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

ENTERED

SEP 2013

SEP 9 2013

Mr. John E. 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 Advanced Mixed Waste Treatment Project Waste Stream Profile Form Number BN510.2, *Supercompacted Debris Waste*

Dear Mr. Kieling:

The Department of Energy, Carlsbad Field Office has approved the Waste Stream Profile Form (WSPF) Number BN510.2, *Supercompacted Debris Waste* for the Advanced Mixed Waste Treatment Project.

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

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

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

Sincerely,

Jose R. Franco, Manager
Carlsbad Field Office

For Jose R. Franco

Enclosure

cc: w/enclosure

S. Holmes, NMED	*ED
T. Kliphuis, NMED	ED
C. Smith, NMED	ED
C. Walker, TechLaw	ED
WIPP Operating Record	ED
CBFO M&RC	

*ED denotes electronic distribution

CBFO:NTP:JRS:GL:13-0723:UFC 5900.00

130908

Waste Stream Profile Number: BN510.2

Generator site name: Advanced Mixed Waste Treatment Project | Technical contact: Eric Schweinsberg

Generator site EPA ID: ID4890008952 | Technical contact phone number: (208)557-6425

Date(s) of audit report approval by NMED: 4/29/2005 (Revised 5/3/2005), 6/16/06, 1/18/08, 1/9/09, 1/8/2010, 1/25/11, 5/01/12

Title, version number, and date of documents used for WAP certification:

Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Rev. 24, June 10, 2013.

Quality Assurance Project Plan, MP-TRUW-8.2, Rev. 17, June 11, 2013.

CCP Transuranic Authorized Methods For Payload Control (CCP CH-TRAMPAC), CCP-PO-003, Rev. 13, 7/31/13

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

Waste Stream Information

WIPP ID: IN-BN510.2[3] | Summary Category Group: S5000

Waste Matrix Code Group: Heterogeneous Debris Waste | Waste Stream Name: Supercompacted Debris Waste

Description from the ATWIR: The waste stream BN510.2 is a newly generated debris waste stream generated from supercompacted 55-gallon containers of debris waste.[3]

Defense TRU Waste: ☒ Yes ☐ No | Check One: ☒ CH ☐ RH

Number of SWBs: 105 | Number of Drums: 16,000 100 gallon drums | Number of Canisters: 0

Batch Data report numbers supporting this waste stream characterization: See Characterization Summary Report

List applicable EPA Hazardous Waste Numbers:[2] D004, D005, D006, D007, D008, D009, D010, D011, D022, D027, D028, D029, D030, D032, D034, D037, D043, F001, F002, F004, F005, F006, F007 and F009

Applicable TRUCON Content Codes: ID121

Acceptable Knowledge Information[1]

(For the following, enter the supporting documentation used [i.e., references and dates])

Required Program Information

Map of site: Reference Nos. 2 and 3

Facility mission description: Reference No.11

Description of operations that generate waste: References Nos.1 and 3

Waste identification/categorization schemes: Reference Nos.1, 3, 4, 5 and 6

Types and quantities of waste generated: Reference No. 1

Correlation of waste streams generated from the same building and process, as appropriate: Reference Nos. 1 and 3

Waste certification procedures: Reference Nos.7 and 21

Required Waste Stream Information

Area(s) and building(s) from which the waste stream was generated: Reference Nos. 1and 3

Waste stream volume and time period of generation: Reference No. 1

Waste generating process description for each building: Reference Nos.1 and 3

Documentation regarding how site has historically managed the waste: Reference No. 1 and 3

Process flow diagrams: Reference No. 1 and 3

Material inputs or other information identifying chemical/radionuclide content and physical waste form: Ref. Nos. 1, 3, 4, 5 and 6

Waste Material Parameter Weight Estimates per unit of waste: Reference No. 1

Which Defense Activity generated the waste: (check one)

- ☒ Weapons activities including defense inertial confinement fusion [4]
- ☐ Naval Reactors development
- ☐ Verification and control technology
- ☐ Defense research and development
- ☐ Defense nuclear waste and material by products management
- ☐ Defense nuclear material production
- ☐ Defense nuclear waste and materials security and safeguards and security investigations

Additional Acceptable Knowledge Documentation

Process design documents:	N/A
Standard operating procedures:	Reference Nos. 1, 3, and 13
Safety Analysis Reports:	Reference No. 14
Waste packaging records:	N/A
Test plans/research project reports:	N/A
Site databases:	Reference No 15
Information from site personnel:	N/A
Standard industry documents:	N/A
Analytical data relevant to the waste stream:	N/A
Material safety data sheets:	Reference Nos. 1, 16, 17, 18, 19, 20, 23 and 24
Sampling and analysis data from comparable/surrogate waste streams:	N/A
Laboratory notebooks:	N/A

Characterization Information[2]

For the following, when applicable, enter procedure title(s), number(s) and date(s)

Radiography:	Reference No. 8
Visual Examination:	Reference Nos. 9 and 10

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 Manager	Printed Name	Date
Eric Schweinsberg	Eric Schweinsberg	Aug. 26th, 2013

NOTE: (1) Use back of sheet or continuation sheets, if required.

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

(3) This waste stream is currently not identified in the ATWIR. The ATWIR will be updated to include: The ATWIR will be updated at the time of the next data call to include the following: BN510.2 waste stream is a newly generated debris waste stream generated from supercompacted 55-gallon containers of debris waste.

(4) The debris waste identified as feedstock to the AMWTP Supercompactor originated from various defense-related sources that include: weapons activities including defense inertial confinement fusion processes or activities, defense nuclear waste and material by-products management, defense nuclear waste and materials security and safeguards and security investigations, Naval reactors development, defense research and development and defense nuclear material production. Currently the largest contributing debris feedstock is associated with debris wastes generated from defense-related weapons activities associated with one or more of the seven U.S. Department of Energy (DOE) sites.

Reference List:

1. RPT-TRUW-83, Acceptable Knowledge Summary for Supercompacted Debris Waste, Rev. 5, March 5, 2013

2. DWG-5232-52-0101, Site Plan of the Advanced Mixed Waste Treatment Facility, Rev. 0, April 1999.

3. RPT -TRUW-06, Acceptable Knowledge Baseline Document for AMWTP Waste, Rev. 14, July 05, 2012.

4. RPT-TRUW-12, AMWTP Waste Stream Designations, Rev. 20, May 22, 2013.

5. RPT-TRUW-05, Waste Matrix Code Reference Manual, Rev. 32, July 18, 2013.

6. RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge, Rev. 18, March 19, 2013.

7. MP-TRUW-8.5, TRU Waste Certification, Rev. 29, June 11, 2013.

8. INST -OI-12, Real Time Radiography Operations (Drum), Rev. 52, April 12, 2013.

9. INST.OI-34, Non-Facility Visual Examination Operations, Rev. 27, April 15, 2013.

10. INST-FOI-17, Facility Visual Examination Operations, Rev. 26, April 25, 2013.

11. Project Execution Plan, Rev 6, October 03, 2012.

12. MP-TRUW-8.2, Quality Assurance Project Plan, Rev. 17, June 11, 2013.

13. INST-FOI-20, Supercompactor and Post-Compaction Operations, Rev. 39, May 05, 2013.

14. RPT-DSA-02, Documented Safety Analysis, Rev. 9, August 23, 2012.

15. BBWI-Generated Drum Data, including Data from the Transuranic Waste Management Information System (TWMIS).

16. RPT-TRUW-30, Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510), Rev. 7, July 02, 2012.

17. RPT -TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste-Rocky Flats Plant, Rev. 5, May 09, 2012.

18. RPT-TRUW-04, Acceptable Knowledge Document for the Battelle Columbus Laboratories, Building JN-4 Plutonium Laboratory, Rev. 6, June 25, 2012.

19. RPT-TRUW-13, Acceptable Knowledge Document for INL Stored Transuranic Waste-Mound Plant Waste, Rev. 7, July 05, 2012.

20. RPT-TRUW-82, Acceptable Knowledge Document for Hanford Debris Waste Shipped to AMWTP, Rev 3, October 19, 2011.

21. MP-TRUW-8.1, Certification Plan for INL Transuranic Waste, Rev. 24, June 10, 2013.

22. MP-TRUW-8.2, Quality Assurance Project Plan., Rev 17, 6/11/2013.

23. RPT-TRUW-89, Acceptable Knowledge Baseline for Argonne National Laboratory-East Waste, Rev 1, March 10, 2013.

24. RPT-TRUW-79, Acceptable Knowledge Document for Materials and Fuels Complex Waste, Rev 2, March 05, 2013.

I certify by signature below that data of sufficient type, quality, and quantity are collected to meet WAP DQOs.

WSPF No.: BN510.2

Data Quality Objective	Yes	No	N/A	Comment
1. Have all containers in the lot been assigned the correct Waste Matrix Code?	☒	☐	☐	
2. Have waste material parameter weights been established for each container in the lot?	☒	☐	☐	
3. Does each waste container of waste contain transuranic (TRU) radioactive waste?	☒	☐	☐	
4. Does the waste stream exhibit a toxicity characteristic (TC) under 40 CFR Part 261, Subpart C?	☒	☐	☐	
5. Does the waste stream contain listed waste found in 20.4.1.200 NMAC incorporating 40 CFR, Part 261, Subpart D?	☒	☐	☐	
6. Can the waste stream be classified as hazardous or nonhazardous?	☒	☐	☐	The waste stream is classified as a "mixed waste".
7. Have the overall completeness, comparability, and representativeness quality assurance objectives (QAOs) been met for each of the testing procedures as specified in MP-TRUW-8.2, Sections C3-2 and C3-3, for the lot?	☒	☐	☐	
8. Was an Open nonconformance report (NCR) search performed for all containers/pucks/source containers on the final list for the waste stream profile/reconciliation lot?	☒	☐	☐	

WSPF No.: BN510.2

Data Quality Objective	Yes	No	N/A	Comment
9. Was an Open NCR search performed for all batches in the final list for the waste stream profile/reconciliation lot?	☒	☐	☐	
10. Were all batches identified in the waste stream profile form (WSPF) or reconciliation lot complete through site project manager (SPM) signature release? List any batches identified as not complete through validation.	☒	☐	☐	
11. Were any open NCRs found that are applicable to the waste stream profile/reconciliation lot? List NCR, container, and batch.	☐	☒	☐	
12. Is there an approved AK Sufficiency Determination for this waste stream?	☐	☒	☐	The AMWTP has not sought an AK Sufficiency determination for this waste stream.

Site Project Manager: Steve Carpenter (Printed name) (Signature) 8.26.13 (Date)

2nd Site Project Manager: Eric Schweinsberg (Printed name) (Signature) 8/26/13 (Date)

WSPF Number: BN510.2 **Lot Number:** 1

Characterization Information Summary

Introduction

Advanced Mixed Waste Treatment Project (AMWTP) has compiled Acceptable Knowledge (AK) information for waste stream BN510.2 Supercompacted Debris Waste as required by MP-TRUW-8.1, Certification Plan for INL Transuranic waste and MP-TRUW-8.2, Quality Assurance Project Plan (QAPjP). In addition, AMWTP has conducted characterization using Acceptable Knowledge (AK), Real Time Radiography (RTR)/Visual Examination (VE) and Non-Destructive Radioassay (NDA/RA).

Justification for Selection of RTR and/or VE as an appropriate method for characterizing the waste

The boxline waste is characterized using VE and the direct feed waste is characterized by RTR or VE. VE is the appropriate method for characterizing boxline waste because it can be accomplished and recorded per the QAPjP (MP-TRUW-8.2) during sorting, size reduction, and repackaging into 55 gallon drums. Radiography is the appropriate method for the direct feed line because it can be readily accomplished per the QAPjP (MP-TRUW-8.2) on direct feed drums. Where dense or otherwise impenetrable objects and/or lead shielding that may create a condition or configuration where examination using radiography will not yield acceptable DQOs, only visual examination is appropriate. The selected containers in the initial lot have undergone the appropriate RTR/VE and NDA characterization techniques in addition to characterization by AK. The physical form was confirmed to match the AK physical form description for the applicable IDC prior to compaction and all containers have been assigned to the correct waste matrix code.

Table 1 presents the correlation of Container Identification Numbers to Data Packages. Table 2 presents the RTR/VE summary of prohibited items for each container in the lot.

The Site Project Manager (SPM) signature certifies that through AK, testing and/or analysis that the waste included in this waste stream is not corrosive, ignitable, reactive, or incompatible with the WIPP Treatment, Storage, and Disposal Facility (TSDF) and does not contain prohibited items (See RPT-TRUW-83 for more information).

HWNs are assigned based on AK. The HWN assignment for this waste stream includes:

- Toxicity characteristic metals – D004 (arsenic), D005 (barium), D006 (cadmium), D007 (chromium), D008 (lead), D009 (mercury), D010, (selenium), and D011 (silver).
- Toxicity characteristic organics – D022 (chloroform), D027 (1,4- dichlorobenzene), D028 (1,2-dichloroethane), D029 (1,1-dichloroethylene), D030 (2,4-dinitrotoluene), D032, (hexachlorobenzene), D034 (hexachloroethane), D037 (pentachlorophenol), and D043 (vinyl chloride).

- F-Listed HWNs for spent solvents used for cleaning and degreasing, and in laboratory operations include: F001 (1,1,1- trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2-difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane); F002 (1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2-trichloroethane, 1,2-dichlorobenzene, chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane); F004 (cresols and nitrobenzene); and F005 (2-ethoxyethanol, 2-nitropropane, benzene, carbon disulfide, isobutanol, methyl ethyl ketone, pyridine, and toluene).
- F-Listed HWNs from electroplating operations – F006, F007 and F009 waste generated as a result of contact with electroplating waste.

SPM

Printed Name: Steve Carpenter Signature: [signature] Date: 8.26.13

2nd SPM

Printed Name: Eric Schweinsberg Signature: [signature] Date: 8/26/13

SPM signature indicates that the information presented in this package is consistent with batch data reports and indicates concurrence with all information presented in this report.

WSPF Number: BN510.2 **Lot Number:** 1

Characterization Information Summary

Characterization Description:

Containers listed below were characterized by RTR (INST-OI-12, Real Time Radiography Examinations) and NDA (INST-OI-14, Drum Assay Operations).

Table 1. Correlation of Container Identification Numbers to Data Package.

Container No.	RTR Data Package	RA Data Package	VE Data Package
10011856	RTR13-00065	ASY13-01211	N/A
10011863	RTR13-00063	ASY13-01211	N/A
10011884	RTR13-00065	ASY13-01210	N/A
10012006	RTR13-00063	ASY13-01210	N/A
10021426	RTR13-00072	ASY13-01361	N/A
10021429	RTR13-00099	ASY13-01656	N/A
10021455	RTR13-00098	ASY13-01656	N/A
10021551	RTR13-00098	ASY13-01656	N/A
10021558	RTR13-00098	ASY13-01656	N/A
10027342	RTR13-00099	ASY13-01656	N/A
10027366	RTR13-00101	ASY13-01586	N/A
10027370	RTR13-00063	ASY13-01208	N/A
10027373	RTR13-00101	ASY13-01586	N/A
10034396	RTR13-00101	ASY13-01586	N/A
10034569	RTR13-00094	ASY13-01664	N/A
10034572	RTR13-00093	ASY13-01664	N/A
10034643	RTR13-00093	ASY13-01664	N/A
10359096	RTR13-00053	ASY13-00939	N/A
10359098	RTR13-00136	ASY13-01905	N/A
10359105	RTR13-00136	ASY13-01915	N/A
10359107	RTR13-00053	ASY13-00934	N/A
10359108	RTR13-00053	ASY13-00934	N/A
10359138	RTR13-00053	ASY13-00940	N/A
10359142	RTR13-00053	ASY13-00935	N/A

WSPF Number: BN510.2 **Lot Number:** 1

Table 2. RTR/VE Summary of Prohibited Items.

Container No.	RTR Prohibited Items	VE Prohibited Items
10011856	None	N/A
10011863	None	N/A
10011884	None	N/A
10012006	None	N/A
10021426	None	N/A
10021429	None	N/A
10021455	None	N/A
10021551	None	N/A
10021558	None	N/A
10027342	None	N/A
10027366	None	N/A
10027370	None	N/A
10027373	None	N/A
10034396	None	N/A
10034569	None	N/A
10034572	None	N/A
10034643	None	N/A
10359096	None	N/A
10359098	None	N/A
10359105	None	N/A
10359107	None	N/A
10359108	None	N/A
10359138	None	N/A
10359142	None	N/A

Acceptable Knowledge Summary for Supercompacted Debris Waste

Advanced Mixed Waste Treatment Project

Approval:

(Signature on file. See DCR-12229.)

Pending CBFO Approval
Date

REVISION LOG

Revision Number	Date Approved	Pages Affected	Description of Revision
0	09/10/2010	All	DCR-9081. Initial issue.
1	01/12/11	Various	DCR-9747. References modified to accommodate reference changes within AK baseline document for Hanford waste. Revised to incorporate WIPP WAP permit renewal changes. Editorial corrections
2	01/31/12	Various	DCR-10508. Added changes approved by CBFO in Change Notice 1 to BN510.1 waste stream profile. Incorporated BLUESHEET-077.
3	09/17/12	5, A1, A2	DCR-11583. Added changes approved by CBFO in Change Notice 2 to BN510.1 waste stream profile.
4	02/07/13	Various	DCR-12077. Added changes approved by CBFO in Change Notice 3 to BN510.1 waste stream profile. Periodic review.
5	03/18/13	Various	DCR-12123. Changes made to address NWP and CBFO DRR comments.
6	TBD	All	DCR-12229. Entire document revised. Changed to update the document to reflect addition of MFC waste, to incorporate both BN510.1 and BN510.2 into same document, and to incorporate new WIPP permit requirements.

