therefore not reactive wastes (D003).

The only reactive materials used in FB-line were calcium and hydrazine/hydrazine mononitrate. 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. Residual plutonium will not be found as a pure metal.

Calcium

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 (References D033 and D037). 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 (References D048 and M032). 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 (Reference C025), consistent with descriptions of the accumulation of fines in the glovebox in which calcium is used to reduce plutonium fluoride salts (Reference D048). 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 slag and crucible cans or, if not radioactive (i.e., stored outside of the cabinets), disposed as hazardous waste, rather than as TRU waste (References C025, C028, and C029). 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 in the late 1980s. As a result, only very small amounts of calcium are likely to be present in red pail waste (References C029 and D048). 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 containers (Reference C025) which is consistent with calcium's chemical behavior in that "complete oxidation of even a massive piece of calcium metal eventually occurs" (Reference D048). Also, SRS has not applied a code for this contaminant based on an analysis presented in a white paper (Reference D048 and P003). 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 (Reference DR008). The materials in this waste stream are, therefore, not reactive (D003) wastes.

The containers in the waste stream will be evaluated in accordance with the WIPP-WAP using radiography and/or visual examination (VE) prior to shipment to ensure the waste is not ignitable, reactive, or corrosive.

Toxicity Characteristic

Based on review of AK relative to chemicals used or present in the FB-Line and supporting operations, waste stream SR-W027-FB-Pre86-C is contaminated with toxicity characteristic compounds as defined in 40 CFR 261.24. 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 Environmental Protection Agency (EPA) Hazardous Waste Number (HWN) is applied to the waste stream in SR-W027-FB-Pre86-C.

Waste stream SR-W027-FB-Pre86-C is contaminated with toxicity characteristic metal compounds listed in 40 CFR 261. Barium, cadmium, chromium, lead, mercury, and silver have been assigned by SRS. Historic assignment of 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-W027-FB-Pre86-C. SRS retrieval program sampled overburden soils removed during retrieval of these containers and applied hazardous waste numbers based partly on information from the analytical results.

Barium (D005)
An initial review of AK documentation, including interviews with the FB-Line personnel, did not identify a potential source for barium in FB-Line waste (Reference C026, C029, and C067). Therefore, D005 normally would not be assigned to the subject waste stream. However, SRS has applied a hazardous waste number for this contaminant and it is applied to the subject waste stream (References D048 and P003).

Cadmium (D006)
The FB-Line Safety Analysis indicates that cadmium was used as neutron shielding for cation exchange columns (References D020 and D037), although it is expected to be uncommon in TRU waste. One possible configuration was a donut-shaped 6-inch outer diameter shield that fit over the top of a resin column and had a 2-inch inner diameter; however, the metal may also be present as sheets (Reference C021). Although the 1988 safety analysis (Reference D020) was published after the generation of the subject waste stream, interviews with FB-Line personnel (References C021, C024, C025, C026, C028, C029, C032, and C056) confirmed that this was a known source for cadmium. Cadmium was listed as present in post-1986 waste by waste generators. Also, according to a post-closure permit for TRU pads 1-5, cadmium served as a corrosion inhibitor and neutron absorber on various pieces of old equipment (Reference D010). In a list of possible contaminants in FB-Line TRU containers containing job

control waste, cadmium was listed with a 0-10 percent waste component (Reference C068). Considering all of the above information, D006 will be assigned to the subject waste stream.

Chromium (D007)
Interviews with FB-Line personnel (References C022, C026, and C028) identified that chromium was used in the building air conditioning system water. However, waste from air conditioning maintenance was not expected to be TRU waste. One FB-Line engineer suggested its possible presence in biocides and as a corrosion product in stainless steel ducts from decontamination and removal efforts (Reference C021). Chromium was also detected at up to 26-parts per million (ppm) in contaminated soils during the container retrieval effort (Reference M025). Also, SRS has conservatively applied a code for this contaminant (Reference P003). Considering all of the above information, D007 will be assigned to the subject waste stream.

Lead (D008)
Based on the review of source documentation, lead was the primary toxicity characteristic hazardous material in TRU waste from the FB-Line. In 1986 there was an FB-Line strategy for minimizing lead waste (Reference C083). Four lead categories (i.e., sheets, bricks, aprons and gloves) were identified and handling strategies, such as "reuse", were recommended. Most of the lead was used to shield the sample pulse height analysis equipment. It is expected that lead from these categories should also be present in pre-1986 waste. Also, a 1988 FB-Line Safety Analysis (Reference D020) indicates that lead sheet and leaded acrylic were used as shielding. The JB-Line System Analysis from 1978 confirms that lead was used as shielding (Reference D037). Interviews with FB-Line personnel determined that it may be possible that TRU waste contained lead shielding and/or lead bricks, but leaded gloves were disposed of frequently and would be most likely disposed of as TRU waste (References C018, C021, C022, C024, C025, C028, C029, C032, C056, and C067). According to a post-closure permit for TRU pads 1-5, lead was associated with shielding, old equipment, and special protective clothing (Reference D010). In a list of possible contaminants in FB-Line TRU drums containing job control waste, lead was listed as a 10-100 percent waste component (Reference C068).

