



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

JAN 23 2004

ENTERED



Mr. Steve Zappe, WIPP Project Leader
Hazardous Waste Permits Program
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
2905 E. Rodeo Park Drive, Bldg. 1
Santa Fe, NM 87505

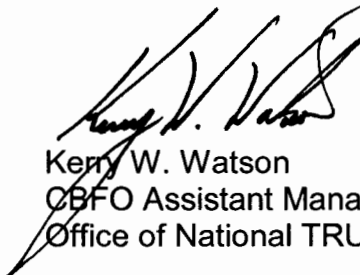
Subject: Transmittal of Approved RFETS WSPF RF102.01-Transuranic Mixed
Metal Debris Waste

Dear Mr. Zappe:

The Department of Energy, Carlsbad Field Office (CBFO) has approved the Rocky Flats Environmental Technology Site (RFETS), Waste Stream Profile Form (WSPF) RF102.01. Enclosed is a copy of the approved form as required by Section B-4(b)(1) of the WIPP Hazardous Waste Facility Permit No. NM4890139088- TSDF.

If you have any questions on this matter, please contact me at (505) 234-7357 or (505) 706-0066.

Sincerely,



Kerry W. Watson
CBFO Assistant Manager
Office of National TRU Program

Enclosure

cc: w/o enclosure
J. Kieling, NMED
C. Walker, TechLaw
R. Chavez, WRES
K. Dunbar, WRES
L. Greene, WRES
S. Calvert, CTAC
CBFO M&RC



WIPP WASTE STREAM PROFILE FORM

RF102.01, Revision 0

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Waste Stream Profile Number: RF102.01Generator site name: RFETSTechnical contact: Eric D'AmicoGenerator site EPA ID: CO7890010528Phone number: (303) 966-5362

Date of audit report approval by NMED: March 9, 2000 as amended February 6, 2001; May 24, 2001; June 5, 2001; April 5, 2002; April 8, 2002; August 20, 2002; August 29, 2002; December 20, 2002; April 8, 2003; September 19, 2003 and December 30, 2003

Title, version number, and date of documents used for WAP certification: Rocky Flats Environmental Technology Site TRU Waste Characterization Program Quality Assurance Project Plan, 95-QAPjP-0050, Version 8, October 2003. Transuranic (TRU) Waste Management Manual, Revision 6, 1-MAN-008-WM-001, June 2003. Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, Revision 0.1, July 2002.

Did your facility generate this waste? ☒ Yes ☐ No If no, provide the name and EPA ID of the original generator:

Waste Stream Information⁽¹⁾WIPP ID: RF102.01⁽³⁾Summary Category Group: S5000⁽³⁾ Waste Matrix Code Group: Uncategorized Metal⁽³⁾

Waste Stream Name: TRM Metal Debris Waste (D004-D011, D022, D028, D029, F001, F002, F005, F006, F007, F009, P030, P098, P099, P106, U003, U103, U108)⁽³⁾

Description from the WTWBIR: This waste stream is metal tools, etc. generated during glovebox operations.

Scrap metals which are heavier than iron and steel. Metallic lead in the form of sheets, bricks, or tape.⁽³⁾

Defense TRU Waste: ☒ Yes ☐ NoCheck one: ☒ CH ☐ RH Number of SWBs 95 Number of Drums 205 Number of Canisters N/ABatch Data Report numbers supporting this waste stream characterization: See Table 7.

List applicable EPA Hazardous Waste Codes⁽²⁾: Numbers D004-D011, D022, D028, D029, F001, F002, F005, F006, F007, F009, P030, P098, P099, P106, U003, U103, U108.

Applicable TRUCON Content Codes: RF 117A, RF 117B, RF 117C, RF 117D, RF 117E, RF 117F, RF 117H, RF 117I, RF 117K, RF 117N, RF 117T

Acceptable Knowledge Information⁽¹⁾Required Program Information

- Map of site: Reference List, No. 5
- Facility mission description: Reference List, No. 5
- Description of operations that generate waste: Reference List, Nos. 1, 2, 3, 4, 5, 8
- Waste identification/categorization schemes: Reference List, Nos. 10, 11
- Types and quantities of waste generated: Reference List, Nos. 1, 2, 3, 4, 5, 8
- Correlation of waste streams generated from the same building and process, as appropriate: Reference List, Nos. 1, 2, 3, 4, 8
- Waste certification procedures: Reference List, No. 7

Required Waste Stream Information

- Area(s) and building(s) from which the waste stream was generated: Reference List, Nos. 1, 2, 3, 4, 8
- Waste stream volume and time period of generation: Reference List, Nos. 6, 8
- Waste generating process description for each building: Reference List, Nos. 1, 2, 3, 4, 8
- Process flow diagrams: Reference List, Nos. 1, 2, 3, 4
- Material inputs or other information identifying chemical/radionuclide content and physical waste form: Reference List, Nos. 1, 2, 3, 4, 5, 8
- Which Defense Activity generated the waste: (Check one) Reference List, No. 5
 - ☒ 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
 - ☐ Defense nuclear materials production
 - ☐ Defense nuclear waste and materials security and safeguards and security investigations

Reviewed For Classification/UCNI

By V S SCHELWECKDate 13 JAN 04 GUP

APPROVED PUBLIC RELEASE

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Supplemental Documentation:

- Process design documents: Note 4
- Standard operating procedures: Note 4
- Safety Analysis Reports: Note 4
- Waste packaging logs: Note 4
- Test plans/research project reports: Note 4
- Site data bases: Note 4
- Information from site personnel: Note 4
- Standard industry documents: Note 4
- Previous analytical data: Note 4
- Material safety data sheets: Note 4
- Sampling and analysis data from comparable/surrogate Waste: Note 4
- Laboratory notebooks: Note 4

Sampling and Analysis Information⁽¹⁾*[For the following, when applicable, enter procedure title(s), number(s) and date(s)]*

- ☒ Radiography: Reference List Nos. 15, 16, 21
- ☒ Visual Examination: 13, 14, 18, 19, 20, 22, 23
- ☒ Headspace Gas Analysis
 - VOCs: Reference List, No. 9, 17, 24
 - Flammable: Reference List, No. 9, 17, 24
 - Other gases (specify): N/A
- ☐ Homogeneous Solids/Soils/Gravel Sample Analysis (Tables 1, 3, 4, and 5 are not applicable and not included)
 - Total metals: N/A
 - PCBs: N/A
 - VOCs: N/A
 - Nonhalogenated VOCs: N/A
 - Semi-VOCs: N/A
 - Other (specify): N/A