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FIGURES

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ACRONYMS

AE	Argonne National Laboratory-East (prefix)
AFCI	Advanced Fuel Cycle Initiative
AK	acceptable knowledge
AL/CL	Analytical Laboratory/Casting Laboratory
AMWTF	Advanced Mixed Waste Treatment Facility
AMWTP	Advanced Mixed Waste Treatment Project
ATWIR	Annual Transuranic Waste Inventory Report
AW	Materials and Fuels Complex (prefix)
BC	Battelle Columbus (prefix)
BN	AMWTP (prefix)
CCP	Central Characterization Project
CH	contact-handled
CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
CWS	Chemical Warfare Service
D&D	decommissioning and dismantling
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DU	depleted uranium
DWPG	drummed waste packaging glovebox
EBR-II	Experimental Breeder Reactor II
EDMS	electronic document management system
EMOP	eight-drum metal overpack pallet
EPA	U.S. Environmental Protection Agency
EU	enriched uranium
FMF	Fuel Manufacturing Facility
HEPA	high efficiency particulate air
HENC	High-Efficiency Passive Neutron Counter
HLW	high-level waste
HRA	Hot Repair Area
HSG	headspace gas
HWMA	Hazardous Waste Management Act
HWN	hazardous waste number
IDC	Item Description Code
INL	Idaho National Laboratory
LLD	lower limit of detection
LLNL	Lawrence Livermore National Laboratory
LSA	low specific activity

MD	Mound Plant (prefix)
MEK	methyl ethyl ketone
MFC	Materials and Fuels Complex
MPFPD	Mixed Plutonium Finishing Plant Debris
NBL	New Brunswick Laboratory
NDA	non-destructive assay
NRF	Naval Reactors Facility
NWPA	Nuclear Waste Policy Act
PCB	polychlorinated biphenyl
PFP	plutonium finishing plant
PK	process knowledge
PMC	plutonium-molybdenum cermet
POS	Plant Optimization System
PPE	personal protective equipment
PPO	pressed plutonium oxide
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RF	Rocky Flats Plant (prefix)
RH	remote-handled
RL	Richland, Washington Hanford Site (prefix)
RLMPFPCD	Richland Mixed Plutonium Finishing Plant Comprehensive Debris
RTG	radioisotopic thermoelectric generators
RTR	real-time radiography
SCW	special-case waste
SDOP	six-drum overpack box
SMOP	six-drum metal overpack pallet
SNF	spent nuclear fuel
SWB	standard waste box
TRU	transuranic
TRUCON	TRU waste content codes
TSCA	Toxic Substance Control Act
VE	visual examination
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WCA	Waste Characterization Area
WETP	WIPP experimental test program
WG Pu	weapons-grade plutonium
WIPP	Waste Isolation Pilot Plant
WMC	Waste Matrix Code
WMP	waste material parameter
WSPF	Waste Stream Profile Form

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BN510.2

BN510 waste is no longer generated.[a] BN510.1 waste will no longer be generated once BN510.2 waste is generated. BN510.1 will cease generation after introduction of MFC waste and will be inactivated. Any remaining inventory of BN510.1 will be shipped as BN510.2 wastes since the RL waste is not included in any remaining inventory and the other BN510.1 waste is a subset of the BN510.2.[b]

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

Supercompacted Debris Waste

1.2.2 Point of Generation

Advanced Mixed Waste Treatment Facility (AMWTF), Building WMF-676

1.2.3 Waste Stream Volume (Newly Generated)

Projected Volumes:

16,000 100-gallon drums (3,330 m^3)(2)

105 Standard Waste Boxes (SWBs) (198 m^3)(2)

Fifty percent of the debris waste feedstock is estimated to contain greater than 100 nanocuries per gram (nCi/g) transuranic (TRU) alpha activity and 50% contains less than 100 nCi/g TRU alpha activity.(14)

1.2.4 Generation Dates and Rate of Generation

August 2013 – December 2018

The average generation rate is estimated to be 120 m^3 per month.(28)

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[a] See RPT-TRUW-30 for AK summary relating to BN510 WSPF.

[b] See Appendix B for information on BN510.1 Waste Stream.

1.2.5 TRUCON Codes

ID121[3]

1.2.6 Waste Isolation Pilot Plant Waste Stream ID

Waste Stream ID: IN-BN510.2

1.2.7 Summary Category Group

S5000 – Debris Waste[4]

1.2.8 Waste Matrix Code Group

Heterogeneous Debris Waste

1.2.9 Waste Matrix Code

The BN510.2 waste stream is assigned the Waste Matrix Code (WMC) S5490 – Unknown/Other Heterogeneous Debris Category

The unknown/other-heterogeneous WMC includes waste that is consistent with the definition for the Heterogeneous Debris (S5400), but does not meet the criteria for assignment into the S5410, S5420, S5440, S5450, or S5460 specific-detailed categories.[4] The waste stream consists of supercompacted debris waste.

1.2.10 Description from the Annual Transuranic Waste Inventory Report

The Annual Transuranic Waste Inventory Report (ATWIR) will be updated at the time of the next data call to include the following: BN510.2 waste stream is a newly generated debris waste stream generated from supercompacted 55-gallon containers of debris waste.[28]

1.2.11 Defense and WIPP Land Withdrawal Act Determination for AMWTP Waste

The BN510.2 supercompacted debris waste stream generated at the Advanced Mixed Waste Treatment Project (AMWTP) is a result of compaction of waste generated at the Rocky Flats (RF), Mound (MD), Battelle Columbus (BC), Argonne National Laboratory-East (AE), Materials and Fuels Complex (AW), and AMWTP (BN).[c] The debris waste identified as feedstock to the AMWTP Supercompactor originated from various defense-related sources that include: weapons activities including defense inertial confinement fusion processes or activities, defense nuclear waste and material byproducts management, defense nuclear waste and materials security and safeguards and security investigations, naval reactors development, defense research and development, and defense nuclear material production.

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[c] Hanford debris waste (previously identified with the generator prefix "RL") is no longer processed within the supercompactor.

1.2.11.1 Defense Evaluation

The DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (WIPP-WAC), requires generator sites to use acceptable knowledge (AK) to determine if the TRU waste streams to be disposed at WIPP meet the definition of TRU "defense" waste. Based on guidance from the DOE, a TRU waste is eligible for disposal at WIPP if it has been generated in whole or by part one or more of the activities listed in Section 42 U.S.C. 10101(3) of the Nuclear Waste Policy Act (NWPA) of 1982. The term "atomic energy defense activity" means any activity of the Secretary (of the U.S. Department of Energy [DOE]) performed in whole or in part in carrying out any of the following functions: [12, 24, 25, 47]

- Naval reactors development
- Weapons activities, including defense inertial confinement fusion
- Verification and control technology
- Defense nuclear materials production
- Defense nuclear waste and materials byproducts management
- Defense nuclear materials security and safeguards and security investigations
- Defense research and development.

The supercompacted debris waste stream BN510.2 is generated within the AMWTP WMF-676 supercompactor as a result of compacting heterogeneous debris waste that originated at: RF, MD, BC, AE, AW, and BN.

The BN510.2 supercompacted debris waste is comprised of heterogeneous debris wastes that were the result of one or more previously noted defense related activities at the following DOE sites:

- Rocky Flats
  - The TRU debris wastes generated at RF and shipped to the Idaho National Laboratory (INL) were generated through defense program activities, or commingled with non-defense program waste that cannot be segregated. Furthermore, there is no historical record or evidence of spent nuclear fuel (SNF) or high-level waste (HLW) ever having been handled at the RF facility.[7, 19]

- Mound
  - The majority of the MD debris waste was generated during defense-related operations conducted at the MD for a variety of customers, including Lawrence Livermore National Laboratory, Hanford, Oak Ridge National Laboratory, and the Space Program. Plutonium-238 heat sources were designed and developed for spacecraft, generators, and satellites used directly by the U.S. Department of Defense (DOD) or in support of DOD missions. One of the major space programs supported by MD was the Space Nuclear Auxiliary Power System, which was sponsored by the DOD. Operations at the facility included processing and recovering plutonium, developing reactor fuels, conducting reactor fuel waste studies, and recovery of tritium and other isotopes for both DOD and domestic or private entities. The radioisotopic content (e.g., plutonium and other TRU isotopes of interest) of the MD debris waste is the result of commingling of wastes from both defense-related and domestic activities. Furthermore, there is no historical record or evidence of SNF or HLW ever having been shipped to the INL from the MD facility. [8, 20]

- Battelle Columbus
  - Debris waste feedstock shipped from BC to the INL was generated during decommissioning and dismantling (D&D) of the JN-3 (Research Reactor Building) and other facilities. Defense-related operations were conducted at BC in support of Army, Navy, and Air Force programs. These operations included weapons-related activities and defense research into plutonium materials properties and development, plutonium metallurgy, actinide joining, and weapons production and assembly. Processing of test shot samples, development of ^{238}Pu heat sources for spacecraft for DOD, and some specialized work for Los Alamos were conducted in the JN-4 Plutonium Laboratory. In addition, there is no historical record or evidence of SNF or HLW ever having being shipped to the INL from the BC facility. [9, 21, 22, 23]

- Argonne National Laboratories–East
  - AE is a multidisciplinary research laboratory that performs work in basic and applied science in the areas of engineering, energy technology, chemistry, physics, materials, biomedicine, and environmental studies. AE has been instrumental in the development of nuclear reactors and associated systems, materials, fuel elements, and components for use in both civilian and defense programs. This work included key participation in the development of essentially all the domestic nuclear reactor systems in use today for isotope production, power generation, and naval submarine propulsion, as well as experimental or proposed applications for weapons destruction, defense waste management, defense security and safeguards, and space propulsion. The New Brunswick Laboratory (NBL), located on the AE campus, serves as the technical extension of the U.S. DOE Office of Safeguards and Security in the areas of nuclear material control and accountability, safeguards, and nonproliferation.[53, 62]

- Commingling of waste occurred at AE because waste was often generated in small volumes (i.e., less than 55 gallons) and numerous waste items were placed together in the same container either at the generator level and/or during repackaging. AE waste generators routinely commingled waste with no segregation of defense from non-defense waste. In addition, waste materials generated during the ongoing destructive examination of materials from different programs and contamination from fuel cutting/grinding/polishing activities also occurred within the hot cell examination area. [53, 62]

- AE contact-handled (CH) wastes do not contain intact irradiated fuel pin test specimens and do not contain test residues, test materials, and the resultant test fragments from the fuel pin test specimens (including irradiated pin fragments and dispersed particulates [fines and dust]).[53] These wastes were managed as remote-handled (RH) waste. While AE performs research and experiments on fuel-bearing specimens, it does not possess or manage spent fuel elements. The research laboratory operations were not production operations involving the separation or reprocessing of constituent elements from reactor fuel and the CH waste does not include the high level fission products. These types of wastes were managed separately as RH waste. The CH debris waste is not SNF or HLW. [53, 62]

- Materials and Fuels Complex

  - The atomic energy defense activities that apply to the TRU wastes generated by the Materials and Fuels Complex (MFC) are naval reactors development, defense nuclear materials productions, and defense research and development (R&D). Defense-related research activities include continuing development of advanced reactor concepts, fuel cycle process development, as well as development of homeland security research, decontamination and decommissioning technologies, and reactor and fuel cycle safety. MFC has engaged in the same or similar waste-generating activities throughout its operation. Specific examples of defense related activities include the following:[59, 63]

    - Analysis of plutonium for gallium content

    - Laboratory services for Knolls Atomic Power Laboratory and Argonne National Laboratory–East (ANL–E)

    - Analytical support for the Naval Reactors Facility (NRF) was conducted from June 2000 to October 2004

    - Lawrence Livermore National Laboratory (LLNL) plutonium oxide disk fabrication

- Experimental Breeder Reactor (EBR)-II fuel and experiments analysis.

Based on the AK review of the MFC process knowledge (PK) documentation and communication with MFC personnel relating to waste-generating processes, the CH-TRU wastes generated at the MFC in the Analytical Laboratory/Casting Laboratory (AL/CL), Fuel Manufacturing Facility (FMF), and Hot Repair Area/Waste Characterization Area (HRA/WCA) were classified as defense-related wastes. All of the sampled waste that was repackaged in the HRA/WCA was generated from defense sites, principally Rocky Flats, and, because of the use of shared facilities throughout MFC, may have been inherently commingled with non-defense waste in the HRA/WCA. CH-TRU waste generated at MFC in the FMF (B704), AL/CL (B752), and HRA/WCA (B785) and shipped to the AMWTP is generated from a variety of defense and non-defense related activities associated with processing of radioisotopes in development of nuclear fuel, spent fuel disposition technology, liquid metal technology, nuclear waste stabilization, and new storage technologies for spent fuel and highly radioactive materials. In addition, TRU debris waste is generated within gloveboxes from laboratory support for waste and nuclear material characterization via sample preparation and analyses. Debris waste generated within these gloveboxes is inherently commingled at the point of generation. Only defense related waste and commingled defense/non-defense CH-TRU waste are accepted at the AMWTP for subsequent disposal at WIPP. Defense and non-defense wastes are not intentionally mixed within TRU debris waste shipped to AMWTP. Non-defense related waste that is not inherently commingled with defense-related waste at the point of generation is not shipped to AMWTP. [59, 63]

Processing of intact spent fuel is not conducted in the AL/CL, FMF, or HRA/WCA. While MFC analytical operations may have provided support for analysis of irradiated sample fuel material and/or may have contained fuel waste materials that could be classified as waste incidental to reprocessing, the analytical waste received from MFC does not meet the classification of waste that are incidental to reprocessing. In addition, the MFC analytical waste does not consist of intact fuel elements. Historically, all HLW generated at MFC has been segregated, packaged in appropriately shielded containers, and stored in an onsite HLW storage facility. The Argonne National Laboratory–West (ANL-W)/MFC waste received at the AMWTP is not SNF or HLW and is classified as defense-related waste. [59, 63]

- Advanced Mixed Waste Treatment Facility
  - The waste generated at the AMWTF (WMF-676) is the result of contact with defense-related TRU debris waste during treatment, characterization, maintenance, repackaging, and management.[6]

In accordance with interim guidance, defense wastes include those wastes generated during work involving only defense activities, or during work in which defense and non-defense wastes

were inadvertently mixed in the past and from which the non-defense portion cannot be segregated. The wastes within the BN510.2 waste stream meet the definition of a defense wastes. [24, 25]

1.2.11.2 Land Withdrawal Act Evaluation

Public Law 102-579, WIPP Land Withdrawal Act, prohibits the disposal of SNF and HLW as defined by the NWPA at WIPP. According to the NWPA, SNF is defined as "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing." [47, 64]

In addition, the DOE Radioactive Waste Management Manual expands on this definition to clarify that test specimens of fissionable material irradiated for research and development only, and not production of power or plutonium, may be classified as waste, and managed in accordance with the requirements of this Order (i.e., DOE O 435.1, Radioactive Waste Management) when it is technically infeasible, cost prohibitive, or would increase worker exposure to separate the remaining test specimens from other contaminated material.[42]

High-level waste is defined by the NWPA as "the highly radioactive material resulting from the reprocessing of SNF, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation." [47]

Based on the AMWTP's AK documentation for the supercompactor feedstock wastes, the BN510.2 waste stream is defense-related wastes and does not meet the definition of HLW or SNF. [6, 7, 8, 9, 62, 63]

1.3 Waste Stream Description

1.3.1 BN510.2 Supercompacted Debris Waste

The BN510.2 newly generated debris waste stream is generated from supercompaction of 55-gallon containers of debris waste. The Waste Stream Profile Form (WSPF) BN510.2 was developed due to the addition of MFC feedstock debris waste and the addition of the D032 (hexachlorobenzene) hazardous waste number that was not assigned to the BN510.1 waste stream.[59] Generation of the BN510.1 waste stream will be discontinued upon approval of the BN510.2 waste stream. The supercompacted debris waste (i.e., BN510.2) has a common physical form that contains similar hazardous constituents and is generated from a single process or activity (Table 1).

A list of approved TRU feedstock debris waste (by generator and item description code [IDC]) is presented in Appendix A, Supercompactor Debris Waste Feedstock. [31]

Table 1. Physical waste form description for BN510.2.

ATWIR Number	IDC	Waste Matrix Code (WMC)	Description
IN-BN510.2	BN-550	S5490	Debris waste from multiple debris waste feedstock sources that have been supercompacted into pucks and packaged into 100-gallon drums.[a]

a. A list of debris waste feedstock IDCs is presented in Appendix A of this report.

The BN510.2 waste stream consists of various combustible and noncombustible debris materials that originated from RF, MD, BC, AE, AW, as well as, AMWTP self-generated non-polychlorinated biphenyl (PCB) debris waste within WMF-676. [6, 7, 8, 9, 53, 54, 59, 67]

The BN510.2 supercompacted debris waste includes: paper and rags; gloves; wipes; asbestos; personal protective equipment (PPE); plastic and rubber items; filters; leaded gloves, aprons, bricks, and sheeting; metal with and without lead or cadmium; floor tiles, piping, sheet rock, insulation, and glass; raschig rings; crucibles; fire brick; wood; Plexiglas®; Benelex®; pieces of equipment and tools; graphite; grit; and asphalt and concrete packaged in 55-gallon drums, supercompacted, and packaged into 100-gallon product drums. Supercompacted debris may contain small amounts of non-debris waste such as absorbed liquids, soil, dirt, sand, absorbent, or homogeneous solids. Non-debris waste will be less than 50% by volume in each 100-gallon drum of compacted debris. [6, 7, 8, 9, 53, 59]

1.4 Process Description

See waste generation process description in Section 1.4.3.

1.4.1 Areas of Operation

The BN510.2 waste stream is generated by supercompaction of debris waste feedstock at the AMWTF in Building WMF-676. [10, 30, 55, 56, 69, 71]

1.4.2 Process Flow Diagram

Figure 1 presents a flow diagram illustrating the generation and processing of AMWTP supercompacted debris waste.

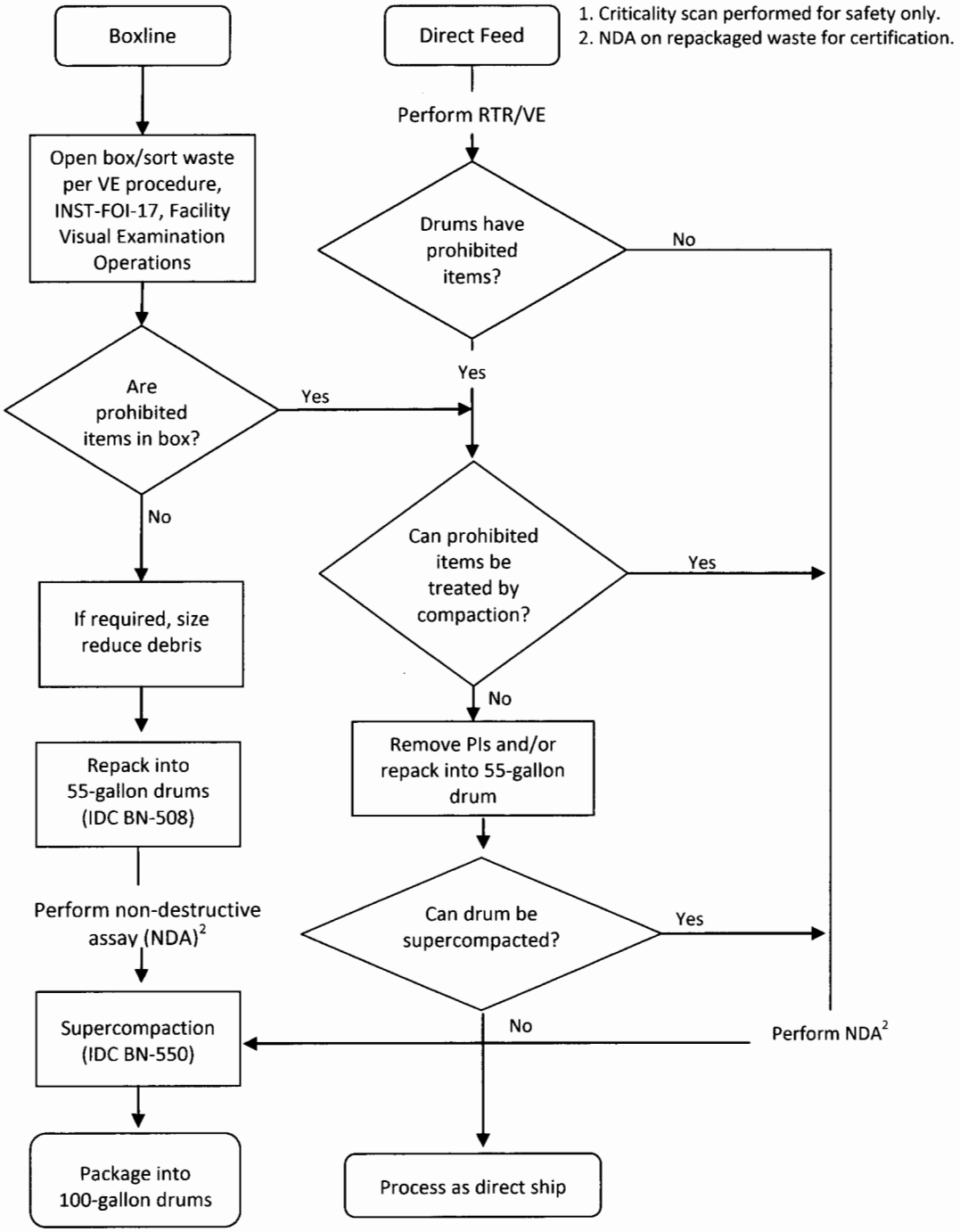

Figure 1. Flow diagram illustrating the generation and processing of AMWTP supercompacted debris waste.