In 1995, a study (Reference D045) was conducted to evaluate metals constituents of combustible debris waste from low-level waste streams including FB-Line streams. Debris in these waste streams is known to contain items and materials similar to TRU job control waste streams. Totals analysis found that PVC debris exhibited up to 117 ppm lead, although it was determined that lead leached from such debris at <0.500 ppm (Reference D046). However, soil analyzed during the 1996-99 retrieval effort was found to be contaminated with lead at up to 8.4 mg/kg. Also, SRS has applied a HWN for this contaminant (Reference P003). Due to the numerous potential sources and the presence of lead in retrieval soils, D008 will be assigned to the subject waste stream.

Mercury (D009)
Interviews with FB-Line personnel indicated the possibility of mercury used in the chemical flowsheet of the FB-Line for dissolving aluminum or in F-Canyon (References C024, C025, and C028). The JB-Line Operations manual (Reference D037) gives

greater detail as describing mercuric nitrate as a process chemical with a high level of toxicity. Mercury was also used in thermometers, manometers, and gauges (Reference C031), but they may not have been used in cabinets (Reference C028). The mercury was part of instruments used in the production process that were replaced according to a post-closure permit for some TRU pads (Reference D010). Mercury was named as a possible soil contaminant in the burial ground and preliminary ground water analyses of the burial ground detected mercury contamination (Reference C006). Mercury was also detected in soil during the 1996-99 retrieval effort (Reference M025). Also, SRS has conservatively applied a hazardous waste number for this contaminant (Reference P003). However, considering the potential sources and other information summarized above, D009 will be assigned to the subject waste stream.

Silver (D011)

Silver solder was used for repairs, but it is unclear whether it was disposed of as TRU waste except as a component of electrical equipment (References C021, C026, and C029). Silver nitrate may have been used in F-Canyon but would not have been disposed of in TRU waste from FB-Line (References C024, and C029). Silver was also used as a precipitant for chloride solutions and could possibly have been disposed of as TRU waste in this form (Reference C025). It is difficult to determine from the above information whether sufficient quantities of solder or precipitant would be present in waste to support the assignment of a HWN. However, results obtained for soils sampled during the 1996-99 retrieval effort showed a single sample with silver contamination. However, SRS has applied a HWN for this contaminant (Reference P003). Therefore, D011 will be assigned to the subject stream.

In summary, EPA HWNs D005, D006, D007, D008, D009, and D011 will be assigned to the waste stream.

The AK sources identified the use of organic toxicity characteristic compounds including benzene (HWN D018), carbon tetrachloride (HWN D019), methyl ethyl ketone (HWN D035), and trichloroethylene (HWN D040). EPA HWNs F005 and F002 are assigned to the waste stream for F-listed solvents benzene (F005), methyl ethyl ketone (F005), and trichloroethylene (HWN F002). Because the more specific F-listed EPA HWNs have been assigned for these compounds, assignment of the corresponding toxicity characteristic HWNs D018, D035, and D040 is not necessary. However, the CCP will apply the HWNs assigned by SRS. Therefore, HWN D018 for benzene and D019 for carbon tetrachloride are assigned to waste stream SR-W027-FB-Pre86-C.

Any of the chemicals identified in the waste stream may be present in TRU waste containers in sufficient quantities to exceed the regulatory levels listed in 40 CFR 261.24 for toxicity characteristic contaminants. On this basis alone, toxicity characteristic HWNs are assigned for tetrachloroethylene and benzene; even though, these chemicals are receiving F-listed HWNs due to their use as solvents.

Also, although SRS had conservatively applied toxicity characteristic HWNs in the past to the subject waste stream for chloroform, 1,1-dichloroethylene, tetrachloroethylene (perchloroethylene), and vinyl chloride, a more recent (1997), SRS process-specific determination found that none of these chemicals were routinely used as a pure commercial chemical in FB-Line. The SRS white paper containing this determination did not investigate the applicability of the D018, D019, D022, D029, D039, D040, and D043 HWNs that were historically applied. Also, vinyl chloride and chloroform, though analyzed for in burial ground groundwater samples, were not detected. No evidence of use of these chemicals even in trade-name chemicals was found. However, SRS has stated that the HWNs associated with these chemicals will continue to be applied.