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 of Site Project ManagerG. A. O'Leary, Manager TRU Programs
Printed Name and Title

Date

1-13-04
Signature of Site QA OfficerC. L. Ferrera, TWCP Site QAO
Printed Name and Title

Date

1/13/04

- NOTE**
- (1) Use back of sheet or continuation sheets, if required.
 - (2) EPA Hazardous Waste Codes were determined using acceptable knowledge and confirmed using headspace gas sampling and analysis (see attached Characterization Information Summary documenting this determination).
 - (3) This waste stream is not specifically identified in the WTWBIR, but the waste is similar to other waste that is identified in the WTWBIR. Specifically, the waste stream is similar to a combination of the following WTWBIR waste streams: RF-MT0320, RF-MT0321, RF-MT0480. The WIPP ID assigned corresponds to the Waste Stream Profile Number. The Summary Category Group, Waste Matrix Code Group, and Waste Matrix Code are based on acceptable knowledge (see attached AK Summary). The BIR ID reported in WWIS is assigned using standard BIR conventions for those containers that do not have a valid BIR ID in the WTWBIR.
 - (4) See the References section in the Acceptable Knowledge Summary (attached) for additional backup documentation associated with this waste stream.

REFERENCE LIST

1. Backlog Waste Reassessment Baseline Book, Waste Form 24, Metal, November 2003.
2. Backlog Waste Reassessment Baseline Book, Waste Form 8, Lead and Glovebox Parts with Lead, December 2003.
3. Backlog Waste Reassessment Baseline Book, Waste Form 25, Heavy Metals, July 2002.
4. Waste Stream and Residue Identification and Characterization (WSRIC), Version 7, June 2003, and archived versions.
5. RFETS TRU Waste Acceptable Knowledge Supplemental Information, RF/RMRS-97-018, Version 11, December 2003.
6. Waste and Environmental Management System (WEMS) database.
7. Transuranic (TRU) Waste Certification, PRO-X05-WC-4018, Revision 5, December 2003.
8. Acceptable Knowledge TRU/TRM Waste Stream Summaries, RMRS-WIPP-98-100, Section 7.15, Revision 0, December 2003.
9. GC/MS Determination of Volatile Organics Waste Characterization, L-4111-X, January 2002.
10. Waste Characterization, Generation, and Packaging, 1-PRO-079-WGI-001, Revision 4, May 2002.
11. Waste Characterization Program Manual, 1-MAN-036-EWQA-Section 1.6.1, Revision 3, May 2002.
12. Interoffice Memorandum from Thomas R. Gatliffe to Eric L. D'Amico, Headspace Gas Analysis Data Evaluation Report For Waste Stream Profile RF102.01 (TRM Metal Debris Wastes [D004-D011, D022, D028, D029, F001, F002, F005-F007, F009, P030, P098, P099, P106, U003, U103, U108]) Lot 1, TRG-265-03, December 2003.
13. Visual Examination for Confirmation of RTR, 4-H80-776-ASRF-007, Revision 5, June 2001.
14. TRU/TRM Waste Visual Verification (V²) and Data Review, PRO-1031-WIPP-1112, Revision 2, February 2003.
15. Real-Time Radiography Testing of Transuranic and Low-Level Waste, 4-W30-NDT-00664, Version 8, November 2003.
16. Real-Time Radiography Testing of Transuranic and Low-Level Waste in Building 569, 4-I19-NDT-00569, Revision 6, January 2002.
17. Headspace Gas Sampling And Analysis Using An Automated Manifold, L-4231-F, March 2002.
18. Visual Examination for Confirmation of RTR, PRO-1471-VE-771, Revision 0, November 2001.
19. Glovebox and C-Cell Waste Operations, PRO-1358-440-VERP, Revision 2, September 2002.
20. RTR Visual Examination Confirmation, Building 371, PRO-1608-VECRR-371, Revision 0, October 2002.
21. Mobile Real-Time Radiography Testing of Transuranic and Low-Level Waste, PRO-1520-Mobile-RTR, Version 2, November 2003.
22. Residue Repack, Building 371; PRO-544-SALT REPACK-371, Revision 5, January 2002.
23. Combustible Residue Repackaging, PRO-823-REPACK-371, Revision 1, March 2001.
24. Headspace Gas Sampling and Analysis Using An On-Line Integrated System, PRO-1676-HGAS-S&A, Version 1, November 2003.

CHARACTERIZATION INFORMATION SUMMARY

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Form A

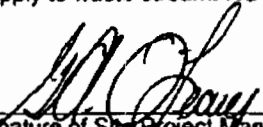
Reconciliation with Data Quality Objectives

I certify by signature (below) that sufficient data have been collected to determine the following Program-required waste parameters:

WSPF # RF102.01

Item	Check Box ^a	Reconciliation Parameter
1	✓	Waste Matrix Code as reported in WEMS.
2	✓	Waste Material Parameter Weights for individual containers as reported in WEMS.
3	✓	The waste matrix code identified is consistent with the type of sampling and analysis used to characterize the waste.
4	✓	Container mass and activities of each radionuclide of concern as reported in WEMS.
5	✓	Each waste container of waste contains TRU radioactive waste.
6	✓	Mean concentrations, UCL ₉₀ for the mean concentrations, standard deviations, and the number of samples collected for each VOC in the headspace gas of waste containers in the waste stream/waste stream lot.
7	N/A	Mean concentrations, UCL ₉₀ for the mean concentrations, standard deviations, and number of samples collected for VOCs in the waste stream/waste stream lot. Summary Categories S3000 and S4000.
8	N/A	Mean concentrations, UCL ₉₀ for the mean concentrations, standard deviations, number of samples collected for SVOCs in the waste stream/waste stream lot. Summary Categories S3000 and S4000.
9	N/A	Mean concentrations, UCL ₉₀ for the mean concentrations, standard deviations, and number of samples collected for metals in the waste stream/waste stream lot. Summary Categories S3000 and S4000.
10	N/A	Sufficient number of samples was taken to meet statistical sampling requirements.
11	✓	Only validated data were used in the above calculations, as documented through the site data review and validation forms and process.
12	✓	Waste containers were selected randomly for sampling, as documented in site procedures.
13	✓	The potential flammability of TRU waste headspace gases.
14	✓	Sufficient number of waste containers was visually examined to determine with a reasonable level of certainty that the UCL ₉₀ for the miscertification rate is less than 14 percent.
15	✓	Whether the waste stream exhibits a toxicity characteristic (TC) under 40 CFR Part 261, Subpart C.
16	✓	All TICs were appropriately identified and reported in accordance with the requirements of the WIPP WAP prior to submittal of a waste stream profile form for a waste stream or waste stream lot.
17	✓	The overall completeness, comparability, and representativeness QAOs were met for each of the analytical and testing procedures as specified in the WIPP WAP Sections B3-2 through B3-9 prior to submittal of a waste stream profile form for a waste stream or waste stream lot.
18	✓	The RTLs (i.e., PRQLs) for all analyses were met prior to submittal of a waste stream profile form for a waste stream or waste stream lot.
19	✓	Appropriate packaging configuration and DAC were met and documented in the headspace gas sampling documentation and the drum age was met prior to sampling.
20	✓	Whether the waste stream can be classified as hazardous or non-hazardous at the 90-percent confidence limit.