1.4.3 Waste Generating Process

1.4.3.1 BN510.2 Supercompaction Process

The AMWTP waste generation process is supercompaction of individual 55-gallon drums of debris waste feedstock into pucks (the final waste form). Debris waste feedstock contained in 55-gallon drums is characterized and validated through radioassay and real-time radiography (RTR)/visual examination (VE) to verify contents and then sent directly to the Supercompactor for processing. [11, 32, 33, 34, 35]

Debris waste feedstock drums (e.g., 55- or 85-gallon drums) that require repackaging are introduced into the drummed waste packaging glovebox (DWPG). Boxes of waste, including overpack boxes, are introduced into a boxline for sorting and repackaging into 55-gallon drums. The overpack boxes with uncharacterized drums undergo RTR to confirm the waste is >50% debris in each drum. [11, 32, 58] The drum contents are then visually examined in the boxline trough to confirm the waste is approved feed stock.[10] The legacy retrieved boxed wastes undergo RTR to confirm the waste form is approved feed stock. Certified VE is performed on the waste processed in the boxline as IDC BN-508. Prohibited items are treated in the boxline or sent to the special-case waste (SCW) glovebox. After treating, sorting, and/or removal of prohibited item(s), the waste is repackaged into 55-gallon drums as IDC BN-508. [10, 11, 47] No campaigning of feedstock type or generator site debris waste feedstock occurs during the supercompaction process. There is no cleanout of the boxline(s) except for periodic housekeeping or potential PCB cleanups. [10, 54, 55, 56] Repackaged waste drums and direct feed drums (not requiring repack) are fed into the Supercompactor.

The Supercompactor is a glovebox with a 2,000-ton capacity compactor. The supercompactor size-reduces 55-gallon waste drums to roughly one-fifth their normal size. The supercompacted drums (pucks) are then packaged into 100-gallon containers (puck drums).

The debris waste feedstock is introduced into the Supercompactor as any of the following:

- Direct feed (in original 55-gallon drums from the generator site)
- From the DWPG where drummed waste is sorted and repackaged into new 55-gallon drums
- From the waste treatment boxline(s) where boxed waste is sorted, size-reduced, and repackaged into 55-gallon drums.

The boxed waste includes multi-drum overpacks (six-drum overpack boxes [SDOPs], eight-drum metal overpack pallets [EMOPs], and six-drum metal overpack pallets [SMOPs]) containing up to eight 55- or six 85-gallon drums). An SDOP is a six-drum overpack wood box, an EMOP is an eight 55-gallon drum metal pallet, and an SMOP is a six 85-gallon drum metal pallet. The multi-drum overpacks are of two types: [11, 32, 57, 58]

(1) The first type is packaged with characterized debris drums for processing in AMWTF. These contain drums with IDCs confirmed by RTR to be approved feedstock debris waste.

(2) The second type is packaged with drums that are not characterized but are labeled with historical AK information that indicates approved feedstock debris waste.

Legacy retrieved boxes from the generators include Sandia steel boxes, bins, fiberglass reinforced plywood boxes, and cake boxes.

After compaction, the drum pucks are loaded into the final 100-gallon drums (IDC BN-550) for shipment to WIPP. [10] No additional chemicals or waste constituents are added to the supercompacted debris waste as a result of this process.

Debris waste generated during maintenance, hot maintenance cell size reduction, repackaging and VE is also included in the Supercompactor feedstock. This facility-generated waste is visually examined. AMWTP does not add additional chemicals or waste constituents to the supercompacted debris waste as a result of this process. [11, 30, 55, 56, 57, 69]

The plant optimization system (POS) is used to optimize processing drums through the Supercompactor to produce 100-gallon drums (containing compacted drum pucks) to meet the WIPP Waste Acceptance Criteria (WAC). [5, 10, 27]

1.4.4 Material Inputs

The BN510.2 supercompacted debris waste includes: paper and rags; gloves; wipes; asbestos; PPE; plastic and rubber items; filters; leaded gloves, aprons, bricks, and sheeting; metal with and without lead or cadmium; floor tiles, piping, sheet rock, insulation, and glass; raschig rings; crucibles; fire brick; wood; Plexiglas®; Benelex®; pieces of equipment and tools; graphite; grit; and asphalt and concrete from multiple DOE sites (i.e., RF, MD, BC, AE, and AW) that are approved supercompactor feedstock. The BN510.2 supercompacted debris waste also includes AMWTP waste (BN) generated during supercompactor operations. Graphite may be part of the feedstock but does not make up >1% by weight of the feedstock in this waste stream. Supercompacted debris may contain small amounts of non-debris waste such as absorbed liquids, soil, dirt, sand, absorbent, or homogeneous solids. Non-debris waste will be less than 50% by volume in each 100-gallon drum of compacted debris.

The AMWTP retrievably-stored feedstock debris waste was generated at the RF, MD, AE, AW, and BC. The feedstock debris waste was generated during plutonium pit production; depleted uranium component fabrication; enriched uranium processing; support operations including radionuclide recovery, waste treatment, maintenance, laboratory analysis, and machining of non-nuclear weapon components; R&D; special order work; fabrication of ^{238}Pu heat sources and manufacture of radioisotopic thermoelectric generators; D&D activities; and materials development. (7, 8, 9, 53, 59)

The BN debris waste feedstock is generated as a result of AMWTP waste facility maintenance operations, treatment (i.e., supercompaction, absorption of prohibited liquids, and removal of prohibited items), characterization, and general container management activities. (6)

The waste contributions into the BN510.2 waste stream originated at the following DOE facilities operations: (6)

- RF
  - Plutonium metal and plutonium-containing materials manufacture, recovery, and treatment(7)
  - Plutonium production support operations including maintenance, laboratory activities, and R&D (7)
  - Non-routine events including renovations, spills, fires, and decommissioning (7)
  - Construction, demolition, and D&D operations. (7)
- MD
  - D&D of the Mound Plant Facility (8)
  - Pressed plutonium oxide (PPO) sphere and plutonium-molybdenum cermet (PMC) production(8)
  - Plutonium and other isotopic recovery (8)
  - Plutonium manufacture support such as laboratory activities and R&D (8)
  - Facility maintenance. (8)
- BC
  - Research into the metallurgical and ceramic properties of plutonium and its alloys (9)
  - Plutonium processing (9)
  - Development of nuclear fuels (9)

- D&D of the BC facilities. [9]

- AE
  - Support activities associated with the development and testing of various breeder reactor systems [53]
  - Laboratory operations associated with R&D/DOE waste management and supporting the examining/evaluating of nuclear fuel [53]
  - Repackaging activities [53]
  - Decontamination and decommissioning activities [53]
  - General plant operations including waste management and maintenance. [53]
- AW
  - Recovery of actinides such as plutonium and other radionuclides and characterization of nuclear materials [59]
  - Experimental fabrication of fuel rods, rodlets, slugs, and blankets [59]
  - Transmutation of actinides experiments in support of DOE programs (e.g., Advanced Fuel Cycle Initiative [AFCI], naval reactor, Generation IV Nuclear Reactor, and Space Nuclear Programs) using the recovered plutonium and other actinides [59]
  - Maintenance and decontamination of related equipment and gloveboxes [59]
  - Characterization of WIPP candidate CH-TRU waste (non-radionuclide processing). i.e., headspace gas sampling, visual examination, coring and sample collection. [59]
- BN
  - Characterization activities [6]
  - Repackaging activities [6]
  - Waste treatment activities including size reduction of large items, supercompaction, absorption of prohibited liquids, and removal of prohibited items [6]
  - Facility operations including waste management and maintenance. [6]

The feedstock debris waste received and stored at the AMWTP is packaged in 55- or 85-gallon drums and a variety of boxes, bins, and crates. These boxes, bins, and crates are constructed of metal, plywood, or fiberglass-reinforced plywood and processed in the boxlines. Drums of waste may also be packaged in overpack boxes for feedstock to the boxlines for processing.

The types of feedstock debris waste containers are as follows:

- Direct feed 55-gallon drums identified by generator (RF, MD, BC, AE, AW, BN) assigned IDCs
- Boxed debris waste from RF, MD, BC, AE, AW, and BN that is processed in the boxline or waste from the DWPG that is repackaged in 55-gallon drums.

The direct feed 55-gallon feedstock debris waste containers retain their generator assigned IDCs until compaction. [1]

1.4.4.1 Supporting AK Documents

The AK document for AMWTP waste, RPT-TRUW-06, Acceptable Knowledge Baseline Document for AMWTP Wastes, [6] was compiled to provide AK for the AMWTP newly-generated wastes in accordance with MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation. [13] RPT-TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant; RPT-TRUW-13, Acceptable Knowledge Document for INL Stored Waste-Mound Plant Waste; RPT-TRUW-04, Acceptable Knowledge Document for the Battelle Columbus Laboratories Building JN-4 Plutonium Laboratory; RPT-TRUW-89, Acceptable Knowledge Document for Argonne National Laboratory-East Waste; RPT-TRUW-79, Acceptable Knowledge Document for Materials and Fuels Complex Waste, and RPT-TRUW-82, Acceptable Knowledge Document for Hanford Debris Waste Shipped to AMWTP[d], are the AMWTP AK documents for the RF, MD, BC, AE, AW, and RL facilities, respectively. [7, 8, 9, 29, 53, 59]

The flow of the AMWTP AK documentation is presented in Figure 2.

[d] RPT-TRUW-82 is cited solely for contribution to the F-listed HWN assignment.

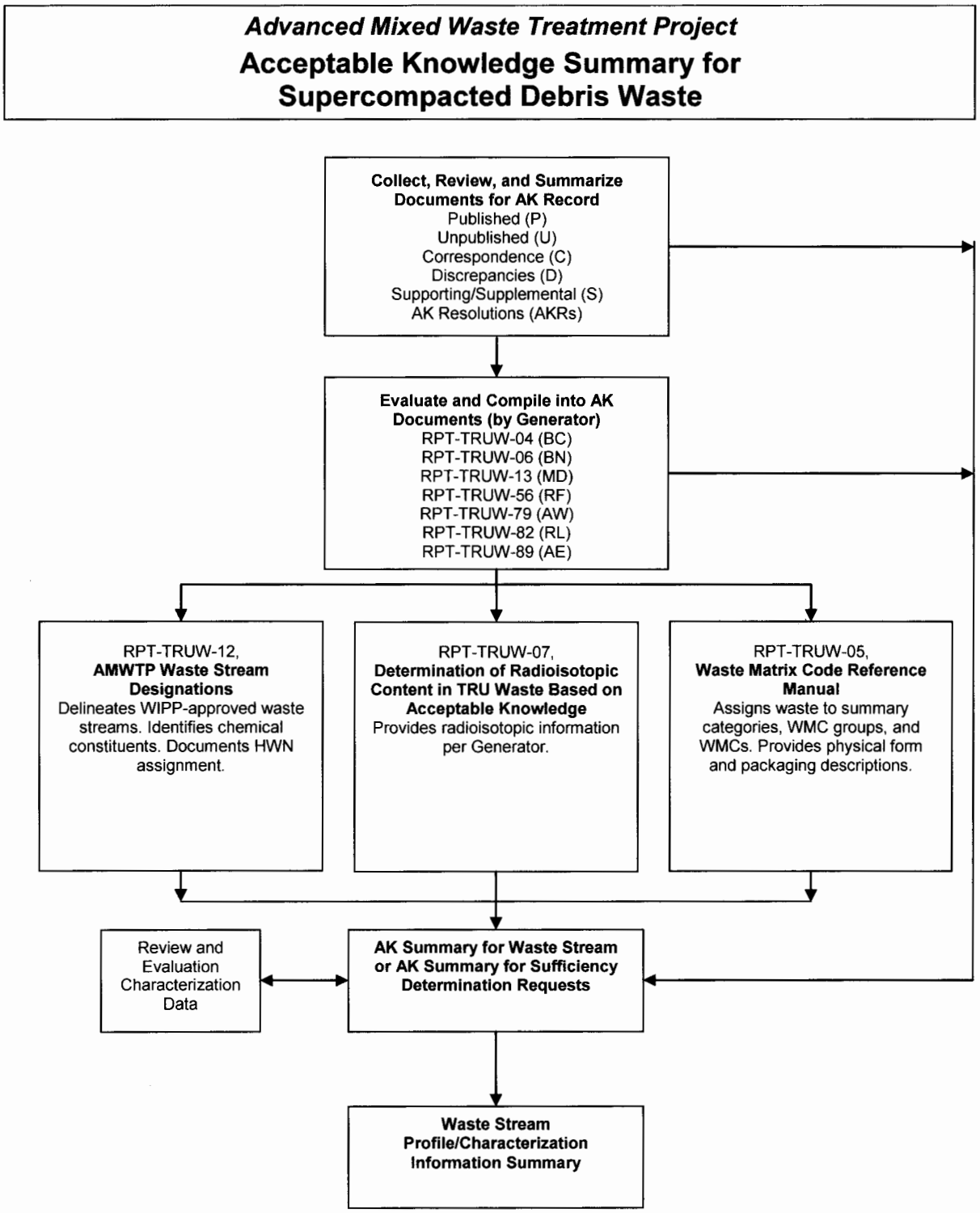

Figure 2. Document hierarchy and information flow for AK.

1.4.5 Waste Material Parameters

1.4.5.1 BN510.2 Supercompacted Debris Waste

The waste material parameter (WMP) weight percentages for the BN510.2 waste stream estimate are based on the VE data for BN510.1 100-gallon product drums generated from July 2, 2010 through February 25, 2013. WMP data for 8,028 containers with completed RTR/VE data from the BN510.1 waste stream were obtained from the AMWTP Waste Tracking System database for containers. The WMP weight parameters based on BN510.1 data are representative of the BN510.2 waste stream. The BN510.1 volume of containers represents approximately 50% of the overall volume of supercompacted drums projected for the BN510.2 waste stream. The estimated WMP weights (by percent) for the BN510.2 waste stream were calculated in accordance with the requirements of MP TRUW 8.13. The WMPs for BN510.2 are summarized in Table 2. [13, 46]

Table 2. Waste material parameters for BN510.2.

Waste Material Parameters	Estimated Percent WMP weight/unit waste
Iron-based Metals/Alloys	75
Aluminum-based Metals/Alloys	<1
Other Metals	<1
Other Inorganic Materials	2
Cellulosics	15
Rubber	1
Plastics (waste materials)	7
Inorganic Matrix	<1
Organic Matrix	<1
Soils/Gravel	<1

1.5 AK Sufficiency Determination

No AK sufficiency determinations apply to this waste stream.

1.6 Prohibited Items

The following items are prohibited in waste containers shipped to WIPP as documented in MP-TRUW-8.1, Certification Plan for INL Transuranic Waste and MP-TRUW-8.2, Quality Assurance Project Plan. [5, 27]

- Liquid waste and prohibited observable liquids
- Sealed containers greater than 4 liters
- Non-radionuclide pyrophoric materials
- Hazardous wastes not occurring as co-contaminants with TRU mixed wastes
- Wastes incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Wastes containing explosives or compressed gases
- Wastes with polychlorinated biphenyls (PCBs) not authorized under an Environmental Protection Agency (EPA) PCB waste disposal authorization
- Wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (hazardous waste numbers [HWNs] D001, D002, or D003)
- Waste that has ever been managed as high-level waste and waste from tanks specified in Table C-5 (MP-TRUW-8.2, Section C-1c), unless specifically approved through as WIPP RCRA Permit Modification
- High-level waste and SNF as identified in the WIPP Land Withdrawal Act (and as defined in the Nuclear Waste Policy Act of 1982). [47, 64]

Supercompaction is the treatment for unprotected sharp objects and sealed containers greater than 4 liters that do not contain prohibited liquids. Because there are no layers of confinement following supercompaction, it is also the treatment for excess layers of confinement.

Feedstock debris wastes that are identified as containing prohibited items during RTR or by VE during boxline processing of wastes are treated in the boxline, treated by supercompaction, have the prohibited item(s) removed, or are rejected, as appropriate.

Boxline(s) are used to VE and repackage the boxed debris waste into 55-gallon drums. Debris waste treated or examined in the DWPG, and waste from maintenance and cleanup activities, are packaged according to procedures, subjected to RTR/VE, and undergo non-destructive assay. [34] These drums are then supercompacted and the pucks packaged into a 100-gallon product drum (IDC BN-550). [10, 11]

Prohibited items that can be treated to remove the prohibited characteristic are managed as newly-generated waste. Containers with WIPP-prohibited liquids may be treated using the following non-hazardous materials: Aquaset®, Aquaset II-G®, Petroset II® or Petroset IIG®, Micro-Cel® E, PIG®, or SP-400® absorbents or Hg Absorb for mercury to render the waste acceptable prior to shipment. [38, 39, 48, 49, 50, 52, 65] Newly-generated waste is characterized and assigned to an appropriate waste stream. [5, 27] In the event the treatment renders an acceptable debris waste form that can be compacted, it is included in this waste stream as IDC BN-508.

Prohibited items may be treated in the boxlines or processed in the SCW glovebox.[10, 11, 27, 30, 55] Nonhazardous pressurized fire extinguishers or other approved pressurized large cylinders may be vented by a controlled release in the boxlines. Boxline processes may perform absorption of free liquids in accordance with approved methods. SCW treatment includes management of containers with liquids, pressurized containers, collected free liquids, collected residual liquids, and elemental mercury in accordance with approved methods. After treating, sorting, and/or removal of prohibited item(s), the waste is repackaged into 55-gallon drums as IDC BN 508. [10, 11, 47, 55, 71]

Some prohibited items are approved for treatment by supercompaction. [61] Supercompaction of 55-gallon drums is the treatment for unprotected sharp objects, pressurized aerosol cans that contain a total liquid volume confirmed by RTR of less than or equal to 49 mL, containers that also have an observable liquid volume confirmed by RTR of not greater than 5% by volume of the container, and sealed containers greater than 4 liters. [32, 44, 60, 61, 66, 73] Because there are no layers of confinement following supercompaction, it is also the treatment for excess layers of confinement. [10, 11, 27, 65, 66]

Drums of direct feedstock debris waste identified during RTR/VE as containing PCB items are segregated or sent to DWPG or SCW for item removal. [1, 17, 30, 31, 55] PCB items identified in boxed debris are removed during boxline operations. PCB-contaminated waste identified during boxline processing is cleaned up in accordance with applicable AMWTP procedures. [54] PCB items removed from feedstock debris waste drums and boxes or generated during the boxline PCB cleanup operation are packaged as newly-generated waste and are not authorized as part of this waste stream.

None of the repackaged supercompacted debris drums or repackaged oversized waste items in boxes shipped to WIPP will contain prohibited items.

1.7 Resource Conservation and Recovery Act Determination

The BN510.2 waste is (and has been) subject to the State of Idaho Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) requirements (e.g., 40 CFR 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, and 40 CFR 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities) and is currently being managed under the AMWTP RCRA-permitting requirements until it is shipped offsite. [44, 45]

1.7.1 BN510.2 Supercompacted Debris Waste

1.7.1.1 EPA Hazardous Waste Numbers

The BN510.2 supercompacted debris waste is characterized as mixed TRU waste. The HWNs assigned to this waste stream include HWNs associated with the feedstock debris waste as originally compiled in AMWTP AK documents. [6, 7, 8, 9, 29, 53, 59]

Toxicity characteristic HWNs applied to the repackaged debris waste are:

D004 (arsenic), D005 (barium), D006 (cadmium), D007 (chromium), D008 (lead), D009 (mercury), D010 (selenium), D011 (silver) D022 (chloroform), D027 (1,4 dichlorobenzene), D028 (1,2-dichloroethane), D029 (1,1 dichloroethylene), D030 (2,4 dinitrotoluene), D032 (hexachlorobenzene), D034 (hexachloroethane), D037 (pentachlorophenol), and D043 (vinyl chloride).