F-Listed Waste

Based on review of AK relative to chemicals historically used or present in the FB-Line, waste stream SR-W027-FB-Pre86-C contains or is mixed with F-listed hazardous wastes from non-specific sources listed in 40 CFR Part 261.31. 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. However, SRS has assigned the EPA HWN F001 for the presence of 1,1,1-trichloroethane, Freon, and trichloroethylene. CCP will maintain the designation. F002 and F005-listed solvents were used in the FB-Line. 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 solvent in the waste as designated by SRS. For this reason, waste stream SR-W027-FB-Pre86-C is assigned F-listed EPA HWN F002 for 1,1,1-trichloroethane, Freon, methylene chloride, tetrachloroethylene, and trichloroethylene and HWN F005 for benzene, methyl ethyl ketone, isobutanol, and toluene. F003 constituents, including acetone, butyl alcohol, cyclohexanone, and xylene are listed; therefore, F003 is assigned.

K-Listed Waste

The materials in waste stream SR-W027-FB-Pre86-C are not hazardous waste from any of the sources specified in 40 CFR 261.32. Therefore, waste stream SR-W027-FB-Pre86-C is not assigned a K-listed HWN.

U and P-Listed Waste

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 (References C021, C024, C026, C029, D020, D033, D037, and D048). No listed chemicals were identified in the container-specific documentation.

No specific source for beryllium was identified for the waste stream in the AK record; therefore P015 is not assigned to the waste streams. Beryllium was present in off-site scrap introduced in scrap recovery. Any beryllium that was dissolved was transferred to the Canyon facility. Beryllium powder as a pure chemical has not been identified in the process that generated this waste.

Process chemicals such as hydrazine and hydrofluoric acid were used in FB-Line in the 1972-1986 time period. Hydrazine (or hydrazine mononitrate), was used in Special Recovery prior to 1986 (References C021, C026, C028, C029, C071, and D020) 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 (Reference C021). This possibility is consistent with information regarding leaks in Special Recovery and precipitation units in October 1979 and a 1980 boil-over incident (Reference C027) in Special Recovery that resulted in chemical spills. Hydrofluoric acid was also used during the 1970s in Special Recovery, when scrap dissolution was conducted in "coffee pots," or four-liter beakers of hydrofluoric acid (Reference C025). 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 "even 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 (Reference D048). 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 will not be assigned for these chemicals.

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 will be applied (Reference D048). Also, SRS performed an evaluation of hazardous waste 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.

Polychlorinated Biphenyls

According to waste generators for the waste stream time period, no capacitors or transformers were inside the FB-Line cabinets (References C021 and C029). There were polychlorinated biphenyl (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 (Reference C021). 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 (References C031 and C073). Electrical equipment that might contain PCBs would have been disposed by special procedures (Reference C029). Although the precise history of FB-Line capacitors is unknown, the annual PCB Inventory Change Report (Reference C074) 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 (References C021 and C029). PCBs may also be present in fluorescent light ballasts (transformers). No fluorescent lights were located inside of the cabinets (globe lights were instead used), but it is possible that a few used to augment normal cabinet lighting may have been added into the TRU waste (References C021, C022, C029, C031, C056, and C067). This is the only type of PCB anticipated in this waste stream. However, any electrical equipment that may contain PCBs or PCB oils should be detected at RTR and removed.

Prohibited Items

Using procedure CCP-TP-066, *CCP Radiography Screening for Prohibited Items*, a quick screening process was used to identify prohibited items in waste containers. Once found, these drums were eliminated from further analyses pending repackaging.

<u>Liquids</u>
Although some generic TRU waste information suggest that up to three percent water may be present in TRU waste containers (Reference C038), liquid from process activities is not anticipated. Pre-1986 containers were not filtered and were covered by earth during retrievable storage. In addition, packaging procedures and waste acceptance criteria required absorption or removal of liquids. One 1976 procedure stipulated that plastic bags were used to package all wet materials such as rags, glass wool, paper, etc., after they were pressed free of excess liquid. "Incidental" quantities of liquids were 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. It was also noted that liquid waste was not to be buried unless the Separations Area "deemed" unacceptable for processing in their waste facilities (References P001 and P010). No unused chemicals or half-empty chemical bottles were disposed of (Reference C056). The JB-Line handling and packaging procedure (1976) provides details as to the proper packaging for wet solid wastes (Reference P016). 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 a container. 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 measured with PHA, and then placed in a container. Wet solid waste from the mechanical line and dry cabinets were to be handled by a special procedure. 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 (References C021, C022, C025, and P009).

TRU debris waste containers with containerized liquids where the liquid exceeds the amount allowed by WIPP are transferred to the F/H Area Laboratory, Savannah River National Laboratory, or F-Canyon where the containers are opened and the bottle containing the liquid is immobilized. The liquids are added to a bottle containing a pre-measured amount of NOCHAR absorbent. The immobilized liquids are then placed back into the original debris container (References P023, P024, P026, P029, and P030).