^a Check (✓) indicates that data or acceptable knowledge are sufficient to determine the waste parameters and that the waste parameters have been reported in the listed document or database. N/A indicates parameter does not apply to waste stream. NO indicates data are insufficient.


Signature of Site Project Manager

G. A. O'Leary
Printed Name

1-13-04
Date

Data Summary Report—Table 2: Headspace Gas Summary Data

WSPF # RF102.01

Sampling and Analysis Method (check one):

☒ 100% Sampling☐ Reduced Sampling

2A

ANALYTE ^a	# Samples ^b	Transform Applied ^c	Normality Test (Pass/Fail) ^d	Mean ^d	UCL ₉₀ ^d	Transformed RTL ^e	Un-Transformed RTL ^e (ppmV)	EPA Code ^f
1,1-Dichloroethane	3	Log	Fail ^h	-0.741	-0.586	2.303	10	
1,2-Dichloroethane	3	Log	Fail ^h	-0.743	-0.526	2.303	10	
1,1-Dichloroethylene	4	Log	Fail ^h	-0.745	-0.526	2.303	10	
cis-1,2-Dichloroethylene	1	Log	Fail ^h	-0.873	-0.698	2.303	10	
trans-1,2-Dichloroethylene	0			0.71			10	
1,1,2,2-Tetrachloroethane	0			0.521			10	
1,1,1-Trichloroethane	10	Log	Fail ^h	0.092	0.558	2.303	10	
1,1,2-Trichloro-1,2,2-Trifluoroethane	6	Log	Fail ^h	-0.429	-0.091	2.303	10	
1,2,4-Trimethylbenzene	0			0.553			NA	
1,3,5-Trimethylbenzene	0			0.585			NA	
Acetone	11	Log	Fail ^h	2.006	2.261	4.605	100	
Benzene	11	Log	Fail ^h	-0.055	0.25	2.303	10	
Bromoform	0			0.588			10	
Butanol	0			6.544			100	
Carbon disulfide	3	Log	Fail ^h	-0.791	-0.691	2.303	10	
Carbon tetrachloride	16	Log	Fail ^h	1.36	1.949	2.303	10	
Chlorobenzene	0			0.493			10	
Chloroform	13	Log	Fail ^h	0.582	1.063	2.303	10	
Cyclohexane	0			0.47			NA	
Ethyl benzene	2	Log	Fail ^h	-0.849	-0.624	2.303	10	
Ethyl ether	0			0.588			10	
Methanol	5	Log	Fail ^h	2.15	2.25	4.605	100	
Methyl ethyl ketone	4	Log	Fail ^h	1.456	1.674	4.605	100	
Methyl isobutyl ketone	3	Sq. Rt.	Fail ^h	2.295	2.546	10	100	
Methylene chloride	8	Log	Fail ^h	-0.115	0.229	2.303	10	
o-Xylene	3	Log	Fail ^h	-0.848	-0.624	2.303	10	
m,p-Xylene	5	Log	Fail ^h	-0.274	0.028	2.303	10	
Tetrachloroethylene	3	Log	Fail ^h	-0.672	-0.441	2.303	10	
Toluene	24	Log	Fail ^h	1.169	1.59	4.277	72.02 ^g	
Trichloroethylene	2	Log	Fail ^h	-0.637	-0.445	2.303	10	

NOTES:

^a A total of 34 samples were collected and analyzed. Analysis was performed for all analytes identified except as noted. Samples were not composited. Headspace gas sampling and analysis was conducted on 14 of the 34 containers prior to the addition of trans-1,2-dichloroethylene to the target analyte list.

^b Identifies the number of samples in which the associated analyte was detected.

Data Summary Report—Table 2: Headspace Gas Summary Data (continued)**NOTES: (continued)**

- ^c Identifies the type of data transformation used, if applicable, to achieve (or better achieve) a normal probability distribution of the data.
- ^d Statistics calculated based on using $\frac{1}{2}$ the MDL for less-than-detectable observations with data transformation as identified (Reference 12). When transformation was applied, the Mean and UCL₉₀ values presented are the transformed values (Reference 12). With no detectable concentrations, listed mean reflects average of one-half of reported MDL values for analyte and calculation of standard deviation and UCL₉₀ values is not meaningful. With fewer than five detectable concentrations, calculated values for UCL₉₀ are subject to potentially large relative error.
- ^e RTLs for headspace gas analysis results correspond to the analyte PRQL for analytes that are WIPP WAP target analytes. "NA" means the analyte is not a WIPP WAP target analyte, but instead a flammable VOC that is analyzed for compliance with the TRUPACT-II Authorized Methods for Payload Control (TRAMPAC).
- ^f No entry indicates no associated EPA Code assigned to the waste stream based on headspace analysis.
- ^g Limit used for evaluation of EPA Hazardous Waste Code for toluene (Reference No. 5).
- ^h Data set (with or without transformation) did not pass the test for normality. The data set that most approximated a normal distribution was used for computation of statistics.

CHARACTERIZATION INFORMATION SUMMARY

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Data Summary Report—Table 2: Headspace Gas Summary Data (continued)

WSPF # RF102.01

2B

TENTATIVELY IDENTIFIED COMPOUND	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC
Propene, CAS # 115-07-1	9.8	1
n-Heptane, CAS # 142-82-5	34	2
2,5-Dihydrofuran, CAS # 1708-29-8	3.5	1
3-Methylhexane, CAS # 589-34-4	49	1
Methyl Chloride, CAS # 74-87-3	7.1	1
1,1,1-Trichloropropane, CAS # 7789-89-1	2.2	1

No TIC listed in 40 CFR 261, Appendix VIII was detected in greater than or equal to 25 percent of the waste containers sampled.

Did the data verify the acceptable knowledge? ☒ Yes ☐ No

Data as reported in Data Summary Report – Table 2 confirm acceptable knowledge in that no toxicity characteristic volatile organic or F-listed solvent EPA codes, other than those assigned by acceptable knowledge, are applicable.