Listed HWNs applied to this waste stream are:

F001: 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2 difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene, and, trichlorofluoromethane

F002: 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2-trichloroethane, 1,2-dichlorobenzene, chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane

F004: cresols and nitrobenzene

F005: 2-ethoxyethanol, 2-nitropropane, benzene, carbon disulfide, isobutanol, methyl ethyl ketone (MEK), pyridine, and toluene

F006, F007, and F009: electroplating waste.

The HWNs assigned to the BN510.2 wastes generated in the facility as a result of supercompaction are derived from the compilation of all EPA HWNs assigned to the approved feedstock debris waste from the contributing generator sites (Table 3). The RL waste is no longer processed as feedstock and has been shipped. Table 3 only identifies the F-listed HWNs and constituents based on the RCRA mixture and the derived from rules. [6, 7, 8, 9, 29, 40, 41, 43, 53, 59]

Table 3. HWN assignment by generator site for BN510.2.

Generator Site/Activity	Arsenic D004	Barium D005	Cadmium D006	Chromium D007	Lead D008	Mercury D009	Selenium D010	Silver D011	Chloroform D022	1,4-Dichlorobenzene D027	1, 2-Dichloroethane D028	1,1-Dichloroetthylene D029	2,4-Dinitrotoluene D030	Hexachlorobenzene D032	Hexachloroethane D034	Pentachlorophenol D037	Vinyl Chloride D043	Spent Solvents F001	Spent Solvents F002	Spent Solvents F004	Spent Solvents F005	Electroplating waste F006 F007 F009
Rocky Flats (RF) [7]																						
Isotope recovery [b]	•	•	•	•	•	•	•	•														
Laboratory reagents, research	•	•	•	•	•	•	•	•	•												• [a]	
Degreasing, decontamination																		• [a]	• [a]			
Cleaning, spill clean up																					• [a]	
Electroplating																						• [a]
Based on AK/HSG											•	•										
Mound Plant (MD) [8]																						
PPO & PMC production and isotope recovery [b]	•	•	•	•	•	•	•	•														
Cleaning and degreasing																		• [c]	• [c]		• [c]	
Electroplating																						• [c]
Based on AK/HSG									•			•										

Table 3 (continued)

Activity	Arsenic D004	Barium D005	Cadmium D006	Chromium D007	Lead D008	Mercury D009	Selenium D010	Silver D011	Chloroform D022	1,4-Dichlorobenzene D027	1, 2-Dichloroethane D028	1,1-Dichloroetthylene D029	2,4-Dinitrotoluene D030	Hexachlorobenzene D032	Hexachloroethane D034	Pentachlorophenol D037	Vinyl Chloride D043	Spent Solvents F001	Spent Solvents F002	Spent Solvents F004	Spent Solvents F005	Electroplating waste F006 F007 F009
Battelle Columbus (BC) [9]																						
Metallurgical research		•	•	•	•	•		•														
Cleaning and degreasing																		• [d]	• [d]		• [d]	
Argonne National Laboratory – East (AE) [53]																						
Laboratory Operations [e]	•	•	•	•	•	•	•	•		•	•	•	•			•			• [e]	• [e]	• [e]	
Research Generated [e]	•	•	•	•	•	•	•	•		•	•	•	•			•			• [e]	• [e]	• [e]	
D&D [e]	•	•	•	•	•	•	•	•		•	•	•	•			•			• [e]	• [e]	• [e]	
Based on AK/HSG [e]	•	•	•	•	•	•	•	•		•	•	•	•			•			• [e]	• [e]	• [e]	

Table 3 (continued)

Activity	Arsenic D004	Barium D005	Cadmium D006	Chromium D007	Lead D008	Mercury D009	Selenium D010	Silver D011	Chloroform D022	1,4-Dichlorobenzene D027	1, 2-Dichloroethane D028	1,1-Dichloroetthylene D029	2,4-Dinitrotoluene D030	Hexachlorobenzene D032	Hexachloroethane D034	Pentachlorophenol D037	Vinyl Chloride D043	Spent Solvents F001	Spent Solvents F002	Spent Solvents F004	Spent Solvents F005	Electroplating waste F006 F007 F009
Hanford [29, 40, 41, 43]																						
PFP plutonium metal production operations and glovebox activities including maintenance, clean out, D&D and stabilization:																						
• RLMPDT.001 (MPFPD)																						
• RLMPFPCD																		•[f]	•[f]	•[f]	•[f]	
Radiochemistry Processing Laboratory operations and maintenance (RLM325D.001)																		•[f]	•[f]	•[f]	•[f]	
Metallurgy operations, cleanout, and D&D (RLM231ZD.001)																		•[f]	•[f]		•[f]	

Table 3 (continued)

Activity	Arsenic D004	Barium D005	Cadmium D006	Chromium D007	Lead D008	Mercury D009	Selenium D010	Silver D011	Chloroform D022	1,4-Dichlorobenzene D027	1, 2-Dichloroethane D028	1,1-Dichloroetthylene D029	2,4-Dinitrotoluene D030	Hexachlorobenzene D032	Hexachloroethane D034	Pentachlorophenol D037	Vinyl Chloride D043	Derived-From Rule F001	Derived-From Rule F002	Derived-From Rule F004	Derived-From Rule F005	Derived-From Rule F006 F007 F009
Materials and Fuels Complex (AW) [59]																						
Radionuclide Processing CH-TRU Debris Waste	•	•	•	•	•	•	•	•	•									•[g]	•[g]		•[g]	
Ash Stabilization and GGE Debris Waste IDC AW-165	•	•	•	•	•	•	•	•										•[g]	•[g]		•[g]	
HRA/WCA debris IDC AW-164	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•[g]	•[g]	•[g]	•[g]	•[g]
AMWTP (BN) [1]																						
Newly generated waste from composited feedstock (i.e., supercompaction operations)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•[h]	•[h]	•[h]	•[h]	•[h]

a. RF – F001 =, 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, carbon tetrachloride, tetrachloroethylene and trichloroethylene; F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, methylene chloride, tetrachloroethylene, and trichloroethylene; and F005 = 2-ethoxyethanol, benzene, carbon disulfide, methyl ethyl ketone, and toluene; and F006, F007, and F009 are assigned due to electroplating waste contamination.

b. Process used to recover radioisotopes (e.g., plutonium, americium, neptunium) which caused precipitation of metals as well as the radionuclides.

c. MD - F001 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, carbon tetrachloride, and methylene chloride; F002 =1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, and methylene chloride; F005 = benzene, carbon disulfide, MEK, and toluene. F007 and F009 HWNs are assigned due to electroplating waste contamination.

d. BC – F001= methylene chloride and trichloroethylene; F002 = methylene chloride and trichloroethylene; and F005 = benzene, MEK, and toluene.

e. AE – D019 carbon tetrachloride, assigned to AE waste, is covered under the F001 assigned to the BN510.1 waste stream. F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, chlorobenzene, methylene chloride, tetrachloroethylene, and trichloroethylene; F004 = nitrobenzene; F005 = benzene, carbon disulfide, isobutanol, MEK, and toluene. Due to the commingling of AE waste and management based on content codes during the early years of shipment, the applicable AE HWNs/constituents associated with AE heterogeneous debris waste are the same for all activities.

f. RL – F001=1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2-difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane; F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,2-dichlorobenzene, chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane; F004 = cresols and nitrobenzene; and F005 = 2-nitropropane, benzene, carbon disulfide, isobutanol, MEK, pyridine and toluene. Listed HWN constituents identified in footnote [f] are the summation from referenced AK and process knowledge (PK) documents. Currently, Hanford waste is no longer feedstock to the Supercompactor and as such only the listed hazardous waste numbers are applicable.

g. MFC/AW - F001= 1,1,1-trichloroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, and trichloroethylene; F002 = o-dichlorobenzene (1,2-dichlorobenzene), 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane; 1,1,2-trichloroethane, chlorobenzene, methylene chloride; tetrachloroethylene, trichloroethylene, and trichloromonofluoromethane (trichlorofluoromethane); F004 = cresols and nitrobenzene; F005 = 2-ethoxyethanol, 2 nitropropane, benzene, carbon disulfide, isobutanol, MEK, pyridine and toluene; and F006, F007, and F009 are assigned due to electroplating waste contamination.

h. BN (product drum)– F001= 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2-difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene and trichlorofluoromethane; F002 =1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane; 1,1,2-trichloroethane, 1,2-dichlorobenzene, chlorobenzene, methylene chloride; tetrachloroethylene, trichloroethylene, and trichlorofluoromethane; F004 = cresols and nitrobenzene; F005 = 2-ethoxyethanol, 2-nitropropane, benzene, carbon disulfide, isobutanol, MEK, pyridine and toluene; and F006, F007, and F009 are assigned due to electroplating waste contamination.

1.7.2 Hazardous Determination

1.7.2.1 Hazardous Waste Management

The BN510.2 wastes are newly generated. Hazardous waste numbers initially (or historically) assigned to the supercompactor feedstock wastes are applicable to the BN510.2 waste stream as a result of the RCRA mixture and the derived-from rules.[1]

1.7.2.1.1 Historical Waste Management

The wastes that comprise the BN510.2 waste stream have historically been managed as mixed TRU waste at the AMWTP. [1, 6]

1.7.2.2 Ignitability

The waste materials in this BN510.2 waste stream do not meet the 40 CFR 261.21, Characteristic of Ignitability, definition of ignitability. The resulting supercompacted debris waste is not a liquid waste and is not an ignitable waste. The current State of Idaho RCRA/HWMA Permit allows the AMWTP to process within the supercompactor aerosol cans with less than or equal to 49 mL and excess liquids that do not exceed a maximum of 5% of the overall container capacity (volume must be confirmed by RTR). [32, 44, 60, 61, 66, 73] To render the waste acceptable at WIPP, containers identified as having ignitable waste properties or containing prohibited liquids will be:

(1) Treated using Aquaset®, Aquaset II-G®, Petroset II®, Petroset IIG®, Micro-Cel® E, PIG®, SP-400® or Hg Absorb for mercury to make the waste amenable for offsite shipment [38, 39, 48, 49, 50, 52, 65]; and/or

(2) Treated by the supercompaction process to remove the excess liquids; [32, 44, 60, 61, 66] or

(3) Undergo removal of the prohibited item(s). [10, 11, 54, 55, 61, 71]

The resulting supercompacted debris waste is not an ignitable waste. The compacted debris waste is not a liquid or a compressed gas and does not contain compressed gases. The waste does not meet the U.S. Department of Transportation definition of an oxidizer as defined in 49 CFR 173, Shippers–General Requirements for Shipments and Packagings. Finally, the waste is not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change. Containers with prohibited liquids will not be shipped to WIPP. [38, 39, 48, 49, 50, 52, 65] Based on the above, this waste stream does not exhibit the characteristic of ignitability (D001).

1.7.2.3 Corrosivity

The materials in this BN510.2 waste stream do not meet the 40 CFR 261.22, Characteristic of Corrosivity, definition of corrosivity. The resulting supercompacted debris waste is not a liquid waste and is not a corrosive waste. The current State of Idaho RCRA/HWMA Permit allows the AMWTP to process within the supercompactor aerosol cans with less than or equal to 49 mL and excess liquids that do not exceed a maximum of 5% of the overall container capacity, volume confirmed by RTR. [32, 44, 60, 61, 66, 73] To render the waste acceptable at WIPP containers identified as having corrosive waste properties or containing prohibited liquids will be:

(1) Treated using Aquaset®, Aquaset II-G®, Petroset II®, Petroset IIG®, Micro-Cel® E, PIG®, SP-400® or Hg Absorb for mercury to make the waste amenable for offsite shipment [38, 39, 48, 49, 50, 52, 65]; and/or

(2) Treated by the supercompaction process to remove the excess liquids; [32, 44, 60, 61, 66] or

(3) Undergo removal of the prohibited item(s). [10, 11, 54, 55, 61, 71]

The resulting supercompacted debris waste is not liquid waste and will not contain liquids in excess of WIPP-WAC limits. Containers with WIPP-prohibited liquids will not be shipped. [38, 39, 42 , 48, 49, 50, 52, 65] Based on the above, this waste stream does not exhibit the characteristic of corrosivity (D002).

1.7.2.4 Reactivity

The waste materials in this BN510.2 waste stream do not meet the 40 CFR 261.23, Characteristic of Reactivity, definition of reactivity. The resulting supercompacted debris waste is not a liquid waste and is not a reactive waste. The current State of Idaho RCRA/HWMA Permit allows the AMWTP to process within the supercompactor aerosol cans with less than or equal to 49 mL and excess liquids that do not exceed a maximum of 5% of the overall container capacity, volume confirmed by RTR. [32, 44, 60, 61, 66, 73] To render the waste acceptable at WIPP, containers identified as having reactive waste properties or containing prohibited liquids will be:

(1) Treated using Aquaset®, Aquaset II-G®, Petroset II®, Petroset IIG®, Micro-Cel® E, PIG®, SP-400® or Hg Absorb for mercury to make the waste amenable for offsite shipment [38, 39, 48, 49, 50, 52, 65]; and/or

(2) Treated by the supercompaction process to remove the excess liquids; [32, 44, 61, 66] or

(3) Undergo removal of the prohibited item(s). [10, 11, 54, 55, 61, 71]

In addition, the BN510.2 waste stream is stable and will not undergo violent chemical change, react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors, or fumes when mixed with water. The waste does not contain sulfide waste which, when exposed to a pH between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment. The waste is not capable of detonation or explosive reaction if subjected to a strong initiating source if heated under confinement. The waste is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure. The materials do not contain explosive material and are not forbidden explosives or Division 1.1, 1.2, or 1.3 (Class A or B) explosives as defined in 49 CFR 173. Although the waste contains wastes that are assigned F006, F007, and F009 listed HWNs that are associated with cyanide electroplating operations, the waste when exposed to a pH between 2 and 12.5 will not generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment. This waste stream does not exhibit the characteristic of reactivity (D003).

1.7.2.5 BN510.2 RCRA Toxicity, Listed and Toxic Substances Control Act (TSCA) Waste

1.7.2.5.1 Toxicity

The BN510.2 supercompacted debris waste stream contains RCRA toxicity constituents associated with toxicity characteristic metals and organics. See Table 3 for process-related activities associated with the HWNs.

The RL waste is no longer processed as feedstock and has been shipped. Table 3 only identifies the F-listed HWNs and constituents based on the RCRA mixture and the derived from rules. The addition of MFC waste, IDC AW-164, assigns the previous characteristic HWNs D030, D034, and D043 that were assigned to Hanford feedstock. There is no removal of HWNs from the BN510.1 waste stream compared to the BN510.2 waste stream. [6, 7, 8, 9, 29, 40, 41, 43, 53, 59]

The RCRA toxicity characteristic metal HWNs: D004 (arsenic); D005 (barium); D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury); D010 (selenium); D011 (silver) were identified based on AK documentation associated with RF, MD, BC, BN, AE, and AW feedstock for the BN510.2 WSPF. The D004, D005, D006, D007, D008, D009, D010, and D011 HWNs are assigned to the waste stream. [1, 6, 7, 8, 9, 31, 53, 59]

The RCRA toxicity characteristic metals and organics assigned to this waste stream are: D004 (arsenic); D005 (barium); D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury); D010 (selenium); D011 (silver); D022 (chloroform); D027 (1,4-dichlorobenzene); D028 (1,2-dichloroethane); D029 (1,1-dichloroethylene); D030 (2,4-dinitrotoluene); D032 (hexachlorobenzene); D034 (hexachloroethane); D037 (pentachlorophenol); and D043 (vinyl chloride). The repackaged debris waste stream contains RCRA toxicity constituents associated with toxicity characteristic metals and organics. See Table 3 for process-related activities associated with the HWNs. [1, 6, 7, 8, 9, 31, 53, 59]

The HWN D019 (carbon tetrachloride) was associated with AE and AW feedstock to the BN510.2 WSPF. Because F-listed HWN F001 was assigned to the feedstock for this constituent, the D019 HWN is not assigned but rather addressed within the F-listed waste section below. [53, 59]

The HWN D022 (chloroform) was assigned based on AK documentation associated with RF, MD, and AW feedstock to the BN510.2 WSPF. The associated toxicity characteristic HWN D022 is assigned to the waste stream. [1, 8, 31, 59]

The HWNs D027 (1,4-dichlorobenzene); D030 (2,4–dinitrotoluene); and D037 (pentachlorophenol) were assigned based on AK documentation associated with one or more of the following supercompactor feedstock sources: AE and AW. The associated toxicity characteristic HWNs D027, D030, and D037 are assigned to the waste stream. [53, 59]

The HWNs D032 (hexachlorobenzene), D034 (hexachloroethane), and D043 (vinyl chloride) were assigned based on AK documentation associated with the AW supercompactor feedstock. The associated toxicity characteristic HWNs D032, D034, and D043 are assigned to the waste stream. [59]

The HWNs D028 (1,2 dichloroethane) and D029 (1,1 dichloroethylene) were assigned in the AK documentation associated with RF, AE, and AW feedstock to the BN510.2 WSPF. The D028 and D029 HWNs are assigned to the waste stream. [7, 31,53, 59]

1.7.2.5.2 Listed Waste

F-Listed HWNs. The BN510.2 supercompacted debris waste stream contains constituents associated with RCRA-listed waste HWNs. See Table 3 for process-related activities associated with the HWNs.