Containerized Liquids
Oil waste (oily rags) were to be put into metal cans (unknown size) with Oil-Dri compound to absorb the oily liquids, then sealed and put into a container (Reference P016). Also, some disposed paint cans may have been greater than four liters, but were punctured (Reference C028).

Aerosol Cans
Aerosol cans were not prohibited prior to 1986. Many cans such as Scene, Magnaflux, or Spot Check, were used for decontamination activities and are very likely to be found unpunctured in this waste stream. Gas cylinders such as oxygen and acetylene were not disposed as TRU waste (References C021, C022, C024, C025, C028, and C029).

Explosives
One potential explosive source, electrical discharge plugs (also known as squibs), used in Halex fire suppression systems located in the FB-Line facility, was identified but would not have been disposed as TRU waste because they were not located in gloveboxes or cabinets (Reference C075). Although explosives are not mentioned as prohibited in the early packaging procedures, only hydrazine was named as a possible explosive by waste generators. Up until 1986, hydrazine mononitrate was used in the FB-Line Special Recovery operations as a dissolution process catalyst and poses an explosion hazard. However, as a liquid, it should not have been placed in TRU waste (References C021, C022, C025, C028, C029, C056, D010, P009, and P016).

Pyrophorics
Like explosives, pyrophorics were not specifically prohibited by early packaging procedures, but interviewed waste generators discounted the possibility that any would have been disposed of in this waste stream (References C021, C025, C028, C029, P001, and P032).

The containers in the waste stream will be evaluated in accordance with the WIPP-WAP using radiography (and/or VE) prior to shipment to ensure the waste does not contain prohibited items.

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

To estimate the waste material parameter weight percentages for waste stream SR-W027-FB-Pre86-C, data were obtained from the Waste Data System (WDS), formerly known as the WIPP Waste Information System database as of October 3, 2006. The waste material parameter data were derived from real-time radiography (RTR) and VE of FB-Line debris waste by the current CCP TRU Waste Certification Program at SRS.

Data from 5,463 containers from waste stream SR-W027-FB-Pre86-C were evaluated. The total approximate volume of this waste stream is 6,941 containers. Therefore, 79 percent of the waste stream is represented by this analysis.

Waste Stream SR-W027-FB-Pre86-C Waste Material Parameter Estimates

Waste Material Parameter	Avg. Weight Percent	Weight Percent Range
Iron-based Metals/Alloys	19.84%	0 – 98.96%
Aluminum-based Metals/Alloys	0.20%	0 – 95.16%
Other Metals	0.10%	0 – 51.95%
Other Inorganic Materials	5.58%	0 – 94.48%
Cellulosics	8.20%	0 – 96.35%
Rubber	6.84%	0 – 96.50%
Plastic (waste materials)	59.24%	0 – 100%
Inorganic Matrix	<0.01%	0 – 0.25%
Organic Matrix	<0.01%	0 – 13.71%
Total Inorganic Waste Avg.	**25.72%**	
Total Organic Waste Avg.	**74.28%**	

List of AK Sufficiency Determinations

There are no AK Sufficiency Determinations for this waste stream.

Transportation

This waste stream meets TRUPACT-II content codes SR 125/225, SR 133/233, SR 425, and SQ 154.

Beryllium

From 1976 through 1982, beryllium was mechanically separated from plutonium/beryllium scrap using common tools (e.g., hammers). Leftover beryllium materials were discarded. Given the total number of items processed by the FB-Line facility and knowledge of the programs in which the items originated, the total amount of beryllium contained in TRU waste generated during this time period will not exceed 18.14 kilograms total beryllium. However, individual drums generated and packaged during this time period may contain greater than 1 percent by weight beryllium in particulate form. TRU waste generated and packaged outside these time periods will contain beryllium only in particulate form as impurities or in residual trace amounts less than 1 percent by weight of the waste in each drum and less than 18.14 kilograms in any payload container.

Radionuclide Information

Weapons-grade plutonium, which is predominantly Pu-239 and Pu-240 by mass, was the primary material processed in FB-Line during the time frame covered by this waste stream. The plutonium material from off-site facilities that was periodically processed in FB-Line had a lower Pu-239 mass and a higher Pu-240 mass than weapons-grade plutonium. There were also other non-weapons-grade plutonium campaigns in FB-Line. Therefore, the overall Pu-239 weight percent may be slightly lower and the overall Pu-240 weight percent may be slightly higher than the values reported in the table (Reference C090). The two predominant radionuclides by mass are Pu-239 and Pu-240; and by activity are Pu-239 and Pu-241.

