IDAHO
DEPARTMENT OF ENVIRONMENTAL QUALITY

HWMA STORAGE and TREATMENT PERMIT for the

IDAHO NUCLEAR TECHNOLOGY and ENGINEERING CENTER, and the RADIOACTIVE WASTE MANAGEMENT COMPLEX

on the

IDAHO NATIONAL LABORATORY

EPA ID NO. ID4890008952

Effective Date: April 27, 2009
Revision Date: August 19, 2016
Book 3B of 3

APPENDIX I

DRAWINGS AND EXHIBITS FOR WMF-1617,

WMF-698 AND WMF-1619

APPENDIX I.

DRAWINGS AND EXHIBITS FOR WMF-1617 AND WMF-698

DRAWING NUMBER	REVISION NUMBER	DRAWING DESCRIPTION
761186	3	Phase V of the Accelerated Retrieval Project WMF-1617 Retrieval Enclosure 5 and Airlock 5 Site Grading Plan
761187	2	Phase V of the Accelerated Retrieval Project WMF-1617 Retrieval Enclosure 5 and Airlock 5 Grading Sections and Details
761193	2	Phase V of the Accelerated Retrieval Project WMF-1617 RE5/AL5 Building Elevations
761194	2	Phase V of the Accelerated Retrieval Project WMF-1617 AL5 Airlock 5 Interior Wall Plan
761195	3	Phase V of the Accelerated Retrieval Project WMF-1617 AL5 Airlock 5 Interior Evelvations
761196	4	Phase V of the Accelerated Retrieval Project WMF-1617 AL5 Airlock 5 Interior Evelvations
761207	2	Phase V of the Accelerated Retrieval Project WMF-1617 Airlock 5 & Retrieval Enclosure 5 Foundation and Legend
761210	2	Phase V of the Accelerated Retrieval Project WMF-1617 Airlock 5 Foundation Slab Pan, Ledend and Sections
762023	3	Phase V of the Accelerated Retrieval Project RE5/AL5 WMF-1617 Equipment Location Plan
762024	2	Phase V of the Accelerated Retrieval Project WMF-1617 AL5 Airlock 5 Equipment Location Plan
762067	3	Phase V of the Accelerated Retrieval Project RE5/AL5 WMF-1617 DPS Fire Protection System Dry Chemical Diagram
762114	4	Phase V of the Accelerated Retrieval Project RE5/AL5 WMF-1617 RE5 Lighting Plan

DRAWING NUMBER	REVISION NUMBER	DRAWING DESCRIPTION
762115	3	PHASE V OF THE ACCELERATED RETRIEVAL PROJECT RE5/AL5 WMF-1617 AL5 LIGHTING PLAN
762141	3	PHASE V OF THE ACCELERATED RETRIEVAL PROJECT RE5/AL5 WMF-1617 FIRE ALARM PLAN
762142	3	PHASE V OF THE ACCELERATED RETRIEVAL PROJECT RE5/AL5 WMF-1617 AIRLOCK 5 FIRE ALARM PLAN
762153	4	PHASE V OF THE ACCELERATED RETRIEVAL PROJECT WMF-1617 RETRIEVAL ENCLOSURE 5 DATA/DATA CCTV FLOOR PLAN
762154	5	PHASE V OF THE ACCELERATED RETRIEVAL PROJECT RE5/AL5 WMF-1617 DATA/DATA CCTV AND INTERCOM FLOOR PLAN
177425	20	RWMC SDA FIREWATER PIPING PLOT PLAN
631228	3	RWMC TARGETED WASTE REMOVAL AND DISPOSITION PROJECT STORAGE ENCLOSURE VENTILATION PLAN, SECTIONS AND DETAIL
631225	4	RWMC TARGETED WASTE REMOVAL AND DISPOSITION PROJECT STORAGE ENCLOSURE PLAN
631233	5	RWMC TARGETED WASTE REMOVAL & DISPOSITION PROJECT WMF-698 STORAGE ENCLOSURE NORMAL POWER AND LIGHTING PLAN
631234	2	RWMC TARGETED WASTE REMOVAL AND DISPOSITION PROJECT STORAGE ENCLOSURE STORAGE ENCLOSURE GROUNDING PLAN
631237	2	RWMC TARGETED WASTE REMOVAL AND DISPOSITION PROJECT STORAGE ENCLOSURE FIRE ALARM PLAN
631238	2	RWMC TARGETED WASTE REMOVAL AND DISPOSITION PROJECT STORAGE ENCLOSURE FIRE ALARM SECTION AND DETAILS
631130	2	RWMC TARGETED WASTE REMOVAL AND DISPOSITION PROJECT STORAGE ENCLOSURE FOUNDATION PLAN