The BN510.2 debris waste stream is assigned the F-listed HWNs: F001, F002, F004, F005, F006, F007, and F009. These F-Listed HWNs were historically assigned to feedstock. [1, 6, 7, 16, 29, 40, 41, 43, 53, 59]

The HWNs: F001 (1,1,1- trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2-difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane) and F002 (1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,2-dichlorobenzene, chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane) were assigned based on AK documentation associated with previous RL feedstock to the BN510.1 and RF, MD, BC, and AW feedstock to the BN510.2 waste stream. In addition, the F002 hazardous waste constituents 1,1,1-trichloroethane; 1,1,2-trichloro-1,2,2-trifluoroethane; 1,2-dichlorobenzene; chlorobenzene; methylene chloride; tetrachloroethylene; trichloroethylene, and trichlorofluoromethane were assigned based on AK documentation associated with RF, MD, BC, RL, AE, and AW feedstock. Additional F002 constituent 1,1,2-trichloroethane was added by

AW feedstock. Therefore, the waste stream is assigned the EPA HWNs F001 and F002. [1, 6, 7, 8, 9, 29, 40, 41, 43, 53, 59]

Non-halogenated F003 solvent constituents (e.g., acetone, cyclohexanone, ethyl benzene, ethyl ether, methanol, methyl isobutyl ketone, n-butyl alcohol, and xylenes) were identified in the AK and PK record as contaminants associated with the feedstock debris waste. The BN510.2 waste stream does not exhibit the characteristic of ignitability. Therefore, the F003 HWN is not assigned to the supercompacted debris waste stream. [1]

The HWN F004 (cresols and nitrobenzene) were assigned based on AK documentation associated with RL feedstock to the BN510.1 WSPF and with the AE and AW feedstock to the BN510.2. Therefore, the waste stream is assigned the EPA HWN F004. [29, 40, 41, 53, 59]

The HWN F005 (2-ethoxyethanol, 2-nitropropane, benzene, carbon disulfide, isobutanol, MEK, pyridine, and toluene) were assigned based on AK documentation associated with RF, MD, BC, AE, and AW feedstock to the BN510.2 waste stream and RL feedstock to the BN510.1 WSPF. Therefore, the waste stream is assigned the EPA HWN F005. [1, 6, 7, 8, 9, 29, 40, 41, 43, 53, 59]

The HWNs F006, F007 and F009 were assigned based on AK documentation associated with RF and AW feedstock and HWNs F007 and F009 were also assigned based on AK documentation associated with MD feedstock to the BN510.2 WSPF. Therefore, waste stream is assigned the F006, F007, and F009 EPA HWNs. [1, 6, 7, 16, 59]

P-, U-, and K-Listed HWNs. The BN510.2 supercompacted feedstock debris wastes in this waste stream are not discarded, unused, commercial chemical products, off-specification species, or manufacturing intermediates and do not contain spill residues thereof that would meet the listing of P- or U-listed hazardous waste as identified in 40 CFR 261.33, Discarded Commercial Chemical Products, off-Specification Species, Container Residues, and Spill Residues thereof. In addition, the waste materials in this waste stream were not mixed with, or derived from, the treatment, storage, or disposal of P- or U-listed waste. As a result, P- or U-listed HWNs are not assigned to this waste stream. [1, 6, 7, 8, 9, 29, 40, 41, 43, 53, 59]

Although hydrofluoric acid was identified as a chemical contaminant associated with the feedstock debris waste, only spent forms of hydrofluoric acid would have contaminated the feedstock debris waste. Based on this information, the U134 HWN is not assigned to this waste stream. [1, 6, 7, 8, 9, 29, 40, 41, 43, 53, 59]

Based on a review of AK, it was determined that the BN510.2 waste stream will contain less than one percent beryllium by weight. Beryllium is a contaminant associated with this waste. The source of the beryllium is not associated with a powdered form and is not associated with unused commercial chemical product, an off-specification species, or a container residue, and does not contain a spill residue thereof. The P015 HWN for beryllium powder is not assigned to this waste stream. [1, 6, 7, 8, 9, 29, 40, 41, 43, 53]

The waste materials within this waste stream are not hazardous waste from specific sources listed in 40 CFR 261.32, Hazardous Wastes from Specific Sources, (i.e., K-listed hazardous waste) and they have not been mixed with; derived from the treatment, storage, or disposal of K-listed wastes; and do not contain spill residues thereof. The waste materials in this waste stream are not assigned K-listed HWNs. [1, 6, 7, 8, 9, 29, 40, 41, 43, 53, 59]

1.7.2.5.3 TSCA Waste

Polychlorinated biphenyl items with PCB concentrations equal to or exceeding 50 parts per million are not expected in the BN510.2 waste stream.

Drums of supercompacted feedstock debris waste identified during RTR/VE as containing PCB items are segregated or sent to DWPG or SCW for item removal. [1, 10, 17, 30, 31, 55] PCB items identified in boxed debris are removed during boxline operations. Potential PCB contaminated waste identified during boxline repackaging is subject to AMWTP PCB cleanup requirements. [54] PCB items removed from approved feedstock debris waste drums and boxes and potential PCB cleanup wastes are packaged as newly-generated waste and are not authorized as feedstock debris waste.

Asbestos has been identified in some of the approved feedstock debris waste. Any containers identified as containing regulated types or quantities (e.g., greater than 1% of friable asbestos) will be labeled, as required, in accordance with TSCA and Occupational Safety and Health Administration regulations.

1.7.2.5.4 Other Applicable Waste Streams

The AMWTP BN510 and BN510.1 waste streams are pertinent to the BN510.2 waste stream. The IDCs identified within Appendix A includes IDCs previously identified within the BN510 and BN510.1 WIPP-approved WSPFs as well as MFC IDCs. The EPA HWNs assigned to the BN510 WSPF included D004 through D011, D022, D028, D029, F001, F002, F005, F006, F007, and F009.[31] The EPA HWNs assigned to BN510.1 include D004 through D011, D022, D027, D028, D029, D030, D034, D037, D043, F001, F002, F004, F005, F006, F007, and F009. [7, 8, 9, 29, 40, 41, 43, 53]

1.8 Radionuclides

The radionuclides of concern for BN510.2 are ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, and ^{241}Am. The remaining WIPP-tracked radionuclides, ^{137}Cs and ^{90}Sr, are not expected to be present in measurable quantities in feedstock debris waste from RF except for IDC RF-480, due to disposal of isotopic sealed source material. Cesium-137 and computed ^{90}Sr are anticipated radionuclides for IDC RF-480 feedstock and may be detected during NDA. Cesium-137 and ^{90}Sr were identified as potentially present in AE, MD, BC, and AW debris waste. [7, 8, 9, 14, 51, 53]

At a minimum, the ratios of the two most prevalent radionuclides in the isotopic mix are compared to confirm existing AK data in compliance with CH-WAC requirements. The two

most prevalent radionuclides expected in the waste stream are ^{239}Pu and ^{240}Pu. This is based on a review of product drums included in the BN510.1 WSPF; however, the prevalent radioisotopes in some containers of the waste may be a combination of ^{239}Pu and a different second TRU or uranium isotope due to commingling of wastes.

Table 4 identifies the predominant radionuclides and the principle source of those radionuclides for each of the original generators and for the BN510.2 wastes. [7, 8, 9, 14, 51, 53, 59] For waste containers that have multiple generators and therefore a mixture of weapons grade plutonium (WG Pu), enriched uranium (EU), depleted uranium (DU), heat source isotopes, and fuel grade plutonium, a combination of any two of the common isotopes identified may be detected as the most prevalent. Although the waste stream contains depleted uranium in the feedstock material, the weight of uranium within the overall feedstock material will be less than 1% by weight. Radioassay data are reviewed and assessed by AMWTP NDA personnel as described in the RPT-TRUW-03, Drum Assay Technical Review Report. [15]

The radioisotopic content for each AMWTP supercompacted debris waste 100-gallon product drum will be calculated based on the aggregate of the NDA results for each of the compacted feedstock debris waste drums contained therein. The POS is used to ensure that each payload container does not exceed WAC weight or dose limits and complies with the required TRU activity (greater than 100 nCi/g). The direct feed 55-gallon drums will contain at least one TRU radionuclide greater than the lower limit of detection (LLD). The 100-gallon product drums that contain puck(s) with TRU radionuclides at less than LLD from the boxline feed, as determined by 55-gallon drum assay, are assayed using the Super HENC (high energy neutron counter) for final TRU determination.

Table 4. Predominant radionuclides expected in debris wastes by generator site.

Generator Site	Principal Plutonium Source	Predominant Radionuclides by Activity
RF	WG	^{239}Pu, ^{240}Pu
RF	WG, DU, EU	^{239}Pu (^{235}U or ^{238}U)
MD	WG	^{239}Pu, ^{240}Pu
MD	Heat source	^{238}Pu, ^{239}Pu
BC	WG	^{239}Pu, ^{240}Pu
AE	Combination WG Pu, fuels-grade Pu	^{241}Pu, ^{239}Pu
AW	Combination WG Pu, fuels-grade Pu	^{241}Am, ^{241}Pu
BN	WG (RF waste)	^{239}Pu, ^{240}Pu
BN	Combination WG Pu, heat source Pu	^{238}Pu, ^{239}Pu
BN	Combination WG Pu, heat source Pu, uranium, thorium, fuels-grade Pu	^{239}Pu (^{240}Pu, ^{241}Pu, ^{238}Pu, ^{241}Am, ^{235}U or ^{238}U)

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

2.1.1 Direct-Load of 100-gallon Supercompacted Debris Waste Containers Into TRUPACTs

The BN510.2 waste stream consists of supercompacted drums of debris waste (pucks) placed directly into 100-gallon product drums. There are no inner packagings or layers of confinement associated with the 100-gallon product drums. There is a filtered lid on the 100-gallon drums. If 100-gallon drums become damaged, they are packaged into SWBs for shipment to WIPP. [10, 18]

2.2 Flammability Consideration

The payload containers in the BN510.2 waste stream must comply with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with the flammable gas limits will be performed for volatile organic compounds (VOCs), hydrogen, and methane. Headspace gas (HSG) sampling and analysis is performed when required by the WIPP-Waste Acceptance Plan and/or CH-TRAMPAC. At a minimum, the HSG analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with HSG results exceeding 500 parts per million flammable VOCs, are evaluated for compliance with applicable CH-TRAMPAC requirements prior to shipment. Payloads containing flammable VOCs are managed in accordance with CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC). [26]

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Appendix A – Approved Feedstock Debris Waste by Original Generator and IDC

The following table lists the approved feedstock debris waste[e] by original generator and IDC. (7, 8, 9, 29, 36, 53, 59, 67)

Waste Type	Site	IDC	Description
COMBUSTIBLES	RF	010	Paper and Rags
	RF	020	Wood and Benelex
	RF	030	Plastic
	RF	040	Rubber
	RF	33A	WIPP Experimental Test Program (WETP) Bin Program-Combustibles A (IDCs 335, 336, 337, and 339)
	RF	33B	WETP Bin Program – Combustibles B (IDCs 330, 337, and 339)
	RF	302	Benelex® and Plexiglas®
	RF	330	Paper and Rags-Dry
	RF	336	Paper and Rags-Moist
	RF	337	Plastic, Teflon®, Washables, PVC
	RF	339	Leaded Rubber Gloves and Aprons
	RF	430	Unleached Ion Column Resin
	RF	431	Leached Resin
	RF	460	Washables, Rubber, Plastic
	RF	463	Leaded Rubber Gloves and Aprons
	RF	464	Benelex® and Plexiglas®
	RF	833	Plastics, TRU Mixed
	RF	831	Dry Combustibles
	RF	832	Wet Combustibles
	RF	900	Low Specific Activity (LSA) Paper, Plastics, etc.
	RF	970	Wood

[e] MLLW feedstock debris waste is not addressed within this table.

Waste Type	Site	IDC	Description
FILTERS	RF	328	Ful-Flo® Incinerator Filters
	RF	335	Absolute 8 × 8 Filters
	RF	338	Insulation and Chemical Warfare Service (CWS) Filter Media
	RF	360	Insulation
	RF	376	Cemented Insulation and Filter Media
	RF	490	High-Efficiency Particulate Air Filters and CWS Filters
	RF	491	Plenum Prefilters
GRAPHITE	RF	070	Graphite
	RF	300	Graphite Molds
	RF	301	Graphite Cores
	RF	303	Scarfed Graphite Chunks
	RF	310	Graphite Scarfings
	RF	312	Coarse Graphite

Waste Type	Site	IDC	Description
HETEROGENEOUS	AE	100	General Plant Waste
	AE	101	Cut up Gloveboxes
	AE	104	Alpha Hot Cell Waste
	AE	106	Special Source Material
	AE	110	Research Generated Waste
	AE	120	D and D Waste Compactable and Combustible Solids
	AW	150	Laboratory Waste
	AW	160	AL/CL Debris Waste
	AW	161	ACL Glassware, Paper, Poly, and Misc.
	AW	162	ANL-W FMF EFL Zr-U-Pu Fuel Cast
	AW	163	ANL-W ACL Cold-Line Ab. Liq. and Debris
	AW	164	ANL-W HRA/WCA Debris
	AW	165	Ash Stabilization and GGE Debris
	AW	167	MFC CH-TRU Heterogeneous Debris
	BC	201	Noncombustible Solids
	BC	202	Combustible Solids-Paper/Cloth
	BN	508	AMWTP Newly Generated Debris
	BN	510	Supercompacted Debris
	BN	550	Supercompacted Debris (BN510.1)
	MD	801	Rags, Paper, Wood, etc.
	MD	802	Dry Box Gloves and O-Rings
	MD	803	Metal, Equipment, Pipe, Valves, etc.
	MD	804	Plastic, Tygon®, Mani-Boots, etc.
	MD	805	Asbestos Filters
	MD	810	Glass, Flasks, Sample Vials, etc.
	MD	813	Glass Filters and Fiberglass
	MD	814	Graphite Waste
	MD	824	Equipment Boxes, Noncombustible
	MD	825	Equipment Drums, Noncombustible
	MD	826	Equipment Boxes, Combustible
	MD	827	Equipment Drums, Combustible
	MD	838	<10 nCi/g Non-combustible

Waste Type	Site	IDC	Description
	MD	847	LSA <100 nCi/g Combustible
	MD	848	LSA <100 nCi/g Noncombustible
	RF	241	Americium Process Residue
	RF	372	Grit
	RF	374	Blacktop, Concrete, Dirt, and Sand
	RF	750	Pits 11 and 12 Debris
	RF	760	Pad 1 Cells 1 and 2 RF Debris
	RF	950	LSA Metal, Glass, etc.
	RF	960	Concrete, Asphalt, etc.

Waste Type	Site	IDC	Description
INORGANIC NON-METAL	RF	060	Glass
	RF	440	Glass
	RF	441	Raschig Rings, Unleached
	RF	442	Raschig Rings, Leached
	RF	44A	WETP Bin Program – Glass (IDCs 440 and 442)
	RF	368	Magnesium Oxide Crucibles
	RF	370	LECO Crucibles
	RF	371	Fire Brick
	RF	377	Coarse Fire Brick
	RF	391	Crucibles and Sand
	RF	392	Sand, Slag, and Crucible
LEAD/CADMIUM METAL	RF	488	Glovebox Parts w/Lead
UNCATEGORIZED METAL	RF	050	Metal Scrap
	RF	48A	WETP Bin Program – Metals (IDCs 480 and 481)
	RF	320	Heavy Non-special Source Metal
	RF	321	Lead
	RF	416	Zinc Magnesium Alloy Metals
	RF	480	Scrap Metal (Non SS)
	RF	481	Leached Metals (Non SS)

Appendix B – Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

AMWTP
Advanced Mixed Waste Treatment Project

RPT-TRUW-83, Rev. 5

Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

Advanced Mixed Waste Treatment Project

Approved:

(Signature on file. See DCR-12123.) 03/18/13
Date

Advanced Mixed Waste Treatment Project
Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

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Advanced Mixed Waste Treatment Project
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Advanced Mixed Waste Treatment Project
Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

ACRONYMS

AE	Argonne National Laboratory-East (prefix)
AK	acceptable knowledge
AMWTF	Advanced Mixed Waste Treatment Facility
AMWTP	Advanced Mixed Waste Treatment Project
ATWIR	Annual Transuranic Waste Inventory Report
BC	Battelle Columbus (prefix)
BN	AMWTP (prefix)
CCP	Central Characterization Project
CH	contact-handled
CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
CWS	Chemical Warfare Service
D&D	decommissioning and dismantling
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DU	depleted uranium
DWPG	drummed waste packaging glovebox
EDMS	electronic document management system
EMOP	eight-drum metal overpack pallet
EPA	U.S. Environmental Protection Agency
EU	enriched uranium
HEPA	high efficiency particulate air
HENC	High-Efficiency Passive Neutron Counter
HWMA	Hazardous Waste Management Act
HSG	headspace gas
HWN	hazardous waste number
IDC	Item Description Code
INL	Idaho National Laboratory
LLD	lower limit of detection
LSA	low specific activity
MD	Mound Plant (prefix)
MEK	methyl ethyl ketone
MPFPD	Mixed Plutonium Finishing Plant Debris
NBL	New Brunswick Laboratory
NDA	non-destructive assay
PCB	polychlorinated biphenyl
PFP	plutonium finishing plant

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Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

PK	process knowledge
PMC	plutonium-molybdenum cermet
POS	Plant Optimization System
PPE	personal protective equipment
PPO	pressed plutonium oxide
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RF	Rocky Flats Plant (prefix)
RH	remote-handled
RL	Richland, Washington Hanford Site (prefix)
RLMPFPCD	Richland Mixed Plutonium Finishing Plant Comprehensive Debris
RTG	radioisotopic thermoelectric generators
RTR	real-time radiography
SCW	special case waste
SDOP	six-drum overpack box
SMOP	six-drum metal overpack pallet
SWB	standard waste box
TRU	transuranic
TRUCON	TRU waste content codes
TSCA	Toxic Substance Control Act
VE	visual examination
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WETP	WIPP experimental test program
WG Pu	weapons-grade plutonium
WIPP	Waste Isolation Pilot Plant
WMC	Waste Matrix Code
WMP	waste material parameter
WSPF	Waste Stream Profile Form

Advanced Mixed Waste Treatment Project
Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BN510.1

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

Supercompacted Debris Waste

1.2.2 Point of Generation

Advanced Mixed Waste Treatment Facility (AMWTF), Building WMF-676

1.2.3 Waste Stream Volume (Newly Generated)

Projected Volumes:

16,000 100-gallon drums (3,330 m^3)[2]

105 Standard Waste Boxes (SWBs) (198 m^3)[2]

Fifty percent of the debris waste feedstock is estimated to contain greater than 100 nanocuries per gram (nCi/g) transuranic (TRU) alpha activity and 50% contains less than 100 nCi/g TRU alpha activity. [14]

1.2.4 Generation Dates and Rate of Generation

August 2010 – December 2018

The average generation rate is estimated to be 120 m^3 per month.[28]

1.2.5 TRUCON Codes

ID121[3]

Advanced Mixed Waste Treatment Project
Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

1.2.6 Waste Isolation Pilot Plant Waste Stream ID

Waste Stream ID: IN-BN510.1[a]

1.2.7 Summary Category Group

S5000 – Debris Waste[(4)]

1.2.8 Waste Matrix Code Group

Heterogeneous Debris Waste

1.2.9 Waste Matrix Code

S5490 – Unknown/Other Heterogeneous Debris Category

The unknown/other-heterogeneous Waste Matrix Code (WMC) includes waste that is consistent with the definition for the Heterogeneous Debris (S5400), but does not meet the criteria for assignment into the S5410, S5420, S5440, S5450, or S5460 specific-detailed categories.[(4)] The waste stream consists of supercompacted debris waste.