Radiological Distribution for Waste Stream SR-W027-FB-Pre86-C

Radiological Distribution for Waste Stream SR-W026-FB-Pre86-C Radionuclide	Total Radionuclide Wt%[1]	Total Radionuclide Ci%[2]	Suspected Present (Yes/No)
Am-241[3]	Not reported[6]	Not reported	Yes
Pu-238	0.20%	4.42%	Yes
Pu-239	**92.90%**	**7.39%**	Yes
Pu-240	**6.02%**	1.76%	Yes
Pu-242	0.20%	Trace[5]	Yes
U-233	Not reported	Not reported	Yes[4]
U-234	Trace	Trace	Yes
U-238	0.04%	Trace	Yes
Sr-90	Trace	Trace	Yes[4]
Cs-137	Trace	Trace	Yes[4]
Additional Radionuclides			
Ba-137	Trace	Trace	Yes[4]
C-14	Trace	Trace	Yes[4]
Cm-244	Not reported	Not reported	Yes
Co-60	Trace	Trace	Yes[4]
H-3	Trace	Trace	Yes[4]
I-129	Trace	Trace	Yes[4]
Ni-59	Trace	Trace	Yes[4]
Nb-95	Trace	Trace	Yes[4]
Np-237	Not reported	Not reported	Yes[4]
Pu-241	0.65%	**86.43%**	Yes
Ru-103	Trace	Trace	Yes[4]
Ru-106	Trace	Trace	Yes[4]
Se-79	Trace	Trace	Yes[4]
Sn-126	Trace	Trace	Yes[4]
Tc-99	Trace	Trace	Yes[4]
Th-232	Not reported	Not reported	Yes

U-235	Trace	Trace	Yes
U-236	Trace	Trace	Yes[4]
Y-90	Trace	Trace	Yes[4]
Zr-95	Trace	Trace	Yes[4]

1. This indicates the total weight percent of each radionuclide over the entire waste stream.
2. This indicates the total activity percent of each radionuclide over the entire waste stream.
3. Am-241 was not reported in SRS assay results but may be present in greater than trace quantities from alpha decay of Pu-241 or from special campaign work.
4. This radionuclide may be present in very trace quantities as a weapons-grade plutonium fission product or decay product.
5. "Trace" indicates <0.01 wt% for that radionuclide.
6. This radionuclide was not reported in SRS assay results but may be present from special campaign work.

Payload management will not be utilized for this waste stream.

AK SOURCE DOCUMENTS

C001	Letter from J.L. Forstner to J.F. LaBonte. "Nuclear Safety Limits for Various Isotopes in the Burial Ground."
C003	Memo from T.A. Reilly to O.M. EBRA-LIMA. "Nuclear Safety Limits for Various Nuclides in Burial Ground Concrete Culverts."
C004	Letter from M.O. Morris to Mr. M.G. O'Rear. "TRU Mixed Waste Generation and Characterization."
C005	Memo from Ross Fanning to Leroy Williams. "SRS U and P Codes."
C006	Fax from Debbie Gartland to John Ciucci.
C007	Memo from James A. Blankenhorn to D. Vernon Osteen, Gloria J. Barnes, and Steven M. Mertz. "Requested Information Regarding TRU Variance Letter."
C011	Letter from W.J. Mottel to Distribution. "Requirements for Packaging Transuranic Waste."
C012	Memo from D.C. Nichols to Users of Burial Forms OSR 7-375 and OSR 7-375A. "Instructions for Using Revised Burial Forms"
C013	Memo from B.G. Clontz to E.O. Kiger. "Problems with Current TRU Storage Pad Setup."
C014	Memo from J.J. Croley to B.G. Clontz. "A Comparative Evaluation of Raycohesive® B-32 and MOR-AD® B-32 Adhesives."
C015	Store Stock Request from K.O. Darden for replacing defective rings and for 55-gallon drums.
C016	Letter from J.S. Johnson to A.S. Barab. "Transuranium Waste Packaging Requirements."
C018	Record of Communication - Interview with M. P. Rodriquez, FB Line Engineer
C019	Integrated Radioactive Waste Management Plan (Partial)
C020	Memo from E. K. Barradale to J. D'Amelio, S. Davis, D. Steward, and J. Stumbaugh, re: Operational Practices During Emplacement of Transuranic Waste on TRU Pads 1-6 in the SRS Burial Grounds
C021	Record of Communication - Interview with Chip Harris
C022	Record of Communication - Interview with Jeff Overcash by Stephanie Fevig and David Guerin
C023	DU PONT letter from O. M. Morris, Superintendent Waste Management Technology to M. G. O'Rear, Waste Management Branch SROO, TRU Mixed Waste Generation and Characterization [For WIPP Part A RCRA Permit]
C024	Interview with Joe Stapf, Process Engineer and MC&A Shipping Supervisor at FB-Line, 1978-1982.
C025	Record of Communication - Interview of Ed Moore
C026	Record of Communication for Interview with Les Sonnenberg, Former FB-Line Mechanical Engineer.
C027	Record of Communication for Interview with A. Gibbs, SRS Solid Waste Management
C028	Record of Communication - Interview of Charley Williams
C029	Record of Communication for Interview with D. Rogers, Former FB-Line Operator and Supervisor
C031	Record Of Communication – Interview with Richard Runnels, Process Engineer at FB-Line 1986-87
C032	Record Of Communication – Interview with John Crim