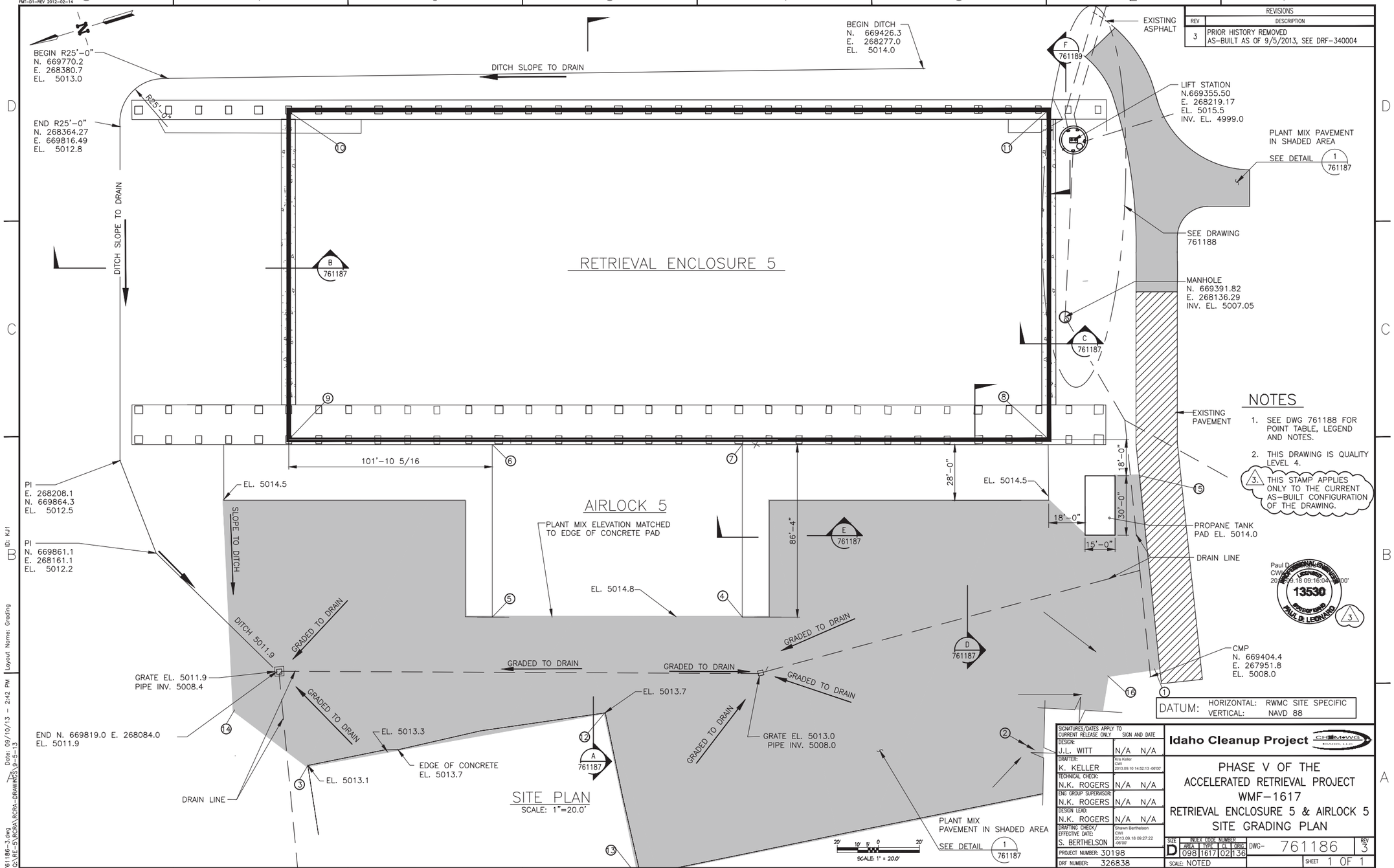
DRAWING NUMBER	REVISION NUMBER	DRAWING DESCRIPTION
627752	2	RWMC TARGETED WASTE REMOVAL AND DISPOSITION PROJECT STORAGE ENCLOSURE STORAGE ENCLOSURE PLAN AND SECTIONS
627917	2	RWMC TARGETED WASTE REMOVAL AND DISPOSITION PROJECT STORAGE ENCLOSURE PAD PLAN, SECTIONS, AND DETAILS
783977	1	PHASE V OF THE ACCELERATED RETRIEVAL PROJECT RE5/AL5 WMF-1617 RE5 VENTILATION 3D VIEW AND EAST VIEW
Exhibit 1	N/A	RWMC WMF-1617 RE5/AL5 AIRLOCK 5 DRUM OUT ENCLOSURE VIEWS
Exhibit 2	N/A	RWMC WMF-1617 RE5/AL5 AIRLOCK 5 SERVICE BAY EQUIPMENT LAYOUT
Exhibit 3	N/A	RWMC WMF-1617 RE5/AL5 AIRLOCK 5 DRUM-OUT ACCESS PLATFORM AND COMPACTOR CONTAINMENT PAN DETAILS
Exhibit 4	N/A	RWMC WMF-1617 RE5/AL5 AIRLOCK 5 DRUM-OUT HOPPER AND DETAILS
Exhibit 5	N/A	DRUM STORAGE SECONDARY CONTAINMENT
Exhibit 6	N/A	TYPICAL WASTE TRAY
Exhibit 7	N/A	WASTE TRAY SECONDARY CONTAINMENT
Exhibit 8	N/A	WASTE TRAY SECONDARY CONTAINMENT GRATE
WMF-1619		
765045	1	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 SITE GRADING PLAN
765048	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 GRADING SECTIONS
765049	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 GRADING SECTIONS AND DETAILS

