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

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 BN510.3, *Supercompacted Debris Waste*

Dear Mr. Kieling:

The Department of Energy, Carlsbad Field Office has approved the Waste Stream Profile Form (WSPF) Number BN510.3, *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

Enclosure

cc: w/enclosure
S. Holmes, NMED *ED
T. Kliphuis, NMED ED
C. Smith, NMED ED
R. Maestas, NMED ED
C. Walker, TechLaw ED
CBFO M&RC
*ED denotes electronic distribution

CBFO:NTP:JRS:GL:13-0788:UFC 5900.00

AMWTP Advanced Mixed Waste Treatment Project	**Waste Stream Profile Form**	Form-1195 Rev. 5 Effective: 03/02/11 Page 1 of 3

Implementing Document: MP-TRUW-8.14

Waste Stream Profile Number: BN510.3

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: 4/29/05 (Revised 5/3/05), 6/16/06, 1/18/08, 1/9/09, 1/8/10, 1/25/11, 5/1/12, 9/10/13

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, 7/31/2013

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-BN510.3[3] | Summary Category Group: S5000

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

Description from the ATWIR: BN510.3 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: 92 | Number of Drums: 9,000 100 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, D033, 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. 1 and 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 Nos. 1 and 3

Material inputs or other information identifying chemical/radionuclide content and physical waste form: Ref. Nos. 1, 3, 4, 5, 6, 16, 17, 18, 19, 20, 22, and 24

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)
- ☐ Verification and control technology
- ☐ 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
- ☐ Defense nuclear material production

Additional Acceptable Knowledge Documentation

Process design documents:	N/A
Standard operating procedures:	Reference Nos. 1, 3, 13, and 25
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, 22, 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 Nos: 8 and 23
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.

Eric Schweinsberg — Signature of Site Project Manager

Eric Schweinsberg — Printed Name

November 18th, 2013 — Date

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 a signed Characterization Information Summary documenting this determination.

(3) This waste stream is currently not identified in the ATWIR. The ATWIR will be updated at the time of the next data call to include the following: BN510.3 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: verification and control technology, weapons activities including defense inertial confinement fusion, 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 eight U.S. Department of Energy (DOE) sites.

Reference List:

1. RPT-TRUW-83, Acceptable Knowledge Summary for Supercompacted Debris Waste, Rev. 6, September 10, 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 Document for AMWTP Waste, Rev. 15, October 23, 2013
4. RPT-TRUW-12, AMWTP Waste Stream Designations, Rev. 21, October 7, 2013
5. RPT-TRUW-05, Waste Matrix Code Reference Manual, Rev. 33, October 31, 2013
6. RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge, Rev. 19, November 5, 2013
7. MP·TRUW-8.5, TRU Waste Certification, Rev. 29, June 11, 2013
8. INST-OI-12, Real-Time Radiography Examinations (Certification Scans), Rev. 52, August 13, 2013
9. INST-OI-34, Non-Facility Visual Examination Operations, Rev. 28, September 3, 2013
10. INST-FOI-17, Facility Visual Examination Operations, Rev. 27, September 3, 2013
11. RPT-PEP-01, 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. 40, September 30, 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-79, Acceptable Knowledge Document for Materials and Fuels Complex Waste, Rev 3, September 30, 2013
21. MP-TRUW-8.1, Certification Plan for INL Transuranic Waste, Rev. 24, June 10, 2013
22. RPT-TRUW-89, Acceptable Knowledge Baseline for Argonne National Laboratory-East Waste, Rev 1, March 20, 2013
23. INST-OI-14, Drum Assay Operations, Rev 34, October 28, 2012
24. RPT-TRUW-91, Acceptable Knowledge Document for Pre-1980 INL-Exhumed SDA Waste, Rev. 1, August 1, 2013
25. MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation, Rev. 25, August 13, 2013.

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

WSPF No.: BN510.3

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 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.: BN510.3

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: Eric Schweinsberg (Printed name) Eric Schweinsberg (Signature) Nov. 18th 2013 (Date)

2nd Site Project Manager: George Byram (Printed name) George B (Signature) 11/18/13 (Date)

WSPF Number: BN510.3 **Lot Number:** 1

Characterization Information Summary
Introduction

Advanced Mixed Waste Treatment Project (AMWTP) has compiled Acceptable Knowledge (AK) information for waste stream BN510.3 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 box line waste is characterized using VE and the direct feed waste is characterized by RTR or VE. VE is the appropriate method for characterizing box line 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 VE 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 through D011
- Toxicity characteristic organics – D022, D027, D028, D029, D030, D032, D033, D034, D037 and D043
- F-Listed HWNs include: F001, F002, F004, F005, F006, F007 and F009

SPM

Printed Name: Eric Schweinsberg Signature: Eric Schweinsberg Date: November 18th 2013

2nd SPM

Printed Name: George Byram Signature: George Byram Date: 11/18/13

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: BN510.3 **Lot Number:** 1

Characterization Information Summary

Characterization Description:

Containers listed below were characterized by RTR (INST-OI-12, Real-Time Radiography Examinations [Certification Scans]) 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
10295803	RTR11-00419	ASY11-02566	N/A
10309125	RTR11-00371	ASY11-02567	N/A
10314331	RTR11-00426	ASY11-02580	N/A
10316836	RTR11-00267	ASY11-01600	N/A
10343019	RTR11-00428	ASY12-01931	N/A
10314966	RTR13-00001	ASY13-00023	N/A
10320665	RTR11-00265	ASY11-01599	N/A
10322386	RTR11-00265	ASY11-01584	N/A
10344289	RTR11-00289	ASY11-01764	N/A
10306575	RTR12-00170	ASY12-04138	N/A

WSPF Number: BN510.3 **Lot Number:** 1

Table 2. RTR/VE Summary of Prohibited Items.