C033	Memo from H. Perry Holcomb, MLB to Distribution. Transcription of a Presentation by Dr. E. L. Albenesius, "SRS Burial Ground Operation From an Historical Perspective."
C035	SRS Information on TRU Waste Characterization in Support of the WIPP No-Migration Variance Petition
C036	Inter-Office Memorandum from Jim Stumbaugh to Brent Daugherty RE: Information Concerning the Retrieval of Low Activity Transuranic (TRU) Waste drums from TRU pads 2-6 (U))
C037	FB-LINE TRU Waste Measurements Methodology (U)
C038	DU PONT letter from J. F. Rogers TRU Solid Waste Facility Remote Handling System, Project No. 860638, Spec. No. 30-949
C040	Letter from C.H. Ice to N. Stetson. "Description of Transuranic Solid Waste at Savannah River."
C041	Letter from V.R. Thayer to Distribution. "Purex Process Technology."
C043	Letter from E.L. Albenesius to C.H. Ice. "Development Program for Long-Term Storage of Savannah River Plant Solid Radioactive Wastes."
C044	Letter from O.M. Morris to M.G. O'Rear. "TRU Waste Data Update Request."
C045	TRU Waste Annual Call for Data
C047	Fax from Clay to Sonya Johnson. "TRU Waste Facts Sheet."
C048	Letter from H.E. Hootman to K.W. French. "Cost-Benefit Evaluation of Compaction for Solid TRU Wastes."
C049	Letter from K.S. Swigart to Distribution. "WIPP-Waste Acceptance Criteria."
C050	Letter from C.F. Jenkins to O.M. Morris. "TRU Waste Storage Drums - Galvanized Closure Rings and Lids Specifications."
C051	Response to the South Carolina Department of Health and Environmental Controls (SCDHEC's) Comments Concerning Retrieval of Low Activity Transuranic (TRU) Waste Drums from TRU Pads 2-6 (U)
C052	Letter from R.S. Simpson to D.L. Charlesworth. "Retrieval of Transuranic Waste."
C053	Record Of Communication – Interview with Mr. Tom Campbell, Fellow Technical Advisor, re: Isotopic Distribution of Material from JB-Line (FB-Line) 1970-86
C054	Record Of Communication – Interview with Mr. Robert Lynn, FB Line Operator, Special Recovery Isotopic Distribution
C055	Data from Mass Spec Logbooks relating to FB-Line weapons grade material 1982-86 Interview with James Satkowski
C056	Record of Communication: Interview with Supervisor Harry Smiley regarding FB-Line Waste from 1970-86.
C058	Memo from W.W. Mowry, G.L. Albert to TRU Waste Coordinators. "Identification of TRU Waste."
C059	Memo from G.L. Albert to TRU Coordinators. "TRU Packaging Requirements."
C060	Memo from W.J. Jaegge to R.R. Flemming, R.B. Spencer, and others "Program for Identification and Segregation of Transuranic Waste with Contamination Levels between 10 and 100 nCi/g."
C061	Letter from J.W. McClard to J.P. Duane. "HB-Line Waste Packaging Requirements."
C062	Memo from H.E. Hootman and W.R. McDonell to T.H. Gould. "Systems Analysis Applied to TRU Waste Management (U)."
C067	Record of Communication for Written Response to Interview Questions from R. Burns, Former FB-Line Engineer
C068	Memo to H. Fincher and J. McClard, 703-F, re: "FB-Line TRU Waste Characterization Data."
C070	Miscellaneous Correspondence on Solvent-Contamination Waste