1.2.10 Description from the ATWIR

The Annual Transuranic Waste Inventory Report (ATWIR) description for waste stream BN510.1 is a newly generated debris waste stream generated from supercompacted 55-gallon containers of debris waste.[(28)] [a]

a. The BN510.1 waste stream includes waste from the following Annual Transuranic Waste Inventory Report waste streams: IN-BN510, RLPFP-01, RL325-01, and RL231Z-01. [(28)]

Advanced Mixed Waste Treatment Project
Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

1.2.11 Defense Determination for AMWTP Waste

The supercompacted debris waste stream (BN510.1) generated at the Advanced Mixed Waste Treatment Project (AMWTP) is a result of compaction of waste generated at the Rocky Flats (RF), Mound (MD), Battelle Columbus (BC), Hanford (RL), Argonne National Laboratory-East (AE), and AMWTP (BN). The debris waste identified as feedstock to the AMWTP Supercompactor originated from various defense-related sources that include: weapons activities including defense inertial confinement fusion processes or activities, defense nuclear waste and material by-products management, defense nuclear waste and materials security and safeguards and security investigations, Naval reactors development, defense research and development, and defense nuclear material production. Currently, the largest contributing debris feedstock is associated with debris wastes generated from defense-related weapons activities associated with one or more of the following six U.S. Department of Energy (DOE) sites:

- The TRU debris wastes generated at RF and shipped to the Idaho National Laboratory (INL) were generated through defense program activities, or commingled with non-defense program waste that cannot be segregated. Furthermore, there is no historical record or evidence of spent nuclear fuel or high-level waste ever having been handled at the RF facility.[7, 19]

- The majority of the MD debris waste feedstock was generated during defense-related operations conducted at the MD for a variety of customers, including Lawrence Livermore National Laboratory, Hanford, Oak Ridge National Laboratory, and the Space Program. Plutonium-238 heat sources were designed and developed for spacecraft, generators, and satellites used directly by the U.S. Department of Defense (DOD) or in support of DOD missions. One of the major space programs supported by MD was the Space Nuclear Auxiliary Power System, which was sponsored by the DOD. Operations at the facility included processing and recovering plutonium, developing reactor fuels, conducting reactor fuel waste studies, and recovery of tritium and other isotopes for both DOD and domestic or private entities. The radioisotopic content (e.g., plutonium and other TRU isotopes of interest) of the MD debris waste feedstock is the result of commingling of wastes from both defense-related and domestic activities.[8, 20]

- Debris waste feedstock shipped from BC to the INL was generated during decommissioning and dismantling (D&D) of the JN-3 (Research Reactor Building) and other facilities. Defense-related operations were conducted at BC in support of Army, Navy, and Air Force programs. These operations included weapons-related activities and defense research into plutonium materials properties and development, plutonium metallurgy, actinide joining, and weapons production and assembly. Processing of test shot samples, development of ^{238}Pu heat sources for spacecraft for DOD, and some specialized work for Los Alamos were conducted in the JN-4 Plutonium Laboratory.[9, 21, 22, 23]

- The debris waste feedstock generated at RL and shipped to the AMWTP was generated during nuclear materials production, nuclear waste and materials by-products management, and defense research and development (R&D) activities conducted at RL facilities. Due to the nature of the work performed at RL analytical facilities, defense-related activities were carried out concurrent with non-defense projects and the wastes were commingled at the point of

Advanced Mixed Waste Treatment Project
Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

generation. Segregation of waste into defense and non-defense portions is not feasible. The RL debris waste may contain debris waste that has been determined to be waste that is incidental to reprocessing of spent nuclear fuel. The debris waste is not spent nuclear fuel or high-level waste.[29]

- AE is a multidisciplinary research laboratory that performs work in basic and applied science in the areas of engineering, energy technology, chemistry, physics, materials, biomedicine, and environmental studies. AE has been instrumental in the development of nuclear reactors and associated systems, materials, fuel elements, and components for use in both civilian and defense programs. This work included key participation in the development of essentially all the domestic nuclear reactor systems in use today for isotope production, power generation, and naval submarine propulsion, as well as experimental or proposed applications for weapons destruction, defense waste management, defense security and safeguards, and space propulsion. The New Brunswick Laboratory (NBL), located on the AE campus, serves as the technical extension of the U.S. DOE Office of Safeguards and Security in the areas of nuclear material control and accountability, safeguards, and nonproliferation.[53]

  Commingling of waste occurred at AE because waste was often generated in small volumes (i.e., less than 55 gallons) and numerous waste items were placed together in the same container either at the generator level and/or during repackaging. AE waste generators routinely commingled waste with no segregation of defense from non-defense waste. In addition, waste materials generated during the ongoing destructive examination of materials from different programs and contamination from fuel cutting/grinding/polishing activities also occurred within the hot cell examination area. [53]

  AE contact-handled (CH) wastes do not contain intact irradiated fuel pin test specimens and do not contain test residues, test materials, and the resultant test fragments from the fuel pin test specimens (including irradiated pin fragments and dispersed particulates [fines and dust]).[53] These wastes were managed as remote-handled (RH) waste. While AE performs research and experiments on fuel-bearing specimens, it does not possess or manage spent fuel elements. The research laboratory operations were not production operations involving the separation or reprocessing of constituent elements from reactor fuel and the CH waste does not include the high level fission products. These types of wastes were managed separately as RH waste. The CH debris waste is not spent nuclear fuel or high-level waste.[53]

- The waste generated at the AMWTF is the result of contact with defense-related TRU debris waste feedstock during treatment, characterization, maintenance, repackaging, and management.[6]

In accordance with interim guidance, defense wastes are identified as those wastes generated during work involving only defense activities, or during work in which defense and non-defense wastes were inadvertently mixed in the past and from which the non-defense portion cannot be segregated. The TRU wastes included in the BN510.1 Waste Stream Profile Form (WSPF) meet this definition.[24, 25]

Advanced Mixed Waste Treatment Project
Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

1.3 Waste Stream Description

The newly generated debris waste stream (BN510.1) is generated from supercompaction of 55-gallon containers of debris waste. The supercompacted debris waste (i.e., BN510.1) is generated from a single process (i.e., supercompaction). The supercompacted debris waste (i.e., BN510.1) has a common physical form that contains similar hazardous constituents and is generated from a single process or activity (Table 1). The generation of BN510 waste has been discontinued and WSPF BN510.1 has been developed due to the addition of hazardous waste numbers (HWNs) to the Supercompactor feedstock from Hanford debris waste.[29, 31] A list of authorized debris waste feedstock (by original generator and item description code [IDC]) is presented in Appendix A, Supercompactor Debris Waste Feedstock.[31] A description of the processes that generated the supercompacted debris waste is presented in Section 1.4.4.

Table 1. Physical waste form description for BN510.1.

ATWIR Number	IDC	Waste Matrix Code (WMC)	Description
IN-BN510.1	BN-550	S5490	Debris waste from multiple debris waste feedstock sources that have been supercompacted into pucks and packaged into 100-gallon drums.[a]

a. A list of debris waste feedstock IDCs is presented in Appendix A of this report.

Supercompacted debris waste consists of various combustible and noncombustible debris materials that originated from multiple DOE sites (i.e., RF, MD, BC, RL, AE, and BN).[6]

The BN510.1 supercompacted debris waste stream includes waste from Hanford Richland Mixed Plutonium Finishing Plant Comprehensive Debris (RLMPFPCD) stream and the following previously approved Waste Isolation Pilot Plant (WIPP)-WSPFs:[29, 31, 37]

- AMWTP BN510[31, 37]
- Hanford RLM231ZD.001[29, 37]
- Hanford RLM325D.001[29, 37]
- Hanford RLMPDT.001 [Mixed Plutonium Finishing Plant Debris (MPFPD)].[29, 37]

Supercompacted debris waste includes: paper and rags; gloves; wipes; asbestos; personal protective equipment (PPE); plastic and rubber items; filters; leaded gloves, aprons, bricks, and sheeting; metal with and without lead or cadmium; floor tiles, piping, sheet rock, insulation, and glass; raschig rings; crucibles; fire brick; wood; Plexiglas®; Benelex®; pieces of equipment and tools; graphite; grit; and asphalt and concrete packaged in 55-gallon drums, supercompacted, and

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packaged into 100-gallon product drums. Supercompacted debris may contain small amounts of non-debris waste such as absorbed liquids, soil, dirt, sand, absorbent, or homogeneous solids. Non-debris waste will be less than 50% by volume in each 100-gallon drum of compacted debris. [7, 8, 9, 29]

1.4 Process Description

1.4.1 Areas of Operation

The BN510.1 waste stream is generated by supercompaction of debris waste feedstock at the AMWTF in Building WMF-676. The debris waste feedstock is introduced into the Supercompactor as any of the following:

- Direct feed (in original 55-gallon drums from the generator site)
- From the drummed waste packaging glovebox (DWPG) where drummed waste is sorted and repackaged into new 55-gallon drums
- From the waste treatment boxline(s) where boxed waste is sorted, size-reduced, and repackaged into 55-gallon drums.

The boxed waste includes multi-drum overpacks (SDOPs, EMOPs, and SMOPs) containing up to eight 55- or six 85- gallon drums). An SDOP is a six-drum overpack wood box, an EMOP is an eight 55-gallon drum metal pallet, and an SMOP is a six 85-gallon drum metal pallet. The multi-drum overpacks are of two types: (1) one type is packaged with characterized debris drums for processing in AMWTF. These contain drums with IDCs confirmed by real-time radiography (RTR) to be acceptable feedstock waste; (2) the other type is packaged with drums that are not characterized but are labeled with historical acceptable knowledge (AK) information that indicates acceptable feedstock waste. [11, 32, 57, 58] Legacy retrieved boxes from the generators include Sandia steel boxes, bins, fiberglass reinforced plywood boxes, and cake boxes.

The Supercompactor, a glovebox with a 2,000-ton capacity compactor, size-reduces 55-gallon waste drums to roughly one-fifth their normal size. The supercompacted drums (pucks) are then packaged into 100-gallon containers (puck drums).

1.4.2 Process Flow Diagram

Figure 1 presents a flow diagram illustrating the generation and processing of AMWTP supercompacted debris waste.

1.4.3 Waste Generating Process

The AMWTP waste generation process is supercompaction of individual 55-gallon drums of debris waste feedstock into pucks (the final waste form). Debris waste feedstock contained in 55-gallon drums is characterized and validated through radioassay and RTR/visual examination (VE) to verify contents and then sent directly to the Supercompactor for processing.[11, 32, 33, 34, 35]

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Debris waste feedstock drums (e.g., 55- or 85-gallon drums) that require repackaging are introduced into the DWPG. Boxes of waste, including overpack boxes, are introduced into a boxline for sorting and repackaging into 55-gallon drums. The overpack boxes with uncharacterized drums undergo RTR to confirm the waste is >50% debris in each drum. [11, 32, 58] The drum contents are then visually examined in the boxline trough to confirm the waste is approved feed stock.[10] The legacy retrieved boxed wastes undergo RTR to confirm the waste form is approved feed stock. Certified VE is performed on the waste processed in the boxline as IDC BN-508. Prohibited items are processed in the boxline or special-case waste (SCW) glovebox. After treating, sorting, and/or removal of prohibited item(s), the waste is repackaged into 55-gallon drums as IDC BN-508. [10, 11, 47] No campaigning of feedstock type or generator site debris waste feedstock occurs during the supercompaction process. There is no cleanout of the boxline(s) except for periodic housekeeping or potential PCB cleanups. [10, 54, 55, 56] Repackaged waste drums and direct feed drums (not requiring repack) are fed into the Supercompactor.

Supercompaction is the treatment for unprotected sharp objects and sealed containers greater than 4 liters that do not contain prohibited liquids. Because there are no layers of confinement following supercompaction, it is also the treatment for excess layers of confinement. After compaction, the drum pucks are loaded into 100-gallon drums (IDC BN-550).[10] No additional chemicals or waste constituents are added to the supercompacted debris waste as a result of this process.

Debris waste generated during repackaging and VE is also included in the Supercompactor feedstock. This facility-generated waste is visually examined.[11]

The plant optimization system (POS) is used to optimize processing drums through the Supercompactor to produce 100-gallon drums (containing compacted drum pucks) to meet the WIPP Waste Acceptance Criteria (WAC).[5, 10, 27]

1.4.3.1 Liquid Waste Generation

Any liquids that may be generated as a consequence of supercompaction are removed from the Supercompactor sump, absorbed, packaged, and dispositioned.[10, 11, 30] This liquid waste is not included in the supercompacted debris waste stream (BN510.1) and is managed as a separate waste.

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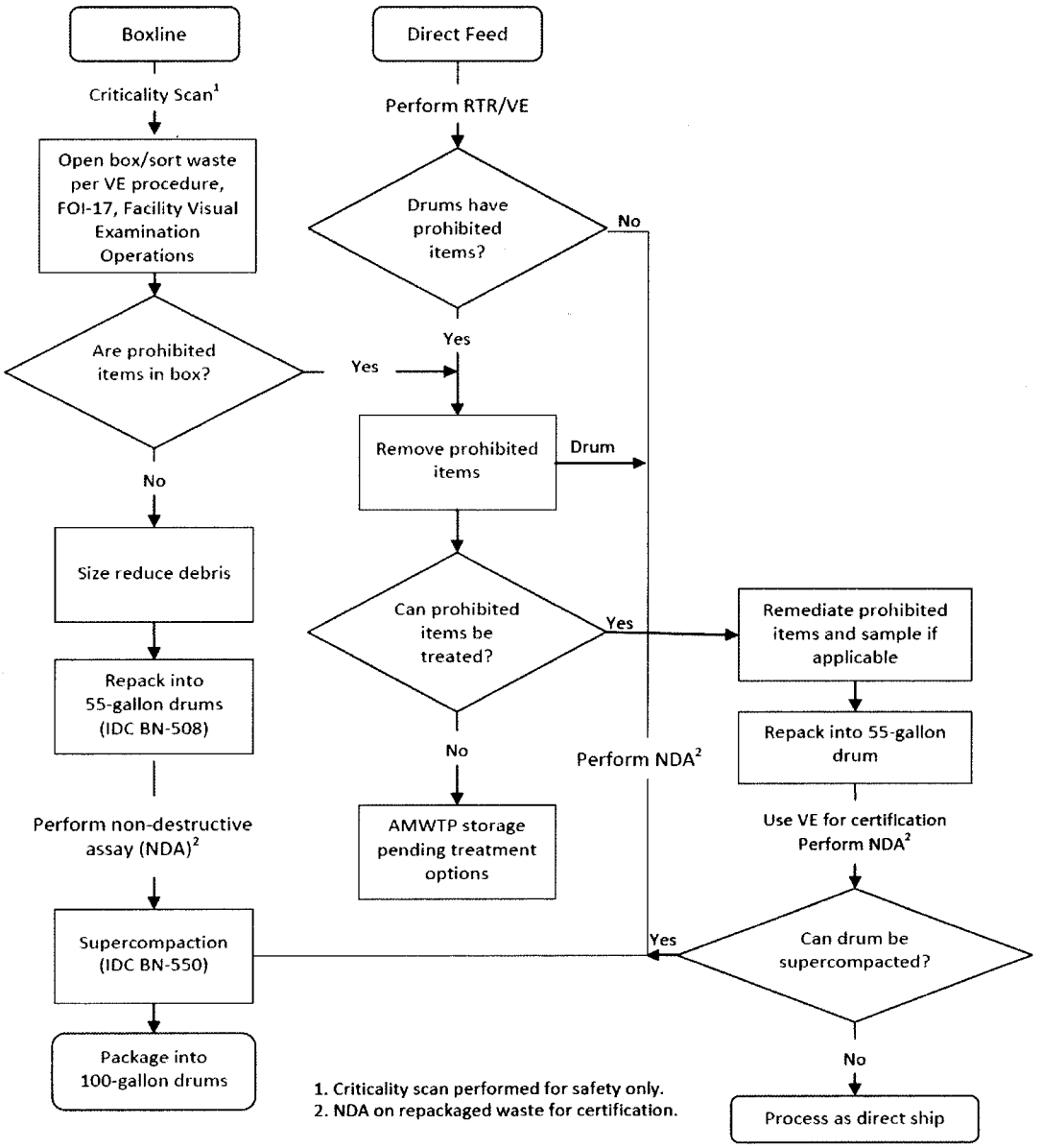

Figure 1. General flowchart for supercompacted debris waste generation and processing at the AMWTP.

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1.4.4 Material Inputs

The heterogeneous debris waste feedstock to the Supercompactor originated from multiple DOE sites (i.e., RF, MD, BC, RL, AE, and BN).

The AMWTP retrievably-stored debris waste feedstock was generated at the RF, MD, AE, and BC. The debris waste feedstock was generated during plutonium pit production; depleted uranium component fabrication; enriched uranium processing; support operations including radionuclide recovery, waste treatment, maintenance, laboratory analysis, and machining of non-nuclear weapon components; R&D; special order work; fabrication of ^{238}Pu heat sources and manufacture of radioisotopic thermoelectric generators; D&D activities; and materials development.[7, 8, 9, 53]

The RL debris waste feedstock shipped to the AMWTP was generated during plutonium production and fabrication; radiochemical processing and plutonium metallurgy laboratory activities; R&D; D&D technology development; and maintenance, cleanout, stabilization, and D&D activities.[29]

The BN debris waste feedstock is generated as a result of AMWTP waste facility maintenance operations, treatment (i.e., supercompaction, absorption of prohibited liquids, and removal of prohibited items), characterization, and general container management activities.[6]

The processes that generated debris wastes are listed below:

- RF
  - Plutonium metal and plutonium-containing materials manufacture, recovery, and treatment[7]
  - Plutonium production support operations including maintenance, laboratory activities, and R&D[7]
  - Non-routine events including renovations, spills, fires, and decommissioning[7]
  - Construction, demolition, and D&D operations.[7]
- MD
  - D&D of the Mound Plant Facility[8]
  - Pressed plutonium oxide (PPO) sphere and plutonium-molybdenum cermet (PMC) production[8]
  - Plutonium and other isotopic recovery[8]
  - Plutonium manufacture support such as laboratory activities and R&D[8]
  - Facility maintenance.[8]

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- BC
  - Research into the metallurgical and ceramic properties of plutonium and its alloys[9]
  - Plutonium processing[9]
  - Development of nuclear fuels[9]
  - D&D of the BC facilities.[9]
- RL
  - Plutonium Finishing Plant production, maintenance, cleanout, stabilization, and D&D[29]
    - RLMPDT.001 (MPFPD)[29]
    - RLMPFPCD[29]
  - Building 325 Radiochemical Processing Laboratory activities (RLM325D.001)[29]
  - Building 231-Z cleanout operations/activities, metallurgy R&D, plutonium fabrication, and D&D technology development (RLM231ZD.001).[29]
- AE
  - Support activities associated with the development and testing of various breeder reactor systems [53]
  - Laboratory operations associated with R&D/DOE waste management and supporting the examining/evaluating of nuclear fuel [53]
  - Repackaging activities [53]
  - Decontamination and decommissioning activities [53]
  - General Plant operations including waste management and maintenance. [53]
- BN
  - Characterization activities[6]
  - Repackaging activities[6]
  - Waste treatment activities including size reduction of large items, supercompaction, absorption of prohibited liquids, and removal of prohibited items [6]
  - Facility operations including waste management and maintenance.[6]

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The debris waste feedstock received and stored at the AMWTP is packaged in 55- or 85-gallon drums and a variety of boxes, bins, and crates. These boxes, bins, and crates are constructed of metal or fiberglass-reinforced plywood. The types of Supercompactor debris waste feedstock containers are as follows:

- Direct feed 55-gallon drums without rigid liners identified by generator (RF, MD, BC, AE, BN) assigned IDCs
- Direct feed 55-gallon drums with rigid liners identified by generator (RF, MD, AE, BC) assigned IDCs
- Repackaged RF, MD, BC, RL, AE, and BN debris waste from the boxline or DWPG in 55-gallon drums.

The first two bulleted types of debris waste feedstock containers retain their generator assigned IDCs until compaction.[1]

The acceptable knowledge document for AMWTP waste, RPT-TRUW-06, Acceptable Knowledge Baseline Document for AMWTP Wastes,[6] was compiled to provide AK for the AMWTP newly-generated wastes in accordance with MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation.[13] RPT-TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant; RPT-TRUW-13, Acceptable Knowledge Document for INL Stored Waste-Mound Plant Waste; RPT-TRUW-04, Acceptable Knowledge Document for the Battelle Columbus Laboratories Building JN-4 Plutonium Laboratory; RPT-TRUW-89, Acceptable Knowledge Document for Argonne National Laboratory-East Waste; and RPT-TRUW-82, Acceptable Knowledge Document for Hanford Debris Waste Shipped to AMWTP, are the AMWTP AK documents for the RF, MD, BC, AE, and RL facilities, respectively.[7, 8, 9, 29, 53]

The flow of the AMWTP AK documentation is presented in Figure 2.