Container No.	RTR Prohibited Items	VE Prohibited Items
10295803	None	None
10309125	None	None
10314331	None	None
10316836	None	None
10343019	None	None
10314966	None	None
10320665	None	None
10322386	None	None
10344289	None	None
10306575	None	None

Acceptable Knowledge Summary for Supercompacted Debris Waste

Advanced Mixed Waste Treatment Project

Approval:

(Signature on file. See DCR-12760.)

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	09/09/13	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.
7	Pending CBFO Approval	All	DCR-12760. Document changed to reflect the addition of SDA debris waste as Supercompactor feedstock. The new WSP is designated as BN510.3.

CONTENTS

FIGURES

TABLES

ACRONYMS

AE	Argonne National Laboratory-East (generator site 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
ANL-E	Argonne National Laboratory-East
ANL-W	Argonne National Laboratory-West
ATWIR	Annual Transuranic Waste Inventory Report
AW	Materials and Fuels Complex (generator site prefix)
BC	Battelle Columbus (generator site prefix)
BN	AMWTP (generator site prefix)
CBFO	Carlsbad Field Office
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
DOHE	Drum Opening Hood Enclosure
DOS	drum opening station
DOT	U.S. Department of Transportation
DRS	Drum Repacking System
DU	depleted uranium
DWHE	Drummed Waste Handling Enclosure
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
EWR	early waste retrieval
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
IDR	initial drum retrieval
INL	Idaho National Laboratory
LLD	lower limit of detection
LLNL	Lawrence Livermore National Laboratory
LSA	low specific activity
MD	Mound Plant (generator site 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 (generator site prefix)
RH	remote-handled
RL	Richland, Washington Hanford Site (generator site prefix)
RLMPFPCD	Richland Mixed Plutonium Finishing Plant Comprehensive Debris
RTG	radioisotopic thermoelectric generators
RTR	real-time radiography
RWMC	Radioactive Waste Management Complex
SCW	special-case waste
SD	pre-1980 INL-Exhumed SDA Waste (generator site prefix)
SDA	Subsurface Disposal Area
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

TSA-RE	Transuranic Storage Area-Retrieval Enclosure
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

Advanced Mixed Waste Treatment Project

Acceptable Knowledge Summary for Supercompacted Debris Waste

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BN510.3.

BN510.2 waste will no longer be generated once BN510.3 waste is generated. BN510.2 will cease generation after introduction of pre-1980 Subsurface Disposal Area (SDA) debris waste and will be inactivated. Any remaining inventory of BN510.2 will be shipped as BN510.3 wastes since the BN510.2 waste is a subset of the BN510.3.[a]

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:

9,000 100-gallon drums (3,411 m^3)(78)

92 standard waste boxes (SWBs) (295 m^3)(78)

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.(13)

1.2.4 Generation Dates and Rate of Generation

August 2013 – December 2018

The average generation rate for BN510.3 is currently estimated at 200 product drums (76 m^3) per month.(79)

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[a] See Attachment 1 for information on BN510.2 waste stream.

1.2.5 TRUCON Codes

ID121[2]

1.2.6 Waste Isolation Pilot Plant Waste Stream ID

Waste Stream ID: IN-BN510.3

1.2.7 Summary Category Group

S5000 – Debris Waste[3]

1.2.8 Waste Matrix Code Group

Heterogeneous Debris Waste

1.2.9 Waste Matrix Code

The BN510.3 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.[3] 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: BN510.3 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 BN510.3 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), the pre-1980 INL-exhumed SDA waste (SD), and AMWTP (BN).[b] The debris waste identified as feedstock to the AMWTP Supercompactor originated from various defense-related sources that include: verification and control technology, weapons activities including defense inertial confinement fusion , defense nuclear waste and material by

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

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.

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 U.S. Department of Energy (DOE), a TRU waste is eligible for disposal at WIPP if it has been generated, in whole or by part, by 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) performed in whole or in part in carrying out any of the following functions: [11, 23, 24, 46]

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

The supercompacted debris waste stream BN510.3 is generated within the AMWTP WMF-676 Supercompactor as a result of compacting heterogeneous debris waste that originated at: RF, MD, BC, AE, AW, SD, and BN.

The BN510.3 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.[6, 18]

- 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. [7, 19]

- 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. [8, 20, 21, 22]

- 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.[52, 61]

- 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. [52, 61]

- 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]).[52] 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. [52, 61]

- 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:[58, 62]

    - 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. [58, 62]

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. [58, 62]

- Subsurface Disposal Area (Pre-1980)

  - From 1954 until 1970, the INL SDA received and disposed of a variety of radioactive waste (including TRU wastes) from multiple sources. The wastes disposed of into the SDA were both defense and non-defense waste. Defense-related wastes initially

disposed of within INL Radioactive Waste Management Complex (RWMC) SDA Pits and Trenches were from process and defense-related activities such as: verification and control technology, weapons activities including defense inertial confinement fusion , 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. Examples of non-defense waste disposed into the INL RWMC SDA include: civilian reactor wastes, medical wastes, United States Geological Service waste, Colorado School of Mines waste, and wastes from various universities. (72)