DRAWING NUMBER	REVISION NUMBER	DRAWING DESCRIPTION
766857	1	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 FOUNDATION PLAN
766858	1	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 FOUNDATION SLAB PLAN
766859	1	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 FOUNDATION SECTIONS
767855	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 EQUIPMENT LOCATION PLAN
767856	1	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 (AL6) EQUIPMENT LOCATION PLAN
767863	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 BUILDING ELEVATIONS
767864	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 FLOOR PLAN
767867	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK BUILDING SECTIONS
767868	1	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 BUILDING SECTION
767869	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 INTERIOR ELEVATIONS
767870	1	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 INTERIOR ELEVATIONS

DRAWING NUMBER	REVISION NUMBER	DRAWING DESCRIPTION
767935	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 DRUM PACKAGING STATION DRY CHEMICAL P & ID
767979	3	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 RETRIEVAL ENCLOSURE 7 LIGHTING PLAN
767980	3	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 LIGHTING PLAN
768004	3	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 RE7 FIRE ALARM PLAN
768005	2	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 FIRE ALARM PLAN
768016	3	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 RETRIEVAL ENCLOSURE 7 DATA/DATA CCTV PLAN
768017	4	PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 DATA/DATA CCTV PLAN AND INTERCOM WIRING DIAGRAM

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
3	PRIOR HISTORY REMOVED AS-BUILT AS OF 9/5/2013, SEE DRF-340004



NOTES

1. SEE DWG 761188 FOR POINT TABLE, LEGEND AND NOTES.
2. THIS DRAWING IS QUALITY LEVEL 4.
3. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

DATUM: HORIZONTAL: RWMC SITE SPECIFIC
VERTICAL: NAVD 88

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY		SIGN AND DATE
DESIGN: J.L. WITT	N/A	N/A
DRAFTER: K. KELLER	Kris Keller CWI 2013.09.10 14:52:13 -06'00'	
TECHNICAL CHECK: N.K. ROGERS	N/A	N/A
ENG GROUP SUPERVISOR: N.K. ROGERS	N/A	N/A
DESIGN LEAD: N.K. ROGERS	N/A	N/A
DRAFTING CHECK/ EFFECTIVE DATE: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 09:27:22 -06'00'	
PROJECT NUMBER: 30198		
DRF NUMBER: 326838		