If not, describe the basis for assigning the EPA Hazardous Waste Codes:

Data Summary Report—Table 6: Exclusion of Prohibited Items**WSPF # RF102.01**

The absence of prohibited items is documented through acceptable knowledge. Radiography or visual examination is performed on each container in this waste stream to verify the absence of the following prohibited items:

- Liquids
- Non-radionuclide pyrophoric materials
- Waste incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Explosives or compressed gases
- PCBs in concentrations greater than or equal to 50 ppm
- Waste exhibiting the characteristics of ignitability, corrosivity or reactivity
- Non-mixed hazardous wastes

Newly generated waste is characterized by visual verification (VV) at the time of waste packaging using the visual examination (VE) technique unless the use of radiography in lieu of, or in combination with, visual verification is justified by any of the following criteria:

- Visual verification was conducted during packaging, but was unacceptable,
- Visual verification requires extensive handling of high gram content waste that results in high radioactive exposure for the VV personnel,
- Situations where waste packaging is conducted at numerous locations generating small quantities of transuranic waste requiring a large number of VV personnel, and/or
- Where waste was originally packaged as low-level waste, but subsequently determined to be transuranic.

Each container of waste is certified and shipped only after radiography and/or VE either:

1. Did not identify any prohibited items in the waste container, or
2. All prohibited items found in a waste container by radiography or VE are identified and corrected (i.e., eliminated or removed) through the site non-conformance reporting system.

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**Data Summary Report—Table 7: Correlation
of Container Identification to Batch Data Reports**

WSPF # RF102.01

Package No.	Radioassay Data Package	Headspace Sample Batch No.	Headspace VOC Data Package	RTR Data Package ^a	VE or VV Data Package ^b
D64077	CPN-98-004	00C1093	HVOC-DP-00258	6T1646	
D65096	CIQ-98-011	00C1083	HVOC-DP-00252	6T1632	
D66438	CPN-98-007	00C1089	HVOC-DP-00254	6T1623	
D67906	CPN-99-009	02W0047	HGAS-DP-00364	6T2040	
D68305	CPN-00-020	00W0069	HVOC-DP-00341	6T1699	
D68745	CPN-98-005	00C1082	HVOC-DP-00250	6T1620	
D69440	CPN-99-009	03W0325	HGAS-DP-00649	6T2056	
D72440	569IP1-DP-052002	01W0142	HVOC-DP-00471	6T1869	
D87906	569IP1-DP-111401	01W0192	HVOC-DP-00519	5T0259	
D87909	569IP1-DP-103001	01W0128	HVOC-DP-00458	6T2009	
D87923	569IP1-DP-013002	01W0149	HVOC-DP-00478	5T0283	
D91522	569IP1-DP-110701	01W0213	HVOC-DP-00541	5T0255	
D92521	569IP1-DP-110601	01W0213	HVOC-DP-00541	5T0254	
D93739	569IP1-DP-040102	01W0213	HVOC-DP-00542	6T2026	
DA3938	CIQ-00-045	01W0001	HVOC-DP-00365	6T1646	
DB0139	CIQ-00-031	01W0217	HVOC-DP-00546	5T0119	
DB6023	569IP1-DP-013002	03W0201	HGAS-DP-00547	5T0283	
DB6963	CPN-01-024	02W0105	HGAS-DP-00302	6T1802	
DB7491	569IP1-DP-061302	03W0027	HGAS-DP-00389	6T2103	
DB7568	CIQ-01-047	02W0090	HGAS-DP-00294	6T1802	
DB8527	569IP1-DP-120501	02W0175	HGAS-DP-00288	5T0269	
DB8760	569IP1-DP-111301	03W0217	HGAS-DP-00562	5T0258	
DB8767	440IP1-DP-082703	03W0332	HGAS-DP-00656	MT0013	
DC1215	569IP1-DP-120601	02W0130	HGAS-DP-00286	5T0271	
DC1676	569IP1-DP-011602	02W0133	HGAS-DP-00295	5T0280	
DC1680	569IP1-DP-080901	02W0117	HGAS-DP-00268	5T0229	
DD0306	569IP1-DP-032702	03W0214	HGAS-DP-00559		VV-776-00003
DD1372	569IP1-DP-040402	03W0199	HGAS-DP-00544		VV-776-00006
DD2293	569IP1-DP-061402	03W0244	HGAS-DP-00582		VV-776-00012
DD3134	569IP1-DP-081302	03W0298	HGAS-DP-00624		VV-776-00015
S00677	440SH1-DP-041902	02W0069	HGAS-DP-00202	5T0211	
S00758	440SH1-DP-031202	02W0150	HGAS-DP-00251	5T0129	
S01246	440SH1-DP-020602	03W0002	HGAS-DP-00335		VV-707-00002
S02133	440SH1-DP-121802	03W0178	HGAS-DP-00522		VV-707-00030

NOTES:

- ^a No entry indicates visual verification (VV) at the time of waste packaging using the visual examination (VE) technique was performed for the container.
- ^b No entry indicates container was not selected for visual examination to confirm RTR and did not undergo VV at the time of waste packaging using the VE technique.

Acceptable Knowledge Summary

WSPF # RF102.01

RMRS-WPP-98-100, Acceptable Knowledge TRM Waste Stream Summaries, Section 7-15: TRM Metal Debris Waste (D004-D011, D022, D028, D029, F001, F002, F005, F006, F007, F009, P030, P098, P099, P106, U003, U103, U108) (attached).



Rocky Flats Environmental Technology Site

ACCEPTABLE KNOWLEDGE INFORMATION

**ACCEPTABLE KNOWLEDGE TRU/TRM
WASTE STREAM SUMMARIES**

RMRS-WIPP-98-100

Section 7.15

TRM Metal Debris Wastes

**(D004 – D011, D022, D028, D029,
F001, F002, F005, F006, F007, F009,
P030, P098, P099, P106, U003, U103, U108)**

Profile No. RF102.01

Revision 2

Reviewed for Classification/UCNI

By: Unclassified Not UCNI

Reference Exemption Number CEX-032-00

Date: January 20, 2004

7.15 TRM Metal Debris Wastes (D004 – D011, D022, D028, D029, F001, F002, F005, F006, F007, F009, P030, P098, P099, P106, U003, U103, U108)

Profile No. RF102.01

Acceptable Knowledge Waste Stream Summary

Waste Stream Name: TRM Metal Debris Wastes (D004 – D011, D022, D028, D029, F001, F002, F005, F006, F007, F009, P030, P098, P099, P106, U003, U103, U108)