- The debris waste associated with the SDA was generated as a result of pre-1980 exhumations within specific INL pits and trenches. During the mid to late 1970s, the INL conducted two SDA exhumations that resulted in the generation of TRU waste and subsequent transportation to the Transuranic Storage Area-Retrieval Enclosure (TSA-RE). The Early Waste Retrieval (EWR) Project from 1976 through 1978 associated with Pits 1 and 2, Trenches 1, 5, 7, 8, 9, and 10. Of the four pre-1980 ER investigations, only two resulted in waste being exhumed and transferred to the TSA-RE. The two INL SDA exhumations that contributed waste to the TSA-RE were associated with the INL Initial Drum Retrieval (IDR) Project, and the INL EWR Project. There is no supporting AK retrieval evidence that indicates unused cyanide wastes were generated and placed in the AMWTP inventory as a result of IDR or EWR retrieval investigations. (72) Segregation practices of defense and non-defense related waste was not employed during the 1970 exhumations.

- Due to the condition of some of the exhumed containers and management practices employed during the retrieval operations, the contents of INL exhumed repackaged waste within the TSA RE are assumed to be a composite of the INL SDA waste contributors. While certain TRU waste items may not have been generated directly from defense activities; based on the activities described above and the inability to separate civilian waste from defense waste, the waste is eligible for disposal at WIPP as a commingled defense waste stream generated "in part" by the atomic energy defense activities. (72, 76)

- The debris waste generated during the pre-1980 exhumation activities are not classified as SNF or HLW. SNF and HLW are not candidates for supercompaction. If found, SNF and HLW will be segregated and managed separately until final disposition determinations are conducted. (72)

- 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.(5)

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 BN510.3 waste stream meet the definition of defense wastes. (23, 24)

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." (46, 63)

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.(41)

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." (46)

Based on the AMWTP's AK documentation for the Supercompactor feedstock wastes, the BN510.3 waste stream is defense-related wastes and does not meet the definition of HLW or SNF. (5, 6, 7, 8, 61, 62, 72, 73, 74, 76)

1.3 Waste Stream Description

1.3.1 BN510.3 Supercompacted Debris Waste

The BN510.3 newly generated debris waste stream is generated from supercompaction of 55-gallon containers of debris waste. The Waste Stream Profile Form (WSPF) BN510.3 was developed due to the addition of SD feedstock debris waste and the addition of the D033 (hexachlorobutadiene) hazardous waste number that was not assigned to the BN510.2 waste stream.(58) The addition of SD wastes to the supercompactor has been approved by the U.S. Environmental Protection Agency (EPA) through the EPA Tier process. (73, 74) Generation of the BN510.2 waste stream will be discontinued after the Carlsbad Field Office approves the BN510.3 waste stream.

The supercompacted debris waste (i.e., BN510.3) 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. [30]

Table 1. Physical waste form description for BN510.3.

ATWIR Number	IDC	Waste Matrix Code (WMC)	Description
IN-BN510.3	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 BN510.3 waste stream consists of various combustible and noncombustible debris materials that originated from AE, AW, BC, MD, RF and SD, as well as AMWTP self-generated (i.e., BN IDCs) non-polychlorinated biphenyl (PCB) debris waste within WMF-676. [5, 6, 7, 8, 52, 53, 58, 66, 72]

The BN510.3 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 55-gallon drum of compacted debris. [5, 6, 7, 8, 52, 58, 72]

1.4 Process Description

See waste generation process description in Section 1.4.3.

1.4.1 Areas of Operation

The BN510.3 waste stream is generated by supercompaction of debris waste feedstock at the AMWTF in Building WMF-676. [9, 29, 54, 55, 68, 70]