C071	Record of Communication - Interview of FB-Line Personnel
C072	Memo from N. Dienes to Distribution List re: Specifications for Plutonium Shipped to the Rocky Flats Plant.
C073	Memo from T. Hendrick re: Polychlorinated Biphenyl's (PCBs) Used in Electrical Equipment
C074	Memo to R. P. Whitfield re: PCB Inventory Changes During Calendar Year 1984
C075	Email from K. Steeg, re: "Squib" Igniters Used in "Halex" Halon Fire Suppression
C076	Record of Communication – Interview of Bob Brookshire and Cary Stephens
C078	Memo from C. L. Martin: Corrected Values for FB-Line TRU Waste Drums Sent to the Solid Waste Disposal Facility from 1985 to 1992 (U)
C081	Memo from H. Hootman re: Radioactivity and Dose Rates from Aging Plutonium in Future Waste Management Operations (U)
C082	Record of Communication - Interview of Mr. Odum and Mr. Maloney re: FB-Line TRU Waste Generated Prior to 1986
C083	Memo from C. V. Lester to C. Gurosik re: Strategy for FB-Line Lead Waste
C086	Email to Blair Becker re: Beryllium Contaminated TRU Waste Information
C087	Email to Dave Haar, et. al. re: AK2; PuBe
C088	Interview of Jeff Shade re: FB-Line
C089	Memo to J.A. D'Amelio re: Review of Acceptable Knowledge Summary Report for SWMF Beryllium Issues
C090	Evaluation of Volume, Period Generation, and Calculation of Individual and Total Radionuclide Masses and Activities for Waste Stream SR-W027-FB-Pre86-C
C094	Anion Exchange Resin in SRS TRU Waste
D001	TRU Waste Characterization Summary, Volume 1, Main Report
D002	Revised Pre Title I Design Safety Evaluation for the Retrieval Operations of Transuranic Waste Drums in the Solid Waste Disposal Facility (U).
D003	Radioactive Waste Burial Grounds
D006	Storing Solid Radioactive Wastes at the Savannah River Plant
D008	Savannah River TRU Waste Inventory Workoff Plan
D009	Implementation Plan for Buried Transuranic Waste at the Savannah River Plant
D010	Application for a Post-closure Permit. Volume XII, Transuranic Waste Pads 1-5, Part 1.
D011	Analysis Plan (TRU Waste Storage Pads and ETWAF/WCF)
D012	FB-Line TRU Waste History
D013	Safety Analysis - 200 Area Savannah River Plant Burial Ground Operations
D014	Review Form for TWBIR Rev. 3 Data
D016	History of Du Pont at the Savannah River Plant
D019	System Plan for the Solid Waste Division
D020	200-Area Safety Analysis, SAIC
D021	Burial Container Limits
D022	Specifications for TRU Waste Drums/Filter Vents
D023	Statement of Work Chemical Inventory and Characterization of Waste Container Contents by Surface Acoustic Wave Technology
D024	Savannah River Site Approved Site Treatment Plan, 1997 Annual Update
D025	Solid Waste Division 1998 System Plan
D026	Transuranic Waste Projections at SRS for Long Range Planning (U)
D027	SRS Data Preparation for the 1995 WIPP TRU Waste Baseline Inventory Report, Mixed Waste Inventory Report, and Integrated Database (U)
D029	Savannah River Site Solid Waste Management Facility Safety Analysis Report
D030	Savannah River Site Transuranic Waste Program

D031	Transuranic Waste Vent and Purge Timeline and Authorization Basis Chronology (Discovery Unreviewed Safety Question and References)
D033	The FB Line Facility - A Training Aid Document
D034	TRU Waste Baseline Inventory Report
D035	The Purex Process
D036	U.S. Atomic Energy Commission AEC Manual: Chapter 0511 Radioactive Waste Management
D037	System Analysis - 200 Area Savannah River Plant: JB-Line Operations
D038	Policy Statement Regarding Solid Waste Burial, Immediate Action Directive
D039	Management of Transuranic Contaminated Material
D040	Radioactive Waste Management
D044	Action Plan for the Resumption of TRU Waste Shipments to the Solid Waste Disposal Facility
D045	Solid Heterogeneous Job Control Waste Raw Material Characterization
D046	Response to DOE Request for Status on Procurement and Disposal of Yellow Pigmented Items at SRS (U)
D047	Development of an Integrated Facility for Processing TRU Wastes at the Savannah River Plant
D048	Removal of RCRA waste codes from TRU waste containers generated at FB-Line
D050	Old Radioactive Waste Burial Ground
D052	Unreviewed Safety Question Process, Evaluation of the Review of HB- and FB-Line Measurement Bias Effect on Plutonium 238 and Pu-239 Quantities in Culverts and Drums on the SWMF SAR Analysis and TSRS
D053	Works Technical Report, for March 1980
D054	Works Technical Report for January, February 1977; DPSPs 77-1-1, 77-1-2
D056	Works Technical Report for August 1976
DR001	Discrepancy Resolution: Drum/Culvert Limit Change
DR008	Acceptable Knowledge Source Document Discrepancy Resolution, Calcium Reactivity
DR009	Discrepancy Resolution for Discrepant Drum in SR-W027-FB-Pre86-C Waste Stream
DR011	Discrepancy Resolution for Generation Dates of 48 Containers in Waste Stream SR-W027-FB-Pre86-C
DR012	Discrepency Resolution: Drums SR514741. SR514741A, and SR123429B Inconsistency with assigned Waste Matrix Code
M001	SR-W027, DOE Waste Stream Questionnaire from DOE National Core Mixed and TRU Waste Data Requirements
M002	Chronological History of the TRU Drum Vent Filter
M003	History of Transuranic Waste Management at the Savannah River Site
M004	EPA Potential Hazardous Waste Site Preliminary Assessment Part 1 - Site Information and Assessment
M005	Characterization of SRP Retrievably Stored Transuranium Waste
M008	Stock Requests (drums, liners, gaskets)
M009	Presentation: Savannah River Site Mixed Waste Streams Data and Photo Catalog
M012	Contingency Plan for Transuranic Waste Storage Pads and Experimental TRU Waste Assay Facility / Waste Certification Facility (ETWAF/WCF)
M014	Mixture of TRU Pad inventory, hand calculations, and radionuclide quantities for TRU pads
M016	Presentation: Savannah River Site Waste Characterization Plans
M018	Table 1. Nuclear Safety Limits for Burial Ground TRU Storage
M021	Slide presentation: Storage and Disposal History