Generation Buildings: Buildings 371, 374, 440, 559, 707, 771, 774, 776, 777, 779, 991, and T207^(1,12,13,31)

Waste Stream Volume (Retrievably Stored): 126 55-Gallon Drums and 27 Standard Waste Boxes⁽¹⁾

Generation Dates (Retrievably Stored): September 1987 – September 2001⁽¹⁾

Waste Stream Volume (Newly Generated): 76 55-Gallon Drums and 64 Standard Waste Boxes⁽¹⁾

Generation Dates (Newly Generated): October 2001 – September 2003⁽¹⁾

Waste Stream Volume (Projected): 3 55-Gallon Drums and 4 Standard Waste Boxes^(1,2)

Generation Dates (Projected): December 2003 to June 2004^(1,2)

TRUCON Content Codes⁽³⁾: RF 117A, RF 117B, RF 117C, RF 117D, RF 117E, RF 117F, RF 117H, RF 117I, RF 117K, RF 117N, RF 117T

Process Knowledge Demonstrates Flammable VOCs in Headspace < 500 ppm: No (see Sec. 7.15.6)

7.15.1 WIPP Transuranic Waste Baseline Inventory Report Information⁽⁴⁾

WIPP Identification Numbers: RF102.01

Summary Category Group: S5000 Waste Matrix Code Group: Uncategorized Metal

Waste Matrix Code: S5119 Waste Stream Name: Light Metal/TRM, Heavy Metal (non SS)/TRM, and Lead/TRM

Description from the WTWBIR: This waste stream is metal tools, etc. generated during glovebox operations. Scrap metals which are heavier than iron and steel. Metallic lead in the form of sheets, bricks, or tape.

NOTE: This waste stream is not specifically identified in the WTWBIR, but the waste is similar to other waste that is identified in the WTWBIR. Specifically, the waste stream is similar to a combination of the following WTWBIR waste streams: RF-MT0320, RF-MT0321, RF-MT0480.

The WIPP ID assigned corresponds to the Waste Stream Profile Number. The Summary Category Group, Waste Matrix Code Group, and Waste Matrix Code are based on acceptable knowledge as provided in Section 7.15.2.

7.15.2 Waste Stream Description

TRM metal debris wastes were generated from a variety of operations in support of weapons fabrication and manufacturing including plutonium production, recovery, laboratory operations, research and development, maintenance and utility operations, waste treatment and residue repackaging operations, and D&D of the facilities and equipment utilized in these operations. This waste is generated from similar activities, and is similar in material, physical form, and hazardous constituents, and is therefore considered a single waste stream. Table 7.15-1 presents the waste matrix code and waste material parameters for metal debris wastes.⁽⁵⁾

Table 7.15-1, Metal Debris Wastes Description

IDC	Description	Waste Matrix Code	Waste Material Parameters	Weight % (Average)
320	Heavy non-SS Metal (TA, W, Pt)	S5119, Unknown/Other Metal Debris	Other Metals/Alloys Iron-based Metal/Alloys	Note 3
321	Lead	S5119, Unknown/Other Metal Debris	Other Metals/Alloys	100%
480 824	Light Metal	S5119, Unknown/Other Metal Debris	Iron-based Metal/Alloys Cellulosics ¹ Plastics ² Aluminum-based Metal/Alloys	93 3% 3% 1%
488	Glovebox Parts with Lead	S5119, Unknown/Other Metal Debris	Iron-based Metal/Alloys Other Metals/Alloys Rubber	Note 3

Notes:

1. The average weight percent of cellulosic materials is based on RTR and includes the fiberboard liner.
2. The average weight percent of plastic materials is based on RTR and includes plastic liner bags.
3. Validated RTR and/or visual examination/verification waste material parameters and weights will be determined during visual verification at the time of packaging or by RTR, as appropriate data are not currently available for these IDCs.

Heavy non-SS Metal: Non-stainless steel metals that are heavier than iron. Examples of this waste include crucibles, funnels, rods, and process fixtures made primarily from tantalum, tungsten, and platinum. Since 1987, lead has been segregated from this waste as IDC 321.^(8,27)

Lead: This IDC was created in 1987 to better account for the generation and material control of lead waste. Waste items consist primarily of lead shielding in the form of sheeting, bricks, and tape. Other items may include lead components from radiographic film processing.⁽⁷⁾

Light Metal: Iron, copper, aluminum, stainless steel, galvanized metal, carbon steel, brass, bronze, and other common alloys. Metal waste items may include mechanical and electrical parts, tools, containers, scrap metals, piping wire, cable, gauges, valves, foil, and planchets.^(6,10,12,13,15,17,19,22,25,30,31)

Glovebox Parts with Lead: This waste consists primarily of lead metal sheet attached to stainless-steel glovebox structures. Small parts and pieces of scrap are collected in drums while gloveboxes are size-reduced as necessary and packaged in boxes.⁽⁷⁾

7.15.3 Areas of Operation

TRM metal debris wastes in this waste stream are generated by the following defense operations:⁽⁵⁾

- Plutonium Production
- Plutonium Recovery
- Laboratory Operations
- Research and Development
- Maintenance and Utilities
- Waste Treatment and Residue Repackaging
- Decontamination and Decommissioning Operations (D&D)

7.15.4 Generation Processes

TRM metal debris wastes were generated from nearly every operation on Site in support of weapons fabrication and manufacturing including plutonium production, recovery, laboratory operations, research and development, maintenance and utility operations, waste treatment and residue repackaging operations, and D&D of the facilities and equipment utilized in these operations.

Building 707 was the main weapons components production facility where plutonium metal was cast into ingots in the foundry. The ingots were machined into parts on various pieces of equipment and assembled into weapons components with welders. Plutonium residues such as metal turnings were formed into briquettes for use in the foundry. Nondestructive testing, inspection, and nuclear material inventory and packaging were conducted in support of production processes. Many of the same weapons components production operations were also performed in Building 777. The Radiography Process in Building 777 cleaned and x-rayed finished plutonium parts as a quality control check. These operations generated metal debris in the form of tools, wire brushes, empty cans, crucibles, pans, hardware, electric cables, foil, banding, discarded pumps, replaced piping and tanks, burned out motors, and scraps of aluminum, copper, and stainless steel.^(6,8,16,24)

Building 771 was the primary plutonium recovery facility. Plutonium residues were dissolved in acid to create plutonium nitrate solution that may have been further processed by anion exchange. The nitrate feed was batched for evaporation followed by precipitation to produce plutonium peroxide and calcined to an oxide. The plutonium oxide was converted to plutonium tetrafluoride and reduced to plutonium metal. These operations generated metal debris in the form of tools, replaced parts, and replaced process piping.^(6,8,18)