1.4.2 Process Flow Diagram

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

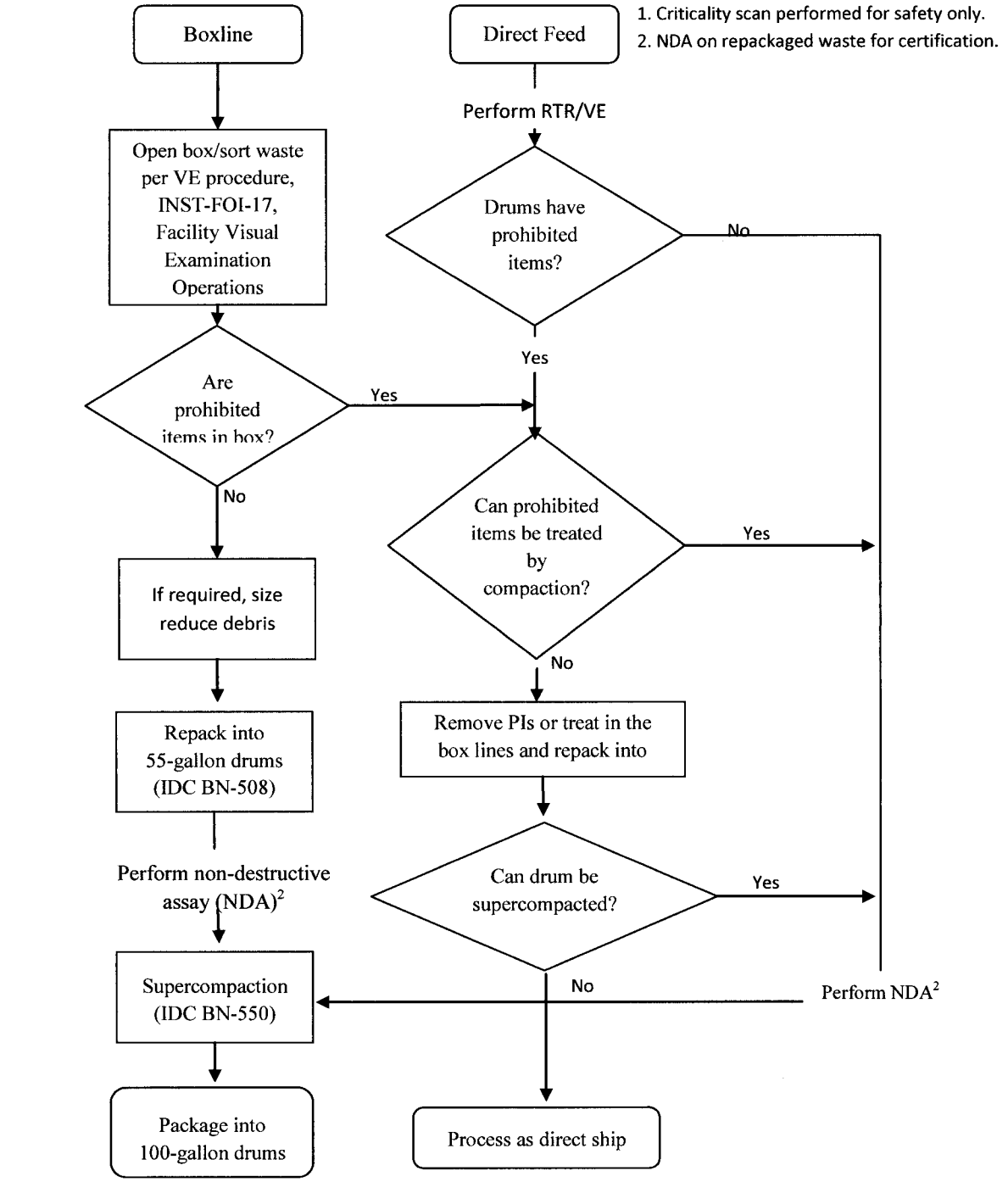

Figure 1. Flow diagram illustrating the generation and processing of AMWTP supercompacted debris waste.

1.4.3 Waste Generating Process

1.4.3.1 BN510.3 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. [10, 31, 32, 33, 34]

Debris waste feedstock containers (e.g., 55- or 85-gallon drums) may be introduced into WMF-676 for container and waste management. Waste container preparation, handling, and repackaging are conducted in the WMF-676 Drum Repack System (DRS). The DRS consists of the drummed waste handling enclosure (DWHE), the drum opening hood enclosure (DOHE), which includes the drum opening station (DOS) and the drummed waste packaging glovebox (DWPG), and the special-case waste (SCW) glovebox.[75] Boxes of waste, including overpack boxes, undergo assay and are introduced into a box line for sorting and repackaging into 55-gallon drums. [67] The overpack boxes with uncharacterized drums undergo RTR to confirm the waste is >50% debris in each drum. [10, 31, 57] The drum contents are then visually examined in the box line trough to confirm the waste is approved feed stock.[9] 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 box line as IDC BN-508. Prohibited items that can be treated may be treated in the box line or sent to the special-case waste (SCW) glovebox. If applicable, after treating, sorting, and/or removal of prohibited item(s), the waste is repackaged into 55-gallon drums as IDC BN-508. [9, 10, 46] No campaigning of approved feedstock type or generator site debris waste feedstock occurs during the supercompaction process. Cleanouts of the box line(s) occur for periodic housekeeping or potential PCB cleanups or to prevent cross-contamination. [9, 53, 54, 55] 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 WMF-676 DRS (e.g., DWPG) where containerized waste can be un-overpacked, treated, sorted, or repackaged
- From the waste treatment box line(s) where boxed waste is treated, 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: [10, 31, 56, 57]

(1) The first type is packaged with characterized debris drums for processing in AMWTF. These contain drums with IDCs confirmed by RTR or VE 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. [9] No additional chemicals or waste constituents are added to the supercompacted debris waste as a result of this process.

Debris waste generated during WMF-676 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 hazardous chemicals or waste constituents to the supercompacted debris waste as a result of this process. [10, 29, 54, 55, 56, 68]

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). [4, 9, 26]

1.4.4 Material Inputs

The BN510.3 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., AE, AW, BC, MD, RF, and SD) that are approved supercompactor feedstock. The BN510.3 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 55-gallon drum of compacted debris.