Idaho Cleanup Project CH2M HILL BechtelBWXT Idaho, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
WMF-1617
RETRIEVAL ENCLOSURE 5 & AIRLOCK 5
SITE GRADING PLAN

SIZE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	02	136	761186	3

SCALE: NOTED SHEET 1 OF 1

RW-1267

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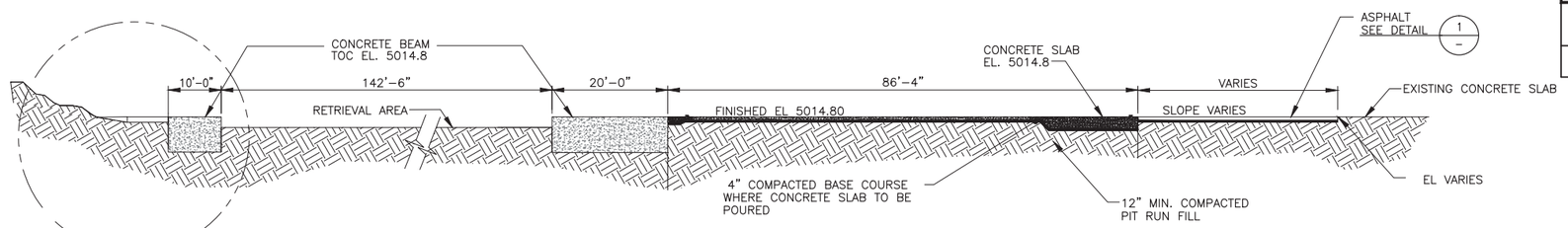
ID: KJ1

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED INCORPORATED FDC-6348, AS-BUILT AS OF 5-10-2012, SEE DRF-336389
2	AS-BUILT AS OF 9/5/2013, SEE DRF-340004



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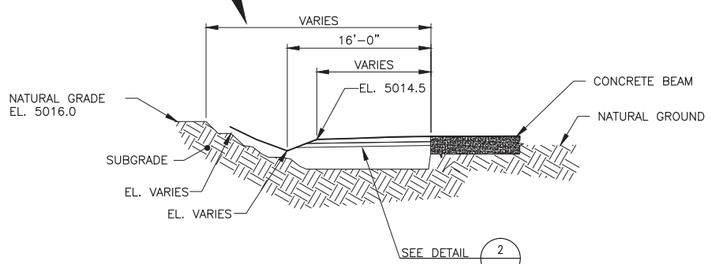
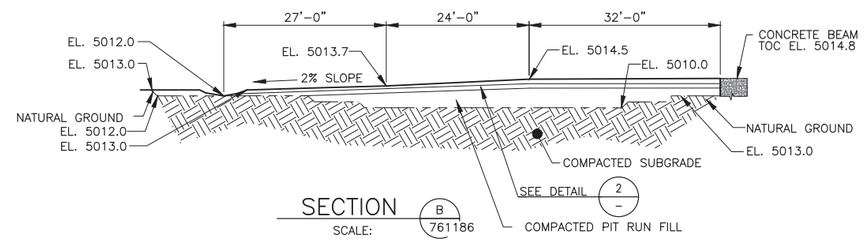


ENLARGED VIEW
SCALE: NTS



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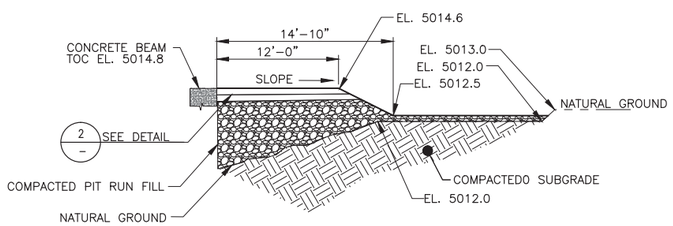