Analytical laboratories in Buildings 371, 559, and 771 provided sampling and analysis support for historical operations as well as D&D activities. The Building 371 Laboratory also screened samples for radioactivity content prior to analysis in the Building 559 laboratory, and served as a backup facility for the Building 771 laboratory. Building 559 housed the laboratory responsible for spectrochemical, chemical, and mass spectrometric analyses of samples from plutonium production operations. Uranium, Raschig rings, solutions, waste samples, and commercial product and gas samples were also analyzed in the laboratory. Plutonium production samples, including metal and oxide, were prepared and subdivided for analysis in the sample cutting process. Metal debris generated from the laboratories included analytical laboratory equipment, tools, wire, piping, dry cell alkaline batteries, steel and aluminum check weights, pipe standards, and empty sample containers.^(6,9,14,15,18)

Research and development activities were conducted to gain more knowledge of the chemistry and metallurgy of plutonium and its interactions with other materials potentially used in plutonium operations. The Chemical Technology Laboratory in Building 771 was used for aqueous plutonium research and development activities, such as simulations of recovery operations including dissolution, feed evaporation, precipitation, and calcination. The Coatings Laboratory in Building 777 coated sample substrates with uranium or plutonium. Plutonium and uranium samples evaluated in the Building 777 Plutonium Metallurgical Laboratory, and Building 779 metallurgy, gas-solid kinetic studies, and nuclear material compatibility studies, were prepared prior to analysis by cutting, grinding, etching, mounting, and polishing. Samples were also similarly prepared for analysis in the Cemented Waste Sample Analysis process in Building 779. Samples originated from all processes where wastes were cemented including saltcrete. These operations generated metal debris including tools and replacement parts, crucibles, stirrers, and metal laboratory equipment.^(6,8,18,24,26)

Utilities in the plutonium buildings included heating, ventilation and air conditioning systems, vacuum systems, process and waste piping systems, and emergency electrical systems. Maintenance on the related equipment such as ventilation filtration systems, ventilation and process off-gas scrubbing systems, compressors, pumps, process piping, valves, radiation instrumentation, and other process equipment was routinely conducted. Filters, including liquid system Ful-flo filters and glovebox HEPA filters were routinely changed-out. Maintenance activities also included drybox glove and battery replacement. Although drybox gloves were normally segregated as separate IDCs, radiography has identified drybox gloves in metal debris waste containers. Metal debris generated from these operations included tools, metal parts, cleaning implements, metal respirator cartridges, wire, scrap metal, piping valves and fittings, and spent alkaline batteries.^(6,7,8,9,14,16,18,23,24)

Separate waste treatment operations were conducted for liquid and solid process wastes. Historical solid waste treatment and repackaging operations were conducted in Buildings 371, 776, and 777. Metal debris was repackaged in the Building 776 Size

Reduction Facility and in the Building 777 Container Repack process. Light metal tools were used in the cutting and disassembly areas of the Advanced Size Reduction Facility where plutonium contaminated gloveboxes or large pieces of equipment were cut to fit into a waste container. In Building 371, incinerator ash, and heels, and other wastes and residues were historically repackaged for residue recovery or waste disposal. These operations generated repackaged and sized reduced metal debris, empty plutonium contaminated cans, broken container parts, probe screens, seals, wire, and aluminum foil.^(6,9,23,24)

Liquid waste treatment is conducted in Buildings 374 and 774. Organic liquids were treated in Building 774. Organic liquids were solidified with Envirostone in the Organic and Sludge Immobilization System (OASIS) process in Building 774. Metal debris wastes and residues were generated from the OASIS process, and maintenance and operation of these systems.⁽²²⁾

Aqueous liquid wastes from Site operations were treated in Buildings 374 and 774. The aqueous waste treatment systems in these buildings were comprised of a series of interconnected tanks to treat acidic, caustic, and otherwise radioactive liquids, and separate relatively low-level effluent from contaminated solids and sludges. Acidic waste liquids were neutralized with sodium hydroxide or potassium hydroxide. The solids and sludges from treatment operations were removed from the liquids by filtration and clarification, and the sludges solidified with Portland cement and diatomaceous earth. Additional treatment of the liquids by evaporation in Building 374 produced a salt brine that was dried and cemented (i.e., saltcrete). Some Building 774 sludge was solidified in the Microwave Process. In this process, the sludge was dried with microwaves, the dried sludge mixed with frit (boron and diatomite) or ground borosilicate glass, then melted in 8-liter steel containers. Metal debris wastes were generated from maintenance, repair, and periodic replacement of valves, pumps, pipelines, and tanks of these systems.^(6,11,12,20)

In Buildings 371, 707, and 776, metal residue materials as well as other residues (e.g., pyrochemical salts, incinerator ash, firebrick, organic contaminated residues, Building 374 bypass sludge and saltcrete) were repackaged to meet residue interim safe storage criteria (ISSC) and WAC for the WIPP. Secondary materials from repackaging include empty metal containers, lead, tools, piping, hardware and other scrap metal segregated from the primary waste materials and contaminated with ash, sludges, oxides, etc. In addition, metal debris and other waste materials such as filters, insulation, incinerator sludge, spill cleanup materials, solidified organics, leaded gloves, glass, and composite debris are repackaged in Building 440. These waste containers are visually examined as part of WIPP characterization activities, or opened to remove non-conformances or repackaged to current WIPP waste generating requirements.^(10,13,17,25)

D&D activities include the physical isolation and removal of contaminated gloveboxes, equipment, machinery, furnishings, and support systems. This includes removal and size reduction of glovebox internals, process piping and supports, tanks and ancillary

equipment (including tank T207, historically used to store liquid wastes prior to treatment in Building 774), and other fixed equipment such as ducting, wires, conduits, electrical panels, circuit boards, electrical equipment containing circuit boards, dry cell alkaline or nickel-cadmium batteries, and cabinets. This waste stream also includes excess and or inactive sealed sources or standards removed and packaged during D&D operations conducted in the plutonium buildings, including Building 991. Gloveboxes and equipment are size reduced as necessary and packaged for shipment to WIPP.^(6,7,10,15,17,19,25,28,29,30,31)

A more detailed description of each of these processes and process flow diagrams can be found in the WSRIC Building Books referenced in Section 7.15.8.