The AMWTP retrievably-stored feedstock debris waste was generated at the RF, MD, AE, AW, SD, 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. (6, 7, 8, 52, 58, 72)

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. (5)

The waste contributions into the BN510.3 waste stream originated at the following DOE facilities operations: (5)

- RF
  - Plutonium metal and plutonium-containing materials manufacture, recovery, and treatment(6)
  - Plutonium production support operations including maintenance, laboratory activities, and R&D (6)
  - Non-routine events including renovations, spills, fires, and decommissioning (6)
  - Construction, demolition, and D&D operations. (6)
- MD
  - D&D of the Mound Plant Facility (7)
  - Pressed plutonium oxide (PPO) sphere and plutonium-molybdenum cermet (PMC) production(7)
  - Plutonium and other isotopic recovery (7)
  - Plutonium manufacture support such as laboratory activities and R&D (7)
  - Facility maintenance. (7)
- BC
  - Research into the metallurgical and ceramic properties of plutonium and its alloys (8)
  - Plutonium processing (8)
  - Development of nuclear fuels (8)
  - D&D of the BC facilities. (8)

- AE
  - Support activities associated with the development and testing of various breeder reactor systems [52]
  - Laboratory operations associated with R&D/DOE waste management and supporting the examining/evaluating of nuclear fuel [52]
  - Repackaging activities [52]
  - Decontamination and decommissioning activities [52]
  - General plant operations including waste management and maintenance. [52]
- AW
  - Recovery of actinides such as plutonium and other radionuclides and characterization of nuclear materials [58]
  - 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 [58]
  - 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]
- SD
  - Pre-1980 INL SDA exhumations. [72]
- BN
  - Characterization activities [5]
  - Repackaging activities [5]
  - Waste treatment activities including size reduction of large items, supercompaction, absorption of prohibited liquids, and removal of prohibited items [5]
  - Facility operations including waste management and maintenance. [5]

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 box lines. Drums of waste may also be packaged in overpack boxes for feedstock to the box lines for processing.

The types of feedstock debris waste containers are as follows:

- Direct feed 55-gallon drums identified by generator (AE, AW, BC, BN, MD, RF, and SD) assigned IDCs
- Boxed debris waste from AE, AW, BC, BN, MD, RF, and SD that is processed in WMF-676 and that is repackaged in 55-gallon drums. [75]

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 Document for AMWTP Waste, [5] 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. [12] 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[c], and RPT-TRUW-91, Acceptable Knowledge Document for Pre-1980 INL-Exhumed SDA Waste, are the AMWTP AK documents for the RF, MD, BC, AE, AW, RL, and SD facilities, respectively. [6, 7, 8, 28, 52, 58, 72]

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

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

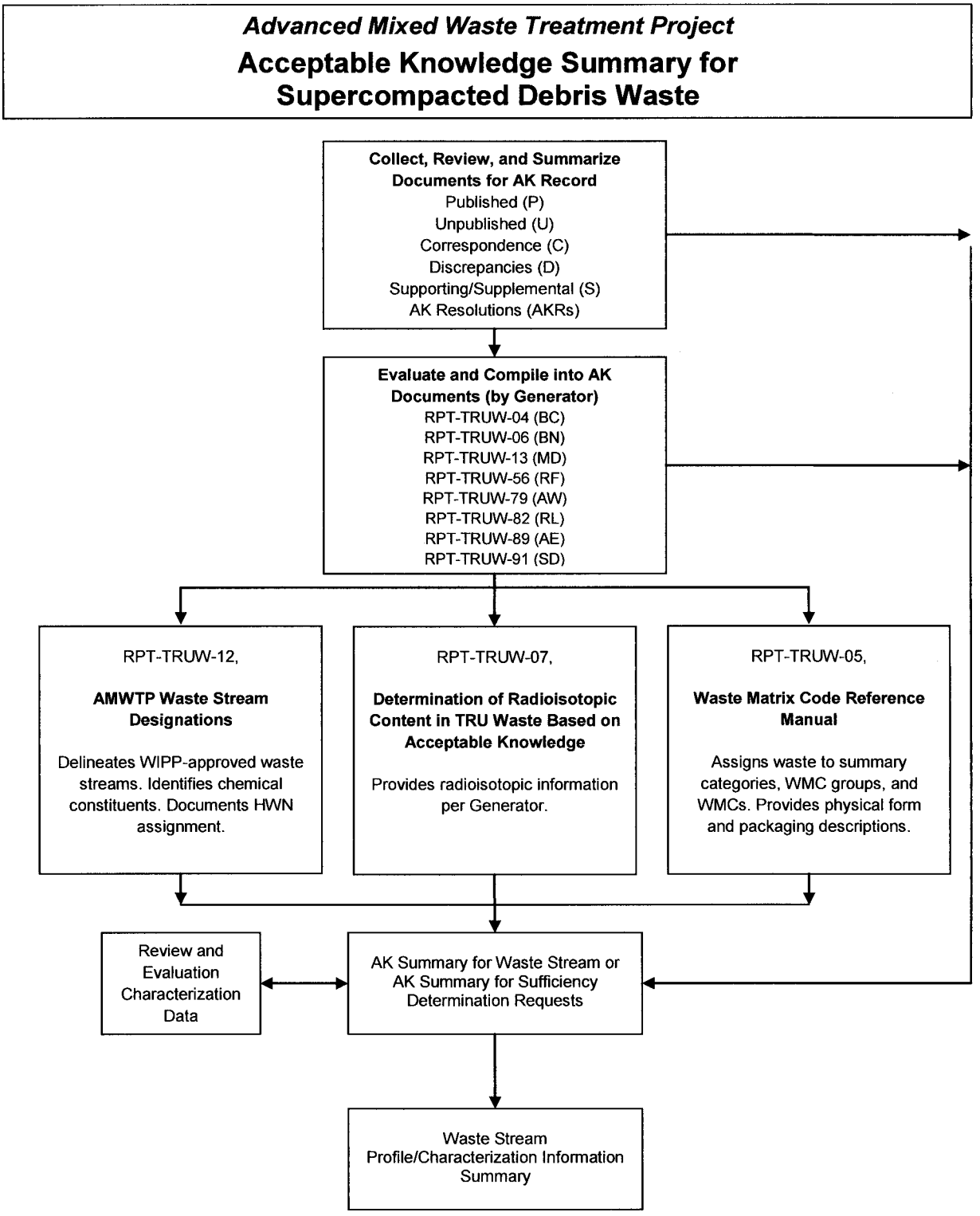

Figure 2. Document hierarchy and information flow for AK.