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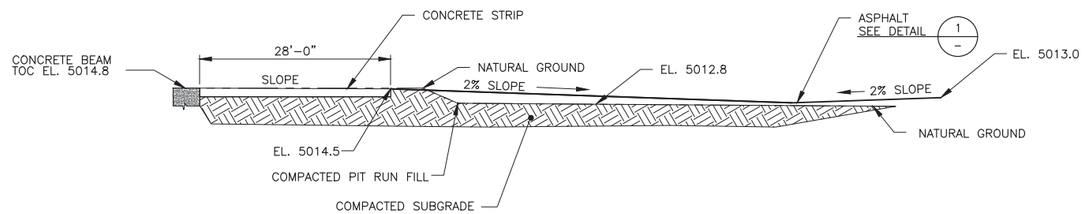

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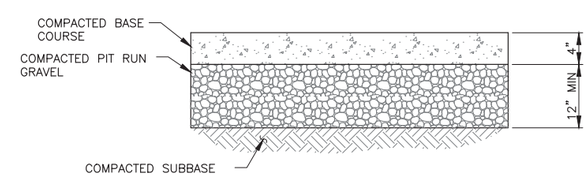
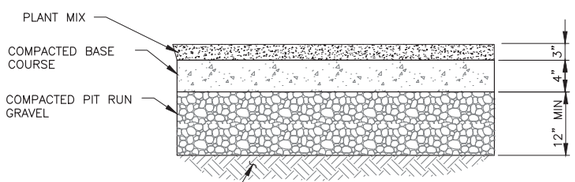


DETAIL 2 –
SCALE: 1"=1.0'



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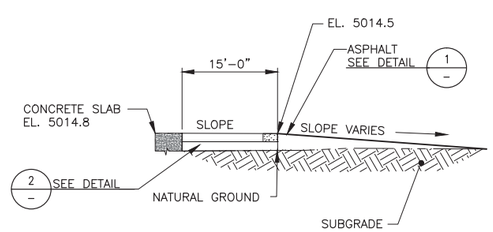

SECTION E 761186
SCALE:

NOTES

1. THIS DRAWING IS QUALITY LEVEL 4.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

Paul D. Leonard
CWI
2013.09.18 08:58:21 -06'00'
LICENSED PROFESSIONAL ENGINEER
13530
STATE OF IDAHO
PAUL D. LEONARD

2

1' 0 1'
SCALE: 1" = 1'-0"

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J.L. WITT	N/A N/A
DRAFTER: K. KELLER	Kris Keller CWI 2013.09.10 14:52:27 -06'00'
TECHNICAL CHECK: N.K. ROGERS	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS	N/A N/A
DESIGN LEAD: N.K. ROGERS	N/A N/A
DRAFTING CHECK/ EFFECTIVE DATE: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 09:27:42 -06'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 326838	

Idaho Cleanup Project CH2M HILL BWXT IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
WMF-1617
RETRIEVAL ENCLOSURE 5 & AIRLOCK 5
GRADING SECTIONS AND DETAILS

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	02	136	761187	2

SCALE: NOTED
SHEET 1 OF 1

RW-1267

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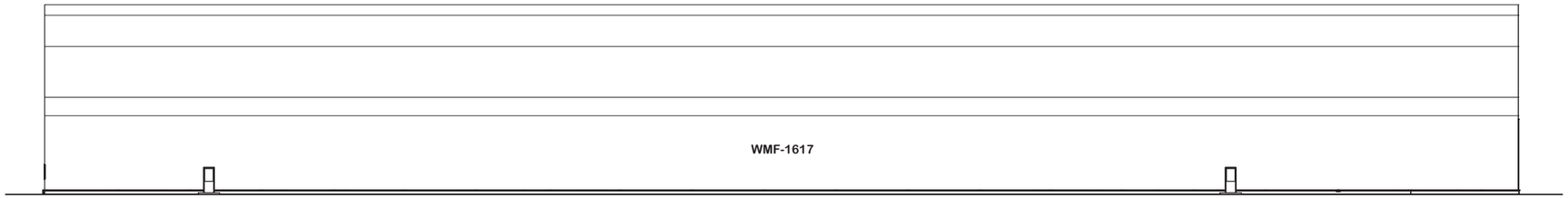
Date: 09/10/13 - 2:37 PM
Layout Name: Layout1
ID: KJ1