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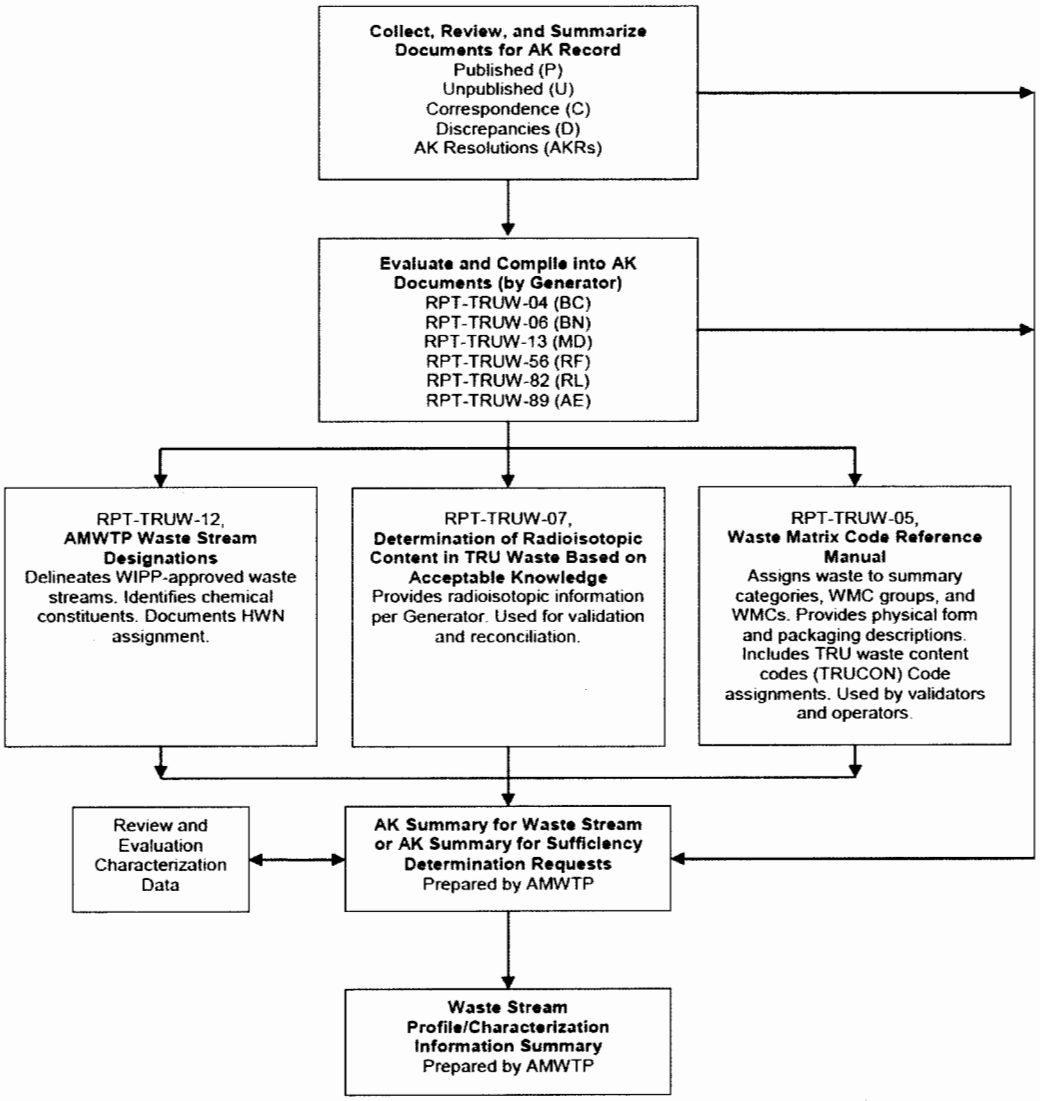

Figure 2. Document hierarchy and information flow for AK.

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1.4.5 Waste Material Parameters

The original waste material parameter (WMP) weight percentages for the BN510.1 waste stream estimate were based on the VE data for 100-gallon product drums generated from 2005 through 2009. WMP data for 22,399 containers with completed RTR/VE data from the BN510 waste stream were obtained from the AMWTP Waste Tracking System database for containers examined prior to January 1, 2010. This population represented approximately 54% of the estimated volume of supercompacted waste (i.e., 22,399 out of 41,600 drums projected for BN510 and BN510.1 waste streams). The updated estimate is based on the VE data from 3,426 drums of BN510.1 supercompacted waste visually examined prior to September 12, 2011. The estimated WMP weights (by percent) for the BN510.1 waste stream, excluding 100-gallon drum packaging, were calculated in accordance with the requirements of MP-TRUW-8.13. The updated estimated WMP weight parameters are representative of the BN510.1 waste stream and are summarized in Table 2.[12, 13, 46]

Table 2. Waste material parameters for supercompacted debris waste.

Waste Material Parameters	Estimated Percent WMP weight/unit waste
Iron-based Metals/Alloys	79
Aluminum-based Metals/Alloys	<1
Other Metals	<1
Other Inorganic Materials	1
Cellulosics	12
Rubber	<1
Plastics (waste materials)	7
Inorganic Matrix	<1
Organic Matrix	0
Soils/Gravel	<1

1.5 AK Sufficiency Determination

No AK sufficiency determinations apply to this waste stream.

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1.6 Prohibited Items

The following items are prohibited in waste containers shipped to WIPP as documented in MP-TRUW-8.1, Certification Plan for INL Transuranic Waste and MP-TRUW-8.2, Quality Assurance Project Plan.[5, 27]

- Liquid waste and prohibited observable liquids
- Sealed containers greater than 4 liters
- Non-radionuclide pyrophoric materials
- Hazardous wastes not occurring as co-contaminants with TRU mixed wastes
- Wastes incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Wastes containing explosives or compressed gases
- Wastes with polychlorinated biphenyls (PCBs) not authorized under an Environmental Protection Agency (EPA) PCB waste disposal authorization
- Wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (HWNs D001, D002, or D003)
- Waste that has ever been managed as high-level waste and waste from tanks specified in Table C-8 of MP-TRUW-8.2, unless specifically approved though a Class 3 permit modification.[27]

Debris waste feedstock containers that are identified as containing prohibited items during RTR or VE are treated (to absorb prohibited liquids or to remove prohibited items) or are rejected, as appropriate. None of the supercompacted debris drums shipped to WIPP will contain prohibited items.

Boxline(s) are used to VE and repackage the boxed debris waste into 55-gallon drums. Debris waste feedstock treated or examined in the DWPG, and waste from maintenance and cleanup activities, is either examined by RTR or visually examined.[10, 55, 56] The 55-gallon drums are non-destructive assayed. These drums of debris waste feedstock are then supercompacted and the pucks packaged into a 100-gallon product drum (IDC BN-550).[10, 11]

Prohibited items that can be treated to remove the prohibited characteristic are managed as newly generated waste. Containers with WIPP-prohibited liquids may be treated using non-hazardous solidification agents (e.g., Aquaset®, Aquaset II-G®, Petroset II® or Petroset IIG®, Micro-Cel® E, PIG®, or SP-400® absorbents) to render the waste acceptable prior to shipment.[38, 39, 42, 48, 49, 50, 52] Newly generated waste is characterized and assigned to an appropriate waste stream.[5, 27] In the event the treatment renders a debris waste form that can be compacted, it is included in BN510.1 as IDC BN-508.

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1.7 Resource Conservation and Recovery Act Determination

The BN510.1 waste is (and has been) subject to the State of Idaho Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) requirements (e.g., 40 CFR 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, and 40 CFR 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities) and is currently being managed under the AMWTP RCRA permitting requirements until it is shipped offsite.[44, 45]

1.7.1 EPA Hazardous Waste Numbers

Supercompacted debris is characterized as mixed TRU waste. The HWNs assigned to the authorized supercompacted debris waste feedstock include HWNs associated with the debris waste feedstock as originally compiled in the AK documents.[6, 7, 8, 9, 29, 53]

Toxicity characteristic HWNs applied to the supercompacted debris waste are:

D004 (arsenic), D005 (barium), D006 (cadmium), D007 (chromium), D008 (lead), D009 (mercury), D010 (selenium), D011 (silver) D022 (chloroform), D027 (1,4-dichlorobenzene), D028 (1,2-dichloroethane), D029 (1,1-dichloroethylene), D030 (2,4-dinitrotoluene), D034 (hexachloroethane), D037 (pentachlorophenol), and D043 (vinyl chloride).

Listed HWNs applied to this waste stream are:

F001: 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2-difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene, and, trichlorofluoromethane;

F002: 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,2-dichlorobenzene , chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane;

F004: cresols and nitrobenzene;

F005: 2-ethoxyethanol, 2-nitropropane, benzene, carbon disulfide, isobutanol, methyl ethyl ketone (MEK), pyridine, and toluene; and

F006, F007, and F009: electroplating waste.

The HWNs assigned to the BN wastes generated in the facility as a result of handling and processing feedstock waste are derived from the compilation of all EPA HWNs assigned to the authorized debris waste feedstock from the contributing generator sites (Table 3).[6, 7, 8, 9, 29, 40, 41, 43, 53]

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Table 3. HWN assignment by generator site.

Generator Site/Activity	Arsenic D004	Barium D005	Cadmium D006	Chromium D007	Lead D008	Mercury D009	Selenium D010	Silver D011	Chloroform D022	1,4-Dichlorobenzene D027	1, 2-Dichloroethane D028	1,1-Dichloroethylene D029	2,4-Dinitrotoluene D030	Hexachloroethane D034	Pentachlorophenol D037	Vinyl Chloride D043	Spent Solvents F001	Spent Solvents F002	Spent Solvents F004	Spent Solvents F005	Electroplating waste F006 F007 F009
Rocky Flats[7]																					
Isotope recovery [b]	•	•	•	•	•	•	•	•													
Laboratory reagents, research	•	•	•	•	•	•	•	•	•											•[a]	
Degreasing, decontamination																	•[a]	•[a]			
Cleaning, spill clean up																				•[a]	
Electroplating																					•[a]
Based on AK/HSG											•	•									
Mound Plant[8]																					
PPO & PMC production and isotope recovery [b]	•	•	•	•	•	•	•	•													
Cleaning and degreasing																	•[c]	•[c]		•[c]	
Electroplating																					•[c]
Based on AK/HSG									•			•									

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Table 3 (continued)

Activity	Arsenic D004	Barium D005	Cadmium D006	Chromium D007	Lead D008	Mercury D009	Selenium D010	Silver D011	Chloroform D022	1,4-Dichlorobenzene D027	1, 2-Dichloroethane D028	1,1-Dichloroethylene D029	2,4-Dinitrotoluene D030	Hexachloroethane D034	Pentachlorophenol D037	Vinyl Chloride D043	Spent Solvents F001	Spent Solvents F002	Spent Solvents F004	Spent Solvents F005	Electroplating waste F006 F007 F009
Battelle Columbus [9]																					
Metallurgical research		•	•	•	•	•		•													
Cleaning and degreasing																	•[d]	•[d]		•[d]	
Argonne National Laboratory – East [53]																					
Laboratory Operations[e]	•	•	•	•	•	•	•	•		•	•	•	•		•			•[e]	•[e]	•[e]	
Research Generated[e]	•	•	•	•	•	•	•	•		•	•	•	•		•			•[e]	•[e]	•[e]	
D&D[e]	•	•	•	•	•	•	•	•		•	•	•	•		•			•[e]	•[e]	•[e]	
Based on AK/HSG[e]	•	•	•	•	•	•	•	•		•	•	•	•		•			•[e]	•[e]	•[e]	

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Table 3 (continued)

Activity	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Chloroform	1,4-Dichlorobenzene	1,2-Dichloroethane	1,1-Dichloroethylene	2,4-Dinitrotoluene	Hexachloroethane	Pentachlorophenol	Vinyl Chloride	Spent Solvents	Spent Solvents	Spent Solvents	Spent Solvents	Electroplating waste
	D004	D005	D006	D007	D008	D009	D010	D011	D022	D027	D028	D029	D030	D034	D037	D043	F001	F002	F004	F005	F006 F007 F009
Hanford [29, 40, 41, 43]																					
PFP plutonium metal production operations and glovebox activities including maintenance, clean out, D&D and stabilization:																					
• RLMPDT.001 (MPFPD)	•	•	•	•	•	•	•	•					•								
• RLMPFPCD	•	•	•	•	•	•	•	•	•				•				•[f]	•[f]	•[f]	•[f]	
Radiochemistry Processing Laboratory operations and maintenance (RLM325D.001)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•[f]	•[f]	•[f]	•[f]	
Metallurgy operations, cleanout, and D&D (RLM231ZD.001)			•	•	•	•											•[f]	•[f]		•[f]	

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Table 3 (continued)

Activity	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Chloroform	1,4-Dichlorobenzene	1, 2-Dichloroethane	1,1-Dichloroetthylene	2,4-Dinitrotoluene	Hexachloroethane	Pentachlorophenol	Vinyl Chloride	Derived-From Rule	Derived-From Rule	Derived-From Rule	Derived-From Rule	Derived-From Rule
	D004	D005	D006	D007	D008	D009	D010	D011	D022	D027	D028	D029	D030	D034	D037	D043	F001	F002	F004	F005	F006 F007 F009
AMWTP [7, 8, 9, 29, 31, 40, 41, 43]																					
Newly generated waste from composited feedstock (i.e., supercompaction operations).	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•[g]	•[g]	•[g]	•[g]	•[g]

a. RF – F001 =, 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, carbon tetrachloride, tetrachloroethylene and trichloroethylene; F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, methylene chloride, tetrachloroethylene, and trichloroethylene; and F005 = 2-ethoxyethanol, benzene, carbon disulfide, methyl ethyl ketone, and toluene; and F006, F007, and F009 are assigned due to electroplating waste contamination.

b. Process used to recover radioisotopes (e.g., plutonium, americium, neptunium) which caused precipitation of metals as well as the radionuclides.

c. MD - F001 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, carbon tetrachloride, and methylene chloride; F002 =1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, and methylene chloride; F005 = benzene, carbon disulfide, MEK, and toluene. F007 and F009 HWNs are assigned due to electroplating waste contamination.

d. BC – F001= methylene chloride and trichloroethylene; F002 = methylene chloride and trichloroethylene; and F005 = benzene, MEK, and toluene.

e. AE – D019 carbon tetrachloride, assigned to AE waste, is covered under the F001 assigned to the BN510.1 waste stream. F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, chlorobenzene, methylene chloride, tetrachloroethylene, and trichloroethylene; F004 = nitrobenzene; F005 = benzene, carbon disulfide, isobutanol, MEK, and toluene. Due to the commingling of AE waste and management based on content codes during the early years of shipment, the applicable AE HWNs/constituents associated with AE heterogeneous debris waste are the same for all activities.

f. RL – F001=1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2-difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane; F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,2-dichlorobenzene, chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane; F004 = cresols and nitrobenzene; and F005 = 2-nitropropane, benzene, carbon disulfide, isobutanol, MEK, pyridine and toluene. Listed HWN constituents identified in footnote [a] are the summation from referenced AK and process knowledge (PK) documents.

g. BN (product drum)– F001= 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2-difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene and trichlorofluoromethane; F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane; 1,2-dichlorobenzene, chlorobenzene, methylene chloride; tetrachloroethylene, trichloroethylene, and trichlorofluoromethane; F004 = cresols and nitrobenzene; F005 = 2-ethoxyethanol, 2-nitropropane, benzene, carbon disulfide, isobutanol, MEK, pyridine and toluene; and F006, F007, and F009 are assigned due to electroplating waste contamination.

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1.7.2 Hazardous Determination

1.7.2.1 Hazardous Waste Management

The wastes that comprise this waste stream are newly generated. HWNs initially or historically assigned to the wastes are the same as the current HWN assignments.[1] The wastes that comprise this waste stream have historically been managed as mixed TRU waste at the AMWTP and are currently classified by AMWTP AK as mixed TRU waste based on RCRA mixture and/or derived-from rules.[1, 6]

The generation of BN510 waste has been discontinued and WSPF BN510.1 has been developed due to the addition of HWNs to the Supercompactor feedstock from Hanford debris waste.[29, 31]

1.7.2.2 Ignitability

The waste materials in this waste stream do not meet the 40 CFR 261.21, Characteristic of Ignitability, definition of ignitability. Ignitable wastes are prohibited from entering the Supercompactor. The supercompacted debris waste is not a liquid, an ignitable compressed gas, or an oxidizer. If found, liquid in excess of WIPP-WAC limits will be removed or undergo treatment (absorption) prior to supercompaction and WIPP disposal. Containers that are identified as having prohibited liquids may be treated using Aquaset®, Aquaset II-G®, Petroset II®, Petroset IIG®, Micro-Cel® E, PIG®, or SP-400® absorbents to ensure that the waste is acceptable for disposal at WIPP.[38, 39, 42, 48, 49, 50, 52] The waste materials in this waste stream are not compressed gas and do not contain compressed gas. The waste does not meet the U.S. Department of Transportation definition of an oxidizer as defined in 49 CFR 173, Shippers – General Requirements for Shipments and Packagings. Finally, the waste is not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change. This waste stream does not exhibit the characteristic of ignitability (D001).

1.7.2.3 Corrosivity

The materials in this waste stream do not meet the 40 CFR 261.22, Characteristic of Corrosivity, definition of corrosivity. The supercompacted debris waste is not liquid waste and does not contain liquids in excess of WIPP-WAC limits. If found, liquid in excess of WIPP-WAC limits will be removed or treated (absorbed) prior to supercompaction and WIPP disposal. Containers that are identified as having prohibited liquids may be treated using Aquaset®, Aquaset II-G®, Petroset II®, Petroset IIG®, Micro-Cel® E, PIG®, or SP-400® absorbents to ensure that the waste is acceptable for disposal at WIPP.[38, 39, 42, 48, 49, 50, 52] Therefore, this waste stream does not exhibit the characteristic of corrosivity (D002).

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1.7.2.4 Reactivity

The waste materials in this waste stream do not meet the 40 CFR 261.23, Characteristic of Reactivity, definition of reactivity. Reactive wastes are prohibited from entering the Supercompactor. Supercompacted debris is not a liquid waste. Any containers that are identified as having prohibited liquids may be treated using Aquaset®, Aquaset II-G®, Petroset II® or Petroset IIG®, Micro-Cel® E, PIG®, or SP-400® absorbents to ensure that the waste is acceptable for disposal at WIPP.[38, 39,42, 48, 49, 50, 52] The BN510.1 waste stream is stable and will not undergo violent chemical change, react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors, or fumes when mixed with water. The waste does not contain sulfide waste which, when exposed to a pH between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment. The waste is not capable of detonation or explosive reaction if subjected to a strong initiating source if heated under confinement. The waste is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure. The materials do not contain explosive material and are not forbidden explosives or Division 1.1, 1.2, or 1.3 (Class A or B) explosives as defined in 49 CFR 173. Although the waste contains wastes that are assigned F006, F007, and F009 listed HWNs that are associated with cyanide electroplating operations, the waste when exposed to a pH between 2 and 12.5 will not generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment. This non-reactive position is based on AMWTP AK documents that debris waste being used as feedstock is a non-reactive RCRA waste. This waste stream does not exhibit the characteristic of reactivity (D003).

1.7.2.5 Toxicity

The supercompacted debris waste stream contains RCRA toxicity constituents associated with toxicity characteristic metals and organics. See Table 3 for process-related activities associated with the HWNs.