1.4.5 Waste Material Parameters

1.4.5.1 BN510.3 Supercompacted Debris Waste

The estimated waste material parameter (WMP) weight percentages for the BN510.3 waste stream are based on the VE data for BN510.1 100-gallon product drums generated from July 2, 2010 through September 9, 2013.[d] WMP data for 9,137 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 BN510.3 waste stream. The estimated WMP weights (by percent) for the BN510.3 waste stream were calculated in accordance with the requirements of MP-TRUW-8.13. The WMPs for BN510.3 are summarized in Table 2. [12, 45]

Table 2. Waste material parameters for BN510.3. [45]

Waste Material Parameters	Estimated Percent WMP Weight/Unit Waste
Iron-based Metals/Alloys	74
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.

[d] As of September 9, 2013, no SDA wastes have been processed through the Supercompactor. As a result, there are no BN510.3 WMP estimate calculations available at this time. No significant changes to the WMPs are expected as a result of adding SDA debris waste to the Supercompactor.

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. [4, 26]

- 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 PCBs not authorized under an 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). [46, 63]
- Any waste container from a waste stream which has not undergone either radiographic or visual examination of statistically representative subpopulation of the waste stream.

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 box line processing of wastes are treated in the box line, treated by supercompaction, have the prohibited item(s) removed, or are rejected, as appropriate.

Box line(s) are used to VE and repackage the boxed debris waste into 55-gallon drums. Debris waste treated, repackaged, or examined in the WMF-676 DRS (e.g., DWPG), and waste from maintenance and cleanup activities, are packaged according to procedures, subjected to RTR/VE, and undergo nondestructive assay. [33] These drums are then supercompacted and the pucks packaged into a 100-gallon product drum (IDC BN-550). [9, 10, 77]

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. [37, 38, 47, 48, 49, 51, 64] Newly-generated waste is characterized and assigned to an appropriate waste stream. [4, 26] 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 box lines or processed in the SCW glovebox.[9, 10, 26, 29, 54] Nonhazardous pressurized fire extinguishers or other approved pressurized large cylinders may be vented by a controlled release in the box lines. Box line 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 if greater than 50% debris by volume. [9, 10, 46 , 54, 70]

Some prohibited items are approved for treatment by supercompaction. [60] 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, mixed waste containers with an observable liquid volume confirmed by RTR of not greater than 5% by volume of the waste container, and sealed containers greater than 4 liters. [31, 43, 59, 60, 65, 71] Because there are no layers of confinement following supercompaction, it is also the treatment for excess layers of confinement. [9, 10, 26, 64, 65]

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, 16, 29, 30, 54] PCB items or drummed wastes identified in boxed debris are removed during box line operations. PCB-contaminated waste identified during box line processing is cleaned up in accordance with applicable AMWTP procedures. [53] PCB items removed from feedstock debris waste drums and boxes or generated during the box line 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 BN510.3 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. [43, 44]

1.7.1 BN510.3 Supercompacted Debris Waste

1.7.1.1 EPA Hazardous Waste Numbers

The BN510.3 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. [5, 6, 7, 8, 28,30, 52, 58, 72, 77]

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), D033 (hexachlorobutadiene), 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 BN510.3 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. [5, 6, 7, 8, 28, 39, 40, 42, 52, 58, 72, 77]

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

Generator Site/Activity	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Chloroform	1,4-Dichlorobenzene	1, 2-Dichloroethane	1,1-Dichloroetthylene	2,4-Dinitrotoluene	Hexachlorobenzene	Hexachlorobutadiene	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	D032	D033	D034	D037	D043	F001	F002	F004	F005	F006 F007 F009
Rocky Flats (RF) [6]																							
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) [7]																							
PPO & PMC production and isotope recovery [b]	•	•	•	•	•	•	•	•															
Cleaning and degreasing																			• [c]	• [c]		• [c]	
Electroplating																							• [c]
Based on AK/HSG									•			•											

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	Hexachlorobenzene	Hexachlorobutadiene	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	D032	D033	D034	D037	D043	F001	F002	F004	F005	F006 F007 F009
Battelle Columbus (BC) [8]																							
Metallurgical research		•	•	•	•	•		•															
Cleaning and degreasing																			• [d]	• [d]		• [d]	
Argonne National Laboratory – East (AE) [52]																							
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	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Chloroform	1,4-Dichlorobenzene	1, 2-Dichloroethane	1,1-Dichloroetthylene	2,4-Dinitrotoluene	Hexachlorobenzene	Hexachlorobutadiene	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	D032	D033	D034	D037	D043	F001	F002	F004	F005	F006 F007 F009
Hanford [28, 39, 40, 42]																							
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	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Chloroform	1,4-Dichlorobenzene	1, 2-Dichloroethane	1,1-Dichloroethylene	2,4-Dinitrotoluene	Hexachlorobenzene	Hexachlorobutadiene	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	D032	D033	D034	D037	D043	F001	F002	F004	F005	F006 F007 F009
Materials and Fuels Complex (AW) [58]																							
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]
Subsurface Disposal Area (SD) [72]																							
Pre-1980 exhumations	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•[h]	•[h]	•[h]	•[h]	•[h]
AMWTP (BN) [1]																							
Newly generated waste from composited feedstock (i.e., supercompaction operations)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•[i]	•[i]	•[i]	•[i]	•[i]