7.15.5 RCRA Characterization

This waste stream is characterized as a mixed waste. As described in Section 7.15.2, this waste is generated from similar activities, and is similar in material, physical form, and hazardous constituents, and is therefore considered a single waste stream. The waste stream as a whole is assigned EPA hazardous waste numbers D004 – D011, D022, D028, D029, F001, F002, F005, F006, F007, F009, P030, P098, P099, P106, U003, U103, and U108. For on-site storage, the individual containers of mixed waste in this waste stream are assigned a subset of these EPA hazardous waste numbers because the BWR Baseline Book Subpopulations and WSRIC Process Numbers used by the Site do not define waste streams in accordance with the WAP. The specific BWR Baseline Book Subpopulations and WSRIC Process Numbers associated with metal debris wastes in this waste stream are listed in the WEMS AK Waste Stream Summary for Profile Number RF102.01.⁽³²⁾

Visual examination of waste contents at the time of packaging and/or Real-Time Radiography (RTR) is used to verify that the waste stream does not contain free liquid, explosives, non- radionuclide pyrophoric materials, compressed gasses, or reactive waste. Although materials in this waste stream are derived from the treatment of cyanide and sulfide bearing wastes, these constituents were rendered non-reactive and the cyanide or sulfide concentrations are below regulatory limits as described in Reference 36. Therefore, this waste stream does not exhibit the characteristics of ignitability (D001), corrosivity (D002), or reactivity (D003).^(34,35)

The materials in this waste stream are toxicity characteristic for RCRA metals and organics. Arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver were determined to be in TRM metal debris based on EPA hazardous waste numbers for RCRA permitted gloveboxes. Chromium or lead is present from paint on metal debris. Selenium is present based on analytical data for Building 374 waste treatment sludge. Waste materials also include metal tools, empty containers, and equipment containing dry cell nickel-cadmium or mercury batteries, mercury thermometers, mercury switches, brass or bronze fittings (contain lead), circuit boards (containing lead and silver solder), piping with lead solder, lead tape, lead shielding in the form of

sheeting or bricks, and lead bonded to light metal waste have also been identified in this waste. Although drybox gloves are normally segregated as separate IDCs, radiography has identified some drybox gloves in metal debris waste containers. Therefore, D004, D005, D006, D007, D008, D009, D010, and D011 are assigned to metal debris in this waste stream.^(6,7,10,12,13,17,19,25,28,30)

Toxicity characteristic organic constituents identified in this waste stream include chloroform, 1,2-dichloroethane, 1,1-dichloroethylene. Chloroform was identified in waste repackaged in Building 371. This waste stream also includes containers that were originally assigned to a different waste stream by acceptable knowledge (AK), but were subsequently segregated into this waste stream after completion of headspace gas sampling/analysis. Chloroform, 1,2-dichloroethane, and/or 1,1-dichloroethylene were detected in concentrations above the PRQL in the individual container headspace of these segregated containers. Therefore D022, D028, and D029 are assigned to metal debris materials in this waste stream.^(6,10,33)

The materials in this waste stream are mixed with, or derived from the treatment of F-listed constituents. Benzene, butyl alcohol, carbon disulfide, carbon tetrachloride, chlorobenzene, 1,2-dichlorobenzene, ethyl alcohol, Freon TF (1,1,2-trichloro-1,2,2-trifluoroethane), isobutyl alcohol, methyl ethyl ketone, methylene chloride, pyridine, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, and xylene were used for laboratory solvents (e.g., sample extraction), paint stripping, sample etching, machining, cleaning, and or degreasing. This waste stream includes metal debris contaminated with these solvents, or derived from the treatment of materials contaminated with these solvents such as incinerator ash and Building 374 bypass sludge and saltcrete. This waste stream also includes containers that were originally assigned to a different waste stream by AK, but were subsequently segregated into this waste stream after completion of headspace gas sampling/analysis. F001, F002, and/or F005 listed solvents were detected in concentrations above the PRQL in the headspace of these segregated containers. Bypass sludge and saltcrete were derived from the treatment of F-listed waste from all radiological operations on Site, including cyanide-plating operations (F006, F007, and F009). Therefore, these wastes are assigned EPA hazardous waste numbers F001, F002, F005, F006, F007, and F009.^(6,7,10,12,13,15,17,25,30,31)

Although F003 listed solvents such as n-butyl alcohol, and xylene were used in production and laboratory operations, these solvents are listed solely for ignitability. Because the combustible and plastic wastes are not ignitable (i.e., are not assigned D001), EPA hazardous waste number F003 is not assigned to this waste stream.

Materials in this waste stream are mixed with, or derived from the treatment of U- and P-listed waste. This waste stream is comprised of metal debris contaminated with materials derived from the treatment of soluble cyanide salts, including potassium cyanide, potassium silver cyanide, and sodium cyanide as well as acetonitrile, dimethyl sulfate, and 1,4-dioxane. These waste chemicals were treated in Building 881 and the

treatment effluent was subsequently transferred to the radioactive aqueous waste treatment facility in Building 374, the waste generation building where the effluent was solidified into its final waste form. Metal debris were generated from maintenance of Building 374 equipment contaminated with materials derived from the treatment of these chemicals. Therefore P030, P098, P099, P106, U003, U103, and U108 are assigned to this waste stream.^(12,34)

Beryllium parts were used in the manufacture/assembly of weapons components, and residual beryllium contamination of plutonium parts may have occurred. Metal debris associated with these operations may have been contaminated with beryllium and therefore, trace quantities (less than one weight percent) of beryllium may be present in the waste stream. Any beryllium present is as a contaminant of the process and not as unused commercial chemical product, and therefore is not a P015-listed waste.

The metal debris waste streams generated at RFETS and sent to the INEEL for storage have the same IDC but are considered different waste streams because of the EPA hazardous waste numbers assigned. The INEEL waste streams (Local ID Numbers ID-RFO-320T and ID-RFO-480T) were generated and shipped to INEEL prior to the full implementation of RCRA and therefore, EPA hazardous waste numbers were assigned to each IDC as a whole.⁽⁴⁾

Headspace gas sampling and analysis of containers assigned to this waste stream by AK detected 21 VOCs. Statistics were calculated based on using one-half the method detection limit (MDL) for less-than-detectable observations with data transformation applied where appropriate. Using this "WIPP directed" method, the calculated 90 percent upper confidence limit (UCL_{90}) of the mean concentrations for none of the analytes were found to exceed their associated PRQL values. Consequently, no VOC EPA hazardous waste codes were confirmed by headspace gas sampling/analysis; however, no changes to the AK assigned EPA hazardous waste codes were made based on this data (i.e., all EPA hazardous waste codes assigned by AK are retained for the subject waste stream).⁽³³⁾

7.13.6 Transportation

The payload containers in this waste stream must also comply with the TRUPACT-II Authorized Methods for Payload Control (TRAMPAC) requirements. Flammable volatile organic compounds (VOCs) including acetone, benzene, butanol, chlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, ethyl benzene, methanol, methyl ethyl ketone, methyl isobutyl ketone, toluene, xylenes, and carbon disulfide were identified in this waste stream based on the descriptions in the *BWR Baseline Book*, *WSRIC Building Books*, and headspace gas sampling and analysis. Therefore, flammable VOCs in the payload container headspace have the potential to exceed 500 ppm. All payload containers, including those that exceed 500 ppm flammable VOCs in the headspace gas, are evaluated for compliance with applicable TRAMPAC requirements using the eTRAMPAC system prior to shipment.