The RCRA toxicity characteristic metals and organics assigned to this waste stream are: D004 (arsenic); D005 (barium); D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury); D010 (selenium); D011 (silver); D022 (chloroform); D027 (1,4-dichlorobenzene); D028 (1,2-dichloroethane); D029 (1,1-dichloroethylene); D030 (2,4-dinitrotoluene); D034 (hexachloroethane); D037 (pentachlorophenol); and D043 (vinyl chloride).[1, 6, 7, 8, 9, 18, 29, 31, 40, 41, 43, 53]

The RCRA toxicity characteristic metal HWNs: D004 (arsenic); D005 (barium); D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury); D010 (selenium); D011 (silver) were identified based on AK documentation associated with RF, MD, BC, BN, AE, and RL feedstock for the BN510.1 WSPF. The D004, D005, D006, D007, D008, D009, D010, and D011 HWNs are assigned to the supercompacted debris waste stream.[1, 6, 7, 8, 9, 29, 31, 40, 41, 43, 53]

The HWN D019 (carbon tetrachloride) was associated with AE feedstock to the BN510.1 WSPF. Because F-listed waste F001 was assigned to the Supercompactor feedstock, the D019 HWN is not assigned but rather addressed within the F-listed waste section below.[53]

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The HWN D022 (chloroform) was assigned based on AK documentation associated with RF, MD, and RL feedstock to the BN510.1 WSPF. The associated toxicity characteristic HWN D022 is assigned to the supercompacted debris waste stream.[29, 31, 40, 41]

The HWNs D027 (1,4-dichlorobenzene); D030 (2,4-dinitrotoluene); and D037 (pentachlorophenol) were assigned based on AK documentation associated with AE and RL feedstock to the BN510.1 WSPF. The associated toxicity characteristic HWNs D027, D030, and D037 are assigned to the supercompacted debris waste stream. [29, 40, 41, 53]

The HWNs D034 (hexachloroethane) and D043 (vinyl chloride) were assigned based on AK documentation associated with RL feedstock to the BN510.1 WSPF. The associated toxicity characteristic HWNs D034 and D043 are assigned to the supercompacted debris waste stream.[29, 40, 41]

The HWNs D028 (1,2-dichloroethane) and D029 (1,1-dichloroethylene) were assigned in the AK documentation associated with RF, AE, and RL feedstock to the BN510.1 WSPF. The D028 and D029 HWNs are assigned to the supercompacted debris waste stream.[18, 29, 31, 41, 53]

1.7.2.6 Listed Waste

F-Listed HWNs. The supercompacted debris waste stream contains constituents associated with RCRA-listed waste HWNs. See Table 3 for process-related activities associated with the HWNs.

The BN510.1 supercompacted debris waste stream is assigned the F-listed HWNs: F001, F002, F004, F005, F006, F007, and F009. These F-Listed HWNs were historically assigned to feedstock waste by the original generator of the waste, for spent solvents used for cleaning, degreasing, and laboratory operations, and from electroplating operations. [1, 6, 7, 16, 29, 40, 41, 43, 53]

The HWNs: F001 (1,1,1- trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,2,2-tetrachloro-1,2-difluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane) and F002 (1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,2-dichlorobenzene, chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane) were assigned based on AK documentation associated with RF, MD, BC and RL feedstock to the BN510.1 WSPF. In addition, the F002 hazardous waste constituents 1,1,1-trichloroethane; 1,1,2-trichloro-1,2,2-trifluoroethane; chlorobenzene; methylene chloride; tetrachloroethylene; and trichloroethylene were assigned based on AK documentation associated with AE feedstock to the BN510.1 WSPF. Therefore, supercompacted debris waste stream is assigned the EPA HWNs F001 and F002.[1, 6, 7, 8, 9, 29, 40, 41, 43, 53]

Non-halogenated F003 solvent constituents (e.g., acetone, cyclohexanone, ethyl benzene, ethyl ether, methanol, methyl isobutyl ketone, n-butyl alcohol, and xylenes) were identified in the AK and PK record as contaminants associated with the Supercompactor debris waste

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feedstock. The BN510.1 waste stream does not exhibit the characteristic of ignitability. Therefore, the F003 HWN is not assigned to the supercompacted debris waste stream.[1]

The HWN F004 (cresols and nitrobenzene) were assigned based on AK documentation associated with RL and AE feedstock to the BN510.1 WSPF. The resultant supercompacted debris waste retains the listed HWNs assigned to the Supercompactor feedstock based on current regulatory requirements (i.e., the RCRA derived-from rule). Therefore, supercompacted debris waste stream is assigned the EPA HWN F004.[29, 40, 41, 53]

The HWN F005 (2-ethoxyethanol, 2-nitropropane, benzene, carbon disulfide, isobutanol, MEK, pyridine, and toluene) were assigned based on AK documentation associated with RF, MD, BC, AE, and RL feedstock to the BN510.1 WSPF. Therefore, supercompacted debris waste stream is assigned the EPA HWN F005.[1, 6, 7, 8, 9, 29, 40, 41, 43, 53]

The HWNs F006, F007 and F009 were assigned based on AK documentation associated with RF feedstock and HWNs F007 and F009 were also assigned based on AK documentation associated with MD feedstock to the BN510.1 WSPF. Therefore, supercompacted debris waste is assigned the F006, F007, and F009 EPA HWNs.[1, 6, 7, 16]

P-, U-, and K- Listed HWNs. The feedstock debris wastes in this waste stream are not discarded, unused, commercial chemical products, off-specification species, or manufacturing intermediates and do not contain spill residues thereof that would meet the listing of P- or U-listed hazardous waste as identified in 40 CFR 261.33, Discarded Commercial Chemical Products, off-Specification Species, Container Residues, and Spill Residues thereof. In addition, the waste materials in this waste stream were not mixed with, or derived from, the treatment, storage, or disposal of P- or U-listed waste. As a result, P- or U-listed HWNs are not assigned to this waste stream.[1, 6, 7, 8, 9, 29, 40, 41, 43, 53]

Although hydrofluoric acid was identified as a chemical contaminant associated with the Supercompactor debris waste feedstock, only spent forms of hydrofluoric acid would have contaminated the feedstock debris waste. Based on this information, the U134 HWN is not assigned to this waste stream.[1, 6, 7, 8, 9, 29, 40, 41, 43, 53]

Based on a review of AK, it was determined that the BN510.1 waste stream will contain less than one percent beryllium by weight. Beryllium is a contaminant associated with this waste. The source of the beryllium is not associated with a powdered form and is not associated with unused commercial chemical product, an off-specification species, or a container residue, and does not contain a spill residue thereof. The P015 HWN for beryllium powder is not assigned to this waste stream.[1, 6, 7, 8, 9, 29, 40, 41, 43, 53]

The waste materials within this waste stream are not hazardous waste from specific sources listed in 40 CFR 261.32, Hazardous Wastes from Specific Sources, (i.e., K-listed hazardous waste) and they have not been mixed with; derived from the treatment, storage, or disposal of K-listed wastes; and do not contain spill residues thereof. The waste materials in this waste stream are not assigned K-listed HWNs.[1, 6, 7, 8, 9, 29, 40, 41, 43, 53]

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Toxic Substances Control Act (TSCA) Regulated Contaminants. Polychlorinated biphenyl items with PCB concentrations equal to or exceeding 50 parts per million are not expected in the BN510.1 waste stream.

Drums of debris waste feedstock identified during RTR/VE as containing PCB items are segregated or sent to DWPG or SCW for item removal.[1, 10, 17, 30, 31] PCB items identified in boxed debris are removed during boxline operations. Potential PCB contaminated waste identified during boxline repackaging is subject to cleanup requirements. [54] PCB items removed from debris waste feedstock drums and boxes and potential PCB cleanup wastes are packaged as newly generated waste and are not authorized as Supercompactor debris waste feedstock.

Asbestos has been identified in some of the debris feedstock waste. Any containers identified as containing regulated types or quantities (e.g., greater than 1% of friable asbestos) will be labeled, as required, in accordance with TSCA and Occupational Safety and Health Administration regulations.

Other Applicable Waste Streams. The AMWTP BN510 waste stream is pertinent to the BN510.1 waste stream. The IDCs identified within Appendix A includes IDCs previously identified within the BN510 WIPP-approved WSPF. The EPA HWNs assigned to the BN510 WSPF included D004 through D011, D022, D028, D029, F001, F002, F005, F006, F007, and F009.[31] The EPA HWNs assigned to BN510.1 include D004 through D011, D022, D027, D028, D029, D030, D034, D037, D043, F001, F002, F004, F005, F006, F007, and F009. The addition of the D027, D030, D034, D037, D043 and F004 HWNs is due to AK associated with the inclusion of RL debris waste into the Supercompactor feedstock.[29, 40, 41]

1.8 Radionuclides

The radionuclides of concern for BN510.1 are ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, and ^{241}Am. The remaining WIPP-tracked radionuclides, ^{137}Cs and ^{90}Sr, are not expected to be present in measurable quantities in debris waste feedstock from RF except for IDC RF-480, due to disposal of isotopic sealed source material. Cesium-137 and computed ^{90}Sr are anticipated radionuclides for IDC RF-480 feedstock and may be detected during NDA. Cesium-137 and ^{90}Sr were identified as potentially present in AE, MD, BC, and RL debris waste. [7, 8, 9, 14, 29, 53]

At a minimum, the ratios of the two most prevalent radionuclides in the isotopic mix are compared to confirm existing AK data in compliance with CH-WAC requirements. The two most prevalent radionuclides expected in the majority of AMWTP supercompacted debris waste product drums are ^{239}Pu and ^{240}Pu. This is based on a review of product drums included in the BN510.1 WSPF; however, the prevalent radioisotopes in some product drums of supercompacted debris waste may be a combination of ^{239}Pu and a different second TRU or uranium isotope due to commingling of wastes.

Table 4 identifies the predominant radionuclides and the principle source of those radionuclides for each of the original generators and for the supercompacted debris wastes.[7, 8, 9,

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[14, 29, 53] For waste containers that have multiple generators and therefore a mixture of weapons grade plutonium (WG Pu), enriched uranium (EU), depleted uranium (DU), heat source isotopes, and fuel grade plutonium, a combination of any two of the common isotopes identified may be detected as the most prevalent. Radioassay data are reviewed and assessed by AMWTP NDA personnel as described in the RPT-TRUW-03, Drum Assay Technical Review Report.[15]

The radioisotopic content for each AMWTP supercompacted debris waste 100-gallon product drum will be calculated based on the aggregate of the NDA results for each of the compacted debris waste feedstock drums contained therein. The POS is used to ensure that each payload container does not exceed WAC weight or dose limits and complies with the required TRU activity (greater than 100 nCi/g). The direct feed 55-gallon drums will contain at least one TRU radionuclide greater than the lower limit of detection (LLD). The 100-gallon product drums that contain puck(s) with TRU radionuclides at less than LLD from the boxline feed, as determined by 55-gallon drum assay, are assayed using the Super HENC (high energy neutron counter) for final TRU determination.

Table 4. Predominant radionuclides expected in debris wastes by generator site.

Generator Site	Principal Plutonium Source	Predominant Radionuclides by Activity
RF	WG	^{239}Pu, ^{240}Pu
RF	WG, DU, EU	^{239}Pu (^{235}U or ^{238}U)
MD	WG	^{239}Pu, ^{240}Pu
MD	Heat source	^{238}Pu, ^{239}Pu
BC	WG	^{239}Pu, ^{240}Pu
AE	Combination WG Pu, fuels-grade Pu	^{241}Pu, ^{239}Pu
RL	Combination WG Pu, fuels-grade Pu	^{239}Pu (^{241}Pu or ^{241}Am)
BN	WG (RF waste)	^{239}Pu, ^{240}Pu
BN	Combination WG Pu, heat source Pu	^{238}Pu, ^{239}Pu
BN	Combination WG Pu, heat source Pu, uranium, fuels-grade Pu	^{239}Pu (^{240}Pu, ^{241}Pu, ^{238}Pu, ^{241}Am, ^{235}U or ^{238}U)

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

BN510.1 consists of supercompacted drums of debris waste (pucks) placed directly into 100-gallon product drums. There are no inner packagings or layers of confinement associated with the 100-gallon product drums. There is a filtered lid on the 100-gallon drums. If 100-gallon drums become damaged, they are packaged into SWBs for shipment to WIPP.

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2.2 Flammability Consideration

The payload containers in the waste stream must comply with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with the flammable gas limits will be performed for volatile organic compounds (VOCs), hydrogen, and methane. Headspace gas (HSG) sampling and analysis is performed when required by the WIPP-Waste Acceptance Plan and/or CH-TRAMPAC. At a minimum, the HSG analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with HSG results exceeding 500 parts per million flammable VOCs, are evaluated for compliance with applicable CH-TRAMPAC requirements prior to shipment. Payloads containing flammable VOCs are managed in accordance with CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC).[26]

3.0 REFERENCES

NOTE: *Advanced Mixed Waste Treatment Project documents such as procedures, AK reports, and operating instructions, are cited without revision numbers or dates. The most recent revisions of these documents are available through the AMWTP Electronic Document Management System (EDMS). Previous revisions are available on EDMS.*

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3. DOE/WIPP 01-3194, CH-TRU Waste Content Codes (CH-TRUCON)
4. DOE/LLW-217, DOE Waste Treatability Group Guidance, 1995. [P670A]
5. MP-TRUW-8.1, Certification Plan for INL Transuranic Waste
6. RPT-TRUW-06, Acceptable Knowledge Baseline Document for AMWTP Waste
7. RPT-TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant
8. RPT-TRUW-13, Acceptable Knowledge Document for INL Stored Transuranic Waste – Mound Plant Waste
9. RPT-TRUW-04, Acceptable Knowledge Document for the Battelle Columbus Laboratories Building JN-4 Plutonium Laboratory
10. INST-FOI-20, Supercompactor and Post-Compaction Operations
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26. CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC), Central Characterization Project [P672A]

27. MP-TRUW-8.2, Quality Assurance Project Plan

28. DOE/TRU-11-3425, Annual Transuranic Waste Inventory Report - 2011, U.S. Department of Energy, Carlsbad Field Office, Rev. 0. [P1374A]

29. RPT-TRUW-82, Acceptable Knowledge Document for Hanford Debris Waste Shipped to AMWTP

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30. INST-FOI-23, Special Case Waste Operations

31. RPT-TRUW-30, Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510)

32. INST-OI-12, Real-Time Radiography Operations (Drum)

33. INST-OI-34, Non-Facility Visual Examination Operations

34. INST-FOI-01, In-Plant Drum Assay Operations

35. INST-OI-14, Drum Assay Operations

36. RPT-TRUW-05, Waste Matrix Code Reference Manual

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58. MP-TRUW-8.45, Virtual Overpack Process and Planning

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Appendix A – Supercompactor Debris Waste Feedstock

The following table lists the authorized debris waste feedstock by original generator and IDC.[7, 8, 9, 29, 36]

Waste Type	Site	IDC	Description
COMBUSTIBLES	RF	010	Paper and Rags
	RF	020	Wood and Benelex
	RF	030	Plastic
	RF	040	Rubber
	RF	33A	WIPP Experimental Test Program (WETP) Bin Program-Combustibles A (IDCs 335, 336, 337 and 339)
	RF	33B	WETP Bin Program – Combustibles B (IDCs 330, 337, and 339)
	RF	302	Benelex® and Plexiglas®
	RF	330	Paper and Rags-Dry
	RF	336	Paper and Rags-Moist
	RF	337	Plastic, Teflon®, Washables, PVC
	RF	339	Leaded Rubber Gloves and Aprons
	RF	430	Unleached Ion Column Resin
	RF	431	Leached Resin
	RF	460	Washables, Rubber, Plastic
	RF	463	Leaded Rubber Gloves and Aprons
	RF	464	Benelex® and Plexiglas®
	RF	833	Plastics, TRU Mixed
	RF	831	Dry Combustibles
	RF	832	Wet Combustibles
	RF	900	Low Specific Activity (LSA) Paper, Plastics, etc.
	RF	970	Wood
FILTERS	RF	328	Ful-Flo® Incinerator Filters
	RF	335	Absolute 8 × 8 Filters
	RF	338	Insulation and Chemical Warfare Service (CWS) Filter Media
	RF	360	Insulation
	RF	376	Cemented Insulation and Filter Media

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Waste Type	Site	IDC	Description
	RF	490	High-Efficiency Particulate Air Filters and CWS Filters
	RF	491	Plenum Prefilters
GRAPHITE	RF	070	Graphite
	RF	300	Graphite Molds
	RF	301	Graphite Cores
	RF	303	Scarfed Graphite Chunks
	RF	310	Graphite Scarfings
	RF	312	Coarse Graphite
HETEROGENEOUS	AE	100	General Plant Waste
	AE	101	Cut up Gloveboxes
	AE	104	Alpha Hot Cell Waste
	AE	106	Special Source Material
	AE	110	Research Generated Waste
	AE	120	D and D Waste Compactable and Combustible Solids
	BC	201	Non-combustible Solids
	BC	202	Combustible Solids-Paper/Cloth
	BN	508	AMWTP Newly Generated Debris
	BN	510	Supercompacted Debris
	BN	550	Supercompacted Debris (BN510.1)
	MD	801	Rags, Paper, Wood, etc.
	MD	802	Dry Box Gloves and O-Rings
	MD	803	Metal, Equipment, Pipe, Valves, etc.
	MD	804	Plastic, Tygon®, Mani-Boots, etc.
	MD	805	Asbestos Filters
	MD	810	Glass, Flasks, Sample Vials, Etc.
	MD	813	Glass Filters and Fiberglass
	MD	814	Graphite Waste
	MD	824	Equipment Boxes, Non-combustible
	MD	825	Equipment Drums, Non-combustible
	MD	826	Equipment Boxes, Combustible
	MD	827	Equipment Drums, Combustible
	MD	838	<10 nCi/g Non-combustible
	MD	847	LSA <100 nCi/g Combustible
	MD	848	LSA <100 nCi/g Non-combustible

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Waste Type	Site	IDC	Description
	RF	241	Americium Process Residue
	RF	372	Grit
	RF	374	Blacktop, Concrete, Dirt, and Sand
	RF	750	Pits 11 and 12 Debris
	RF	760	Pad 1 Cells 1 and 2 RF Debris
	RF	950	LSA Metal, Glass, etc.
	RF	960	Concrete, Asphalt, etc.
	RL	712	Hanford Plutonium Finishing Plant Debris
	RL	714	Hanford Radiochemical Processing Lab 325 Bldg Debris
	RL	716	Hanford 231-Z Building Debris

Advanced Mixed Waste Treatment Project
Acceptable Knowledge Summary for Supercompacted Debris Waste (BN510.1)

Waste Type	Site	IDC	Description
INORGANIC NON-METAL	RF	060	Glass
	RF	440	Glass
	RF	441	Raschig Rings, Unleached
	RF	442	Raschig Rings, Leached
	RF	44A	WETP Bin Program – Glass (IDCs 440 and 442)
	RF	368	Magnesium Oxide Crucibles
	RF	370	LECO Crucibles
	RF	371	Fire Brick
	RF	377	Coarse Fire Brick
	RF	391	Crucibles and Sand
	RF	392	Sand, Slag, and Crucible
LEAD/CADMIUM METAL	RF	488	Glovebox Parts w/Lead
UNCATEGORIZED METAL	RF	050	Metal Scrap
	RF	48A	WETP Bin Program – Metals (IDCs 480 and 481)
	RF	320	Heavy Non-special Source Metal
	RF	321	Lead
	RF	416	Zinc Magnesium Alloy Metals
	RF	480	Scrap Metal (Non SS)
	RF	481	Leached Metals (Non SS)