NOTES:

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 = 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. SD – F001 = carbon tetrachloride, methylene chloride, tetrachloroethylene, 1,1,1-trichloroethane, trichloroethylene, trichlorofluoromethane and 1,1,2-trichloro-1,2,2-trifluorethane; F002 = methylene chloride, tetrachloroethylene, 1,1,1-trichloroethane, trichloroethylene, trichlorofluoromethane and 1,1,2-trichloro-1,2,2-trifluorethane, chlorobenzene, 1,2-dichlorobenzene, 1,1,2-trichloroethane; F004 = cresols and, nitrobenzene; F005 = benzene, carbon disulfide, isobutanol, 2-ethoxyethanol, methyl ethyl ketone, 2-nitropropane, pyridine and toluene; F006, F007 and F009 are assigned due to electroplating waste contamination.

i. 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 BN510.3 wastes are newly generated. Hazardous waste numbers initially (or historically) assigned to the Supercompactor feedstock wastes are applicable to the BN510.3 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 BN510.3 waste stream have historically been managed as mixed TRU waste at the AMWTP. [1, 5]

1.7.2.2 Ignitability

The waste materials in this BN510.3 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). [31, 43, 59, 60, 65, 71] 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 [37, 38, 47, 48, 49, 51, 64] and/or

(2) Treated by the supercompaction process to remove the excess liquids; [31, 43, 59, 60, 65] or

(3) Undergo removal of the prohibited item(s). [9, 10, 53, 54, 60, 70]

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. [37, 38, 47, 48, 49, 51, 64] Based on the above, this waste stream does not exhibit the characteristic of ignitability (D001).

1.7.2.3 Corrosivity

The materials in this BN510.3 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. [31, 43, 59, 60, 65, 71] 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 [37, 38, 47, 48, 49, 51, 64]; and/or

(2) Treated by the supercompaction process to remove the excess liquids; [31, 43, 59, 60, 65] or

(3) Undergo removal of the prohibited item(s). [9, 10, 53, 54, 60, 70]

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. [37, 38, 41 , 47, 48, 49, 51, 64] 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 BN510.3 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. [31, 43, 59, 60, 65, 71] 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 [37, 38, 47, 48, 49, 51, 64]; and/or

(2) Treated by the supercompaction process to remove the excess liquids; [31, 43, 60, 65] or

(3) Undergo removal of the prohibited item(s). [9, 10, 53, 54, 60, 70]

In addition, the BN510.3 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 BN510.3 RCRA Toxicity, Listed and Toxic Substances Control Act (TSCA) Waste

1.7.2.5.1 Toxicity

The BN510.3 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 SD waste, IDC SD-177, assigns the D033 HWN. There is no removal of HWNs from the BN510.2 waste stream compared to the BN510.3 waste stream. [5, 6, 7, 8, 28, 39, 40, 42, 52, 58, 72, 77]

The RCRA toxicity characteristic metal HWNs: D004 (arsenic); D005 (barium); D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury); D010 (selenium); and D011 (silver) were identified based on AK documentation associated with , AE, AW, BC, BN, MD, RF, and SD feedstock for the BN510.3 WSPF. The D004, D005, D006, D007, D008, D009, D010, and D011 HWNs are assigned to the waste stream. [1, 5, 6, 7, 8, 30, 52, 58, 72, 77]

The RCRA toxicity characteristic organics assigned to this waste stream are: D022 (chloroform); D027 (1,4-dichlorobenzene); D028 (1,2-dichloroethane); D029 (1,1-dichloroethylene); D030 (2,4-dinitrotoluene); D032 (hexachlorobenzene); D033 (hexachlorobutadiene); D034 (hexachloroethane); D037 (pentachlorophenol); and D043 (vinyl chloride). The repackaged debris waste stream contains RCRA toxicity constituents associated with toxicity characteristic organics. See Table 3 for process-related activities associated with the HWNs. [1, 5, 6, 7, 8, 30, 52, 58, 72, 77]

The HWN D019 (carbon tetrachloride) was associated with AE and AW feedstock. Because F-listed HWN F001 is assigned to the feedstock for this constituent, the D019 HWN is not assigned to the BN510.3 WSPF, but rather is addressed within the F-listed waste section below. (52, 58, 72, 77)

The HWN D022 (chloroform) was assigned based on AK documentation associated with AW, MD, RF, and SD feedstock to the BN510.3 WSPF. The associated toxicity characteristic HWN D022 is assigned to the waste stream. (1, 7, 30, 58, 72, 77)

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, AW, and SD. The associated toxicity characteristic HWNs D027, D030, and D037 are assigned to the waste stream. (52, 58, 72, 77)

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. (6, 30,52, 58, 72, 77)

The HWNs D032 (hexachlorobenzene), D034 (hexachloroethane), and D043 (vinyl chloride) were assigned based on AK documentation associated with the AW and SD supercompactor feedstock. The associated toxicity characteristic HWNs D032, D034, and D043 are assigned to the waste stream. (58, 72)