FMT-D1-REV 2012-02-14

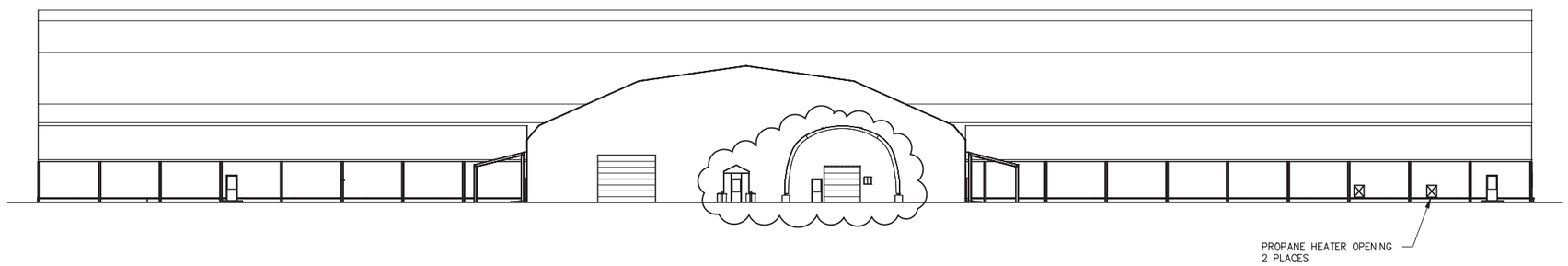
NOTES

1. THIS DRAWING IS A QUALITY LEVEL 3.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

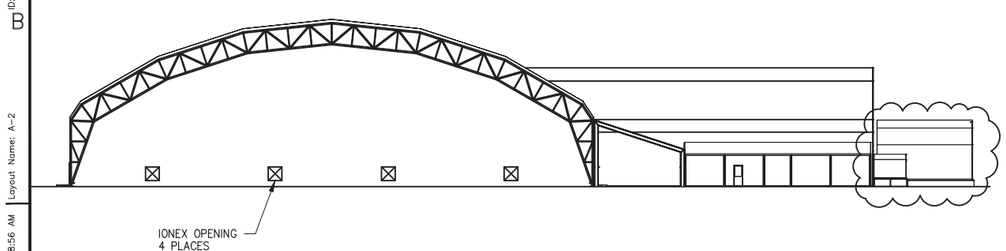
REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC 6342, 6849 & 6932 AS-BUILT AS OF 5/10/2012 SEE DRF-336389
2	INCORP FDC-8916, -9033, -9043, -9083 & -9091, AS-BUILT AS OF 9-5-2013, SEE DRF-340004



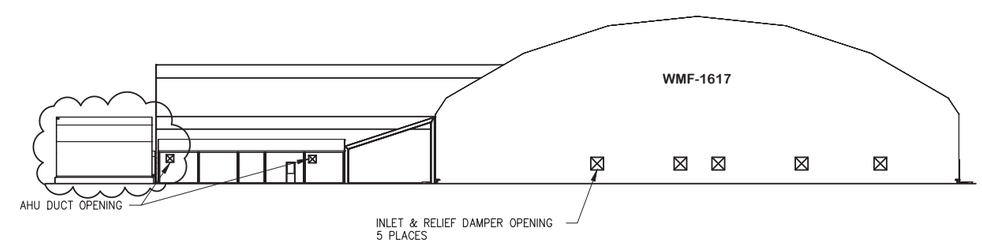
EAST ELEVATION
SCALE: 1/16"=1'-0"



WEST ELEVATION
SCALE: 1/16"=1'-0"



NORTH ELEVATION
SCALE: 1/16"=1'-0"



SOUTH ELEVATION
SCALE: 1/16"=1'-0"

Paul D. Leonard
CWI
2013.09.18 09:03:00
-06'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: J. WITT, P.E.	NA	NA
DRAFTER: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:03:00 -06'00'	
TECHNICAL CHECK: EGS	NA	NA
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	NA	NA
DESIGN LEAD: N.K. ROGERS, P.E.	NA	NA
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson CWI 2013.09.18 09:26:59 -06'00'	
PROJECT NUMBER: 30198		
DRF NUMBER: 326838		