7.15.7 Radionuclides

Table 7.15-2 summarizes the radionuclides potentially present in TRM metal debris wastes.⁽⁵⁾

Table 7.15-2, Metal Debris Wastes Radionuclides

IDC	Description	Radionuclides ¹	Rationale
320	Heavy Non-SS Metal (Ta, W, Pt)	WG Pu, Am-241, DU, EU, Np-237, Am-243	IDC generated in nearly every TRU building; radionuclides dependent on generation process
321	Lead	WG Pu, Am-241, DU, EU, Np-237, Am-243	IDC generated in nearly every TRU building; radionuclides dependent on generation process
480 824	Light Metal	WG Pu, Am-241, DU, EU, Np-237, Am-243, Cs-137 ²	IDC generated in every TRU building; radionuclides dependent on generation process
488	Glovebox Parts with Lead	WG Pu, Am-241, DU, EU, Np-237, Am-243	IDC generated by decommissioning operations

Key: WG Pu weapons-grade plutonium
Am-241 americium-241
DU depleted uranium
EU enriched uranium
Np-237 neptunium-237
Am-243 americium-243
Cs-137 cesium-137

Notes:

1. Am-243 was not initially predicted to be present by AK; however, it has been identified by NDA and is therefore added as a potential radionuclide in this waste stream.
2. Light metal debris may contain sealed sources with Cs-137 as part of the waste.

7.15.8 References

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2. WASTREN 2003. Interoffice Memorandum from Jeff Harrison to Eric D'Amico. Projected Waste Stream Volumes and Generation Dates for TRU and TRM Waste, JLH-011-2003. February 12, 2003.
3. RFETS 2003. Transuranic (TRU) Waste Management Manual, Revision 6, 1-MAN-008-WM-001.
4. DOE 1995. WIPP Transuranic Waste Baseline Inventory Report, Revision 2. DOE/CAO-95-1121.
5. RFETS 2003. RFETS TRU Waste Acceptable Knowledge Supplemental Information. RF/RMRS-97-018, Version 11.
6. RFETS 2003. Backlog Waste Reassessment Baseline Book, Waste Form 24, Metal.
7. RFETS 2003. Backlog Waste Reassessment Baseline Book, Waste Form 8, Lead and Glovebox Parts with Lead.
8. RFETS 2002. Backlog Waste Reassessment Baseline Book, Waste Form 25, Heavy Metals.
9. EG&G 1993. Waste Stream and Residue Identification and Characterization, Building 371, Version 3.2.
10. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 371, Version 7.0.
11. EG&G 1993. Waste Stream and Residue Identification and Characterization, Building 374, Version 3.2.
12. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 374, Version 7.0.
13. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 440STOR, Version 7.0.
14. EG&G 1993. Waste Stream and Residue Identification and Characterization, Building 559, Version 3.2.
15. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 559, Version 7.0.
16. EG&G 1992. Waste Stream and Residue Identification and Characterization, Building 707, Version 3.2.

17. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 707, Version 7.0.
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19. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 771, Version 7.0.
20. EG&G 1992. Waste Stream and Residue Identification and Characterization, Building 774, Version 3.2.
21. RFETS 1997. Waste Stream and Residue Identification and Characterization, Building 774, Version 6.0.
22. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 774, Version 7.0.
23. EG&G 1991. Waste Stream and Residue Identification and Characterization, Building 776, Version 3.2.
24. EG&G 1991. Waste Stream and Residue Identification and Characterization, Building 777, Version 3.2.
25. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 776/777, Version 7.0.
26. EG&G 1991. Waste Stream and Residue Identification and Characterization, Building 779, Version 3.2.
27. RFETS 1995. Waste Stream and Residue Identification and Characterization, Building 779, Version 5.0.
28. RFETS 2000. Waste Stream and Residue Identification and Characterization, Building 779, Version 6.0.
29. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building 991, Version 7.0.
30. RFETS 2003. Waste Stream and Residue Identification and Characterization, Decontamination/Decommissioning WSRIC Building Book, Version 7.0.
31. RFETS 2003. Waste Stream and Residue Identification and Characterization, Building T207, Version 7.0.
32. RFETS 2003. Waste and Environmental Management System (WEMS) Database.
33. Interoffice Memorandum from Thomas R. Gatcliffe to Eric L. D'Amico, Headspace Gas Analysis Data Evaluation Report For Waste Stream Profile RF102.01 (TRM Metal Debris Wastes [D004-D011, D022, D028, D029, F001, F002, F005-F007, F009, P030, P098, P099, P106, U003, U103, U108]) Lot 1, TRG-265-03, December 2003.

34. Kaiser-Hill 2001. Letter from Karen North to James Hindman, Colorado Department of Public Health and Environment. Response to Request for Additional Information on Environmental Protection Agency (EPA) Hazardous Waste "P" and "U" Codes Relative to B374 Operations, KN-111-01. August 29, 2001.
35. WASTREN 2003. Interoffice Memorandum from Scott Smith to Waste Records. Reactivity Characteristic Evaluation for Waste Derived from Aqueous Liquid Waste Treatment Operations, SMS-008-2003. November 17, 2003.
36. Department of Energy, Carlsbad Field Office letter from Dr. Ines Triay and S. D. Warren to Mr. Steve Zappe; Request for Permit Modification to the Hazardous Waste Facility Permit, Permit Number NM4890139088-TSDF, Waste Characterization Updates and Other Process Improvements; Item 5: Add New Hazardous Waste Numbers, May 13, 2003.
37. State of New Mexico Environment Department letter from Ron Curry to Dr. Ines Triay and Dr. Steven Warren; Final Determination, Class 2 Modification Requests WIPP Hazardous Waste Facility Permit EPA I.D. NM4890139088; approving Item 5 to add hazardous waste numbers, September 11, 2003.