M022	Slide presentation: TRU Waste
M024	FB-Line - Cross Index
M025	Soil Sampling Data from Retrieval Effort
M026	Headspace Gas and Filter Vent Data from the Retrieval Vent and Purge Effort
M027	Pre-86 AK Tracking Spreadsheet
M028	Burial Ground Records
M029	CEEP Data
M030	MSDSs
M031	SRS Unofficial COBRA Database Update
M032	Pre-86 FB-Line Overpack Spreadsheet
M039	Spreadsheets Summarizing RTR Data from Confirmation Activities
M040	RTR Drum Quick Screening Log Sheets: Facsimile Correspondence
M041	Acceptable Knowledge Payload Management Calculations for CCP-SRS AK Reports 1 through 7
M042	Acceptable Knowledge Beryllium Assessment for CCP-SRS AK Reports 1 through 7
M043	Email from Jeff Lunsford dated 8/31/2005. SRS Inventory Update.
M044	Evaluation of Additional Containers for SRS-2 Waste Stream SR-W027-FB-Pre86-C (FB-Line), 7/11/06
M045	Burial Ground Records for 4 Drums Added to Waste Stream on 7/11/2006
M046	Evaluation of Additional Container for SRS-2 Waste Stream SR-W027-FB-Pre86-C (FB Line)
M053	Container Paperwork for 221F-Box Waste and 221F-Box Spreadsheet
M056	Evaluation of Additional Containers for SR-W027-FB-Pre86-C (add container memo) from 05/27/2011 to Present
M057	Burial Ground Records for Drum Additions 05/27/2011 to Present (container paperwork)
M058	Container Additions Memos and Container Paperwork
M059	Non-Beryllium Evaluations Within SRS Waste Streams
P001	SRS Waste Acceptance Criteria: E-Area, TRU Pads - Transuranic Waste Acceptance Criteria
P002	Storing TRU Waste in Concrete Containers
P003	Drum Retrieval From TRU Pads 2-6 (U), UET Manual SW 15 SWO
P004	WM-Special Procedure, X-Ray Inspection of TRU Waste Drums on Pad 12
P006	Storage of Transuranium Waste
P008	Storage of Transuranium Waste
P009	Packing TRU Waste and Sealing in 55-Gallon Drums
P010	Savannah River Plant Radiation and Contamination Control/Management of Solid Radioactive Waste
P011	Repackaging TRU Drummed Waste at 643-G
P012	Separations Department: Handling Transuranium Waste 221-H Canyon & 211-H Facility
P013	Waste Management: Waste Handling Facilities: Storage of Transuranium (TRU) Waste
P014	Separations Department: Cleaning and Removing a Plastic Hut
P015	Separations Department: Introducing or Removing Material Through Bag Ports.
P016	Separations Department: Handling and Packaging Radioactive Waste
P020	Operating the NaI PHA Manually
P022	Storage of Transuranic (TRU) Waste in 643-G
P023	Absorbing Containerized Liquids
P024	TRU Drum Remediation

P025	Shipment Preparation for TRU Containers to SWMF
P026	TRU Drum Repackaging
P027	Black Box Repackaging
P029	Absorbing Containerized Liquids
P030	Transuranic (TRU) Waste Repackaging in H-Canyon
P031	SWMF Blackbox Repackaging (U)
P032	F Canyon Container Transfer (U)
P034	Conversion of Spent Anion Resin to Sulfate Form, Test Authorization No. 2-1006, DPSOX-9475
P035	Packaging Sealed Containers With Liquid Waste (U)