Idaho Cleanup Project CH2M HILL IDAHO, LLC

PHASE V OF THE
ACCELERATED RETIEVAL PROJECT
WMF-1617 RE5/AL5

BUILDING ELEVATIONS

SIZE	INDEX CODE NUMBER AREA	TYPE	CI	ORIG	DWG-	REV
D	098	1617	01	136	761193	2

SCALE: NOTED

SHEET 1 OF 1

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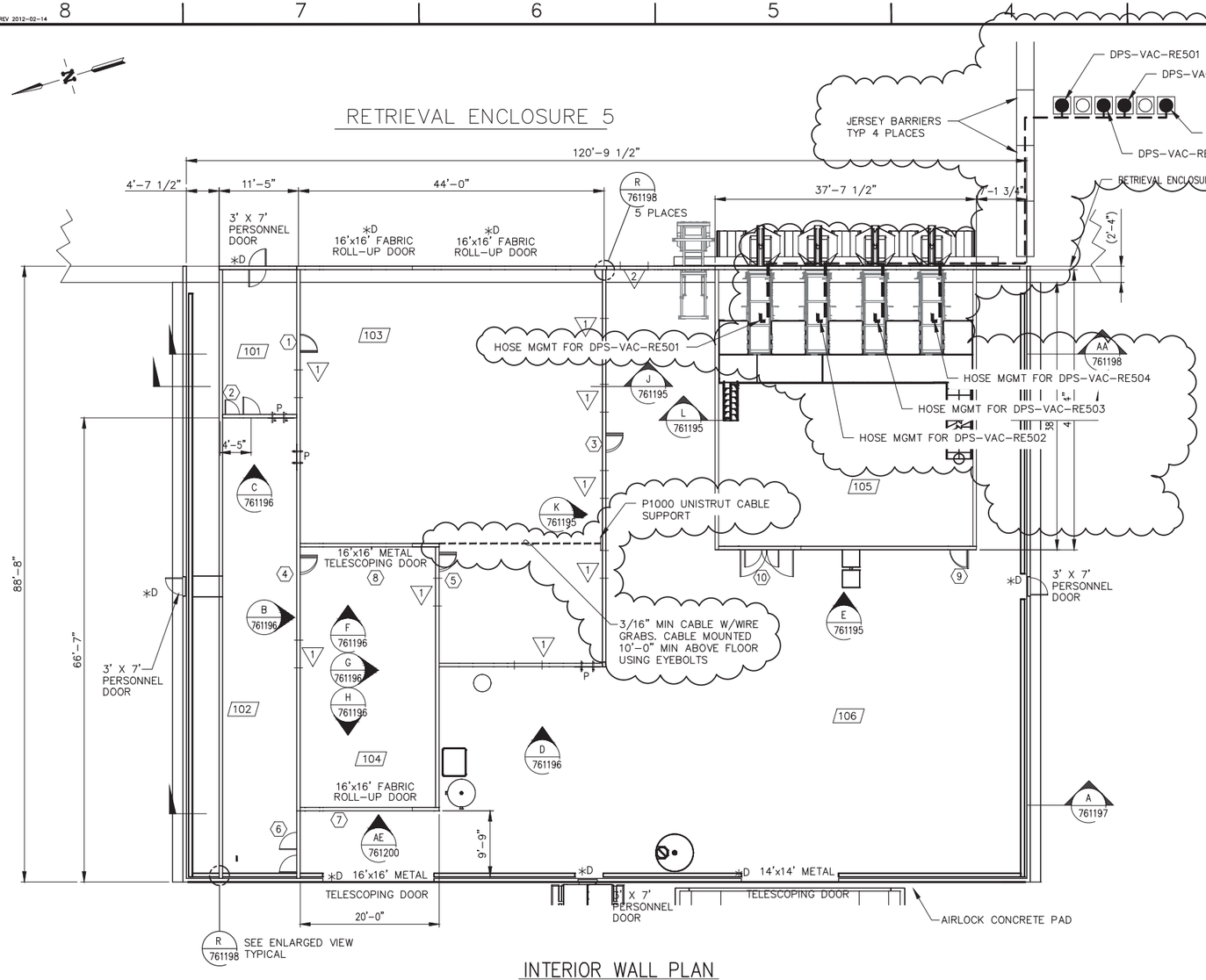
ID: BXS