The HWN D033 (hexachlorobutadiene) was assigned based on AK documentation associated with SD feedstock to the BN510.3 WSPF. The D033 HWN is assigned to the waste stream. (72)

The HWN D039 (tetrachloroethylene) was associated with RL, AW, MD, SD, and RF feedstock. Because F-listed HWN F001 is assigned to the feedstock for this constituent, the D039 HWN is not assigned to the BN510.3 WSPF, but rather is addressed within the F-listed waste section below. (52, 58, 72, 77)

1.7.2.5.2 Listed Waste

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

The BN510.3 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, 5, 6, 15, 28, 30, 39, 40, 42, 52, 58, 72, 77)

The HWN 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) was assigned based on AK

documentation associated with previous RL feedstock to the BN510.1 and AW, BC, MD, SD, and RF feedstock to the BN510.2 and BN510.3 waste streams. (1, 5, 6, 7, 8, 28, 30, 39, 40, 42, 58, 72, 77, 80)

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 previous RL feedstock to the BN510.1, and AE, AW, BC, MD, RF, and SD feedstock to the BN510.2 and BN510.3 waste streams. Therefore, the waste stream is assigned the EPA HWNs F001 and F002. (1, 5, 6, 7, 8, 28, 30, 39, 40, 42, 52, 58, 72, 77, 80)

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 BN510.3 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, AW, and SD feedstock to the BN510.2 and BN510.3 waste streams. Therefore, the waste stream is assigned the EPA HWN F004. (28, 39, 40, 52, 58, 72, 77, 80)

The HWN F005 (2-ethoxyethanol, 2-nitropropane, benzene, carbon disulfide, isobutanol, MEK, pyridine, and toluene) were assigned based on AK documentation associated with AE, AW, BC, MD, RF, and SD feedstock to the BN510.2 and BN510.3 waste streams and RL feedstock to the BN510.1 WSPF. Therefore, the waste stream is assigned the EPA HWN F005. (1, 5, 6, 7, 8, 28, 30, 39, 40, 42, 52, 58, 72, 77, 80)

The HWNs F006, F007, and F009 were assigned based on AK documentation associated with AW, RF, and SD feedstock and HWNs F007 and F009 were also assigned based on AK documentation associated with MD feedstock to the BN510.2 and BN510.3 WSPFs. Therefore, waste stream is assigned the F006, F007, and F009 EPA HWNs. (1, 5, 6, 15, 58, 72, 77)

P-, U-, and K-Listed HWNs. The BN510.3 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, 5, 6, 7, 8, 28, 30, 39, 40, 42, 52, 58, 72, 77)

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, 5, 6, 7, 8, 28, 30, 39, 40, 42, 52, 58, 72, 77)

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, 5, 6, 7, 8, 28, 30, 39, 40, 42, 52, 72, 77)

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, 5, 6, 7, 8, 28, 39, 40, 42, 52, 58, 72, 77)

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 BN510.3 waste stream. Drums of PCB-contaminated Rocky Flats organic sludges are expected in the SD boxed debris waste.

Drums of supercompacted feedstock debris waste identified during RTR/VE as containing PCB wastes may be placed into the box lines or may be segregated or sent to DWPG or SCW for item removal. (1, 9, 16, 29, 30, 54) PCB items and drums of PCB wastes identified in boxed debris are removed during box line operations. Potential PCB contaminated waste identified during box line repackaging is subject to AMWTP PCB cleanup requirements. (53) PCB items removed from approved feedstock debris waste drums and boxes, drums of PCB sludges, and potential PCB cleanup wastes are removed from the WMF-676 box lines and packaged as newly-generated waste. These PCB items and sludge waste are not authorized as feedstock debris waste. (6, 7, 8, 28, 30, 39, 42, 52, 72, 77)

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, BN510.1, and BN510.2 waste streams are pertinent to the BN510.3 waste stream. The IDCs identified within Appendix A include IDCs previously identified within the BN510, BN510.1, and BN510.2 WIPP-approved WSPFs as well as SDA IDCs. The EPA HWNs assigned to the BN510 WSPF included D004 through D011, D022, D028, D029, F001, F002, F005, F006, F007, and F009.(30) 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 EPA HWNs assigned to BN510.2 include D004 through D011, D022, D027, D028, D029, D030, D032, D034, D037, D043, F001, F002, F004, F005, F006, F007, and F009. (6, 7, 8, 28, 30, 39, 40, 42, 52, 58, 72, 80)

1.8 Radionuclides

The radionuclides of concern for BN510.3 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 non-destructive assay (NDA). Cesium-137 and ^{90}Sr were identified as potentially present in AE, MD, BC, SD, and AW debris waste. [6, 7, 8, 13, 50, 52, 58, 72]

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 BN510.3 wastes. [6, 7, 8, 13, 50, 52, 58, 72] 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. [14]

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 box line 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. [6, 7, 8, 13, 50, 52, 58, 72]

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
SD	Combination WG Pu, heat source Pu, uranium, thorium, fuels-grade Pu, DU, EU	^{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 BN510.3 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. [9, 17, 70]

2.2 Flammability Consideration

The payload containers in the BN510.3 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). [25]

3.0 REFERENCES

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

The following table lists the approved feedstock debris waste[e] by original generator and IDC. (6, 7, 8, 28, 35, 36, 52, 58, 66)

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.
	SD	177	Pre-1980 INL-Exhumed SDA Heterogeneous Debris

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)