FMT-D1-REV 2012-02-14

REVISIONS	
REV.	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC 6342, 6595, 6622, 6709, 6722, 6806, 6818, 6856, 6879, 6930, 6942, 6970 & 7055 AS-BUILT AS OF 5/10/2012 SEE DRF-336389
2	ADDED P.E. STAMP AND NOTE 8 INCORPORATED FDC-8686 AND 9111. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



INTERIOR WALL PLAN
SCALE: 1/4"=1'-0"

NOTES

1. METAL STUDS AND TRACKS ARE 20-GAGE OR HEAVIER AT 12" O.C. FOR WALLS OVER 15'-0". SHORTER WALLS ARE SPACED AT 16" O.C. FASTENERS USED TO ASSEMBLE METAL STUD WALLS SHALL BE AT A MINIMUM, NUMBER 8 MODIFIED TRUSS HEAD SCREWS. METAL STUD BASE TRACK FOR THE WALL BETWEEN RE5 AND AL5 IS FASTENED TO THE RE5 BASE BEAM WITH HILTI X-EDNI MX BALLISTIC POINT NAILS.
2. TAPE CONTINUOUSLY ALL METAL WALL PANEL JOINTS AND SCREW HEADS BETWEEN THE RE AND THE AL SEE ROOM FINISH SCHEDULE, DRAWING 761199, FOR APPLICABLE METAL LINER PANEL.
3. SUPPORT LEGS W/BASE PLATES THAT LAND ON EXISTING EMBEDDED PLATES ARE WELDED WITH 1/4" FILLET WELD ALL AROUND BASE PLATE.
4. WELDED IN ACCORDANCE WITH AWS D1.1. VISUALLY INSPECTED WELDED PER REQUIREMENTS OF AWS D1.1. ACCEPTANCE CRITERIA PER TABLE 6.1.
5. LADDERS AND STAIRS ANCHORED WITH 1/2"ø ASTM A-307 MIN. ALL THREAD W/5" MIN. EMBEDMENT.
6. DPS'S AND CATWALK SUPPORTS ANCHORED WITH 5/8"ø ASTM A-307 MIN. ALL THREAD W/5" MIN. EMBEDMENT.
7. THIS DRAWING IS A QUALITY LEVEL 3.
8. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

GENERAL DESIGN NOTES

1. GENERAL BUILDING DESIGN:
   AIRLOCK 5 ENCLOSURE INCLUDES FRAMED WALLS:
   a. 88'-0"x120'-0"=10,580 SF (INTERIOR DIMENSIONS)
   b. CU FT=180,000
   RETRIEVAL ENCLOSURE STRUCTURE:
   a. 380'-0" x165'-0"= 62,700 SF
   b. CU FT=1,191,000
2. DESIGN CODES:
   a. GENERAL – INTERNATIONAL BUILDING CODE (IBC) 2006
   b. STEEL/CONCRETE – SEE STRUCTURAL DRAWINGS AND NOTES
3. OCCUPANCY:
   a. OCCUPANCY CLASSIFICATION:
      • FACTORY INDUSTRIAL GROUP F-1, MODERATE HAZARD, INDUSTRIAL
   b. BUILDING TYPE: II-B
   c. NFPA 101, LIFE SAFETY CODE (LATEST EDITION):
      • SPECIAL PURPOSE INDUSTRIAL, ORDINARY HAZARD
4. DESIGN LOADS (FOR INTERIOR WALLS ONLY):
   a. NPH·····PERFORMANCE CATEGORY 1
   b. SNOW·····NOT APPLICABLE s = 0.328g AND S_1 = 0.13g
   c. WIND·····NOT APPLICABLE
   d. SEISMIC·····PER IBC, SITE CLASS C, I=1.0, S

LEGEND

- STRUCTURE PROVIDED BY RUBB BUILDING SYSTEMS
- 6-INCH METAL STUD WALL AND METAL LINER(S)
- ROOM NUMBER. SEE ROOM FINISH SCHEDULE ON DRAWING 761199
- DOOR NUMBER. SEE DOOR SCHEDULE ON DRAWING 761199
- WINDOW NUMBER. SEE WINDOW SCHEDULE ON DRAWING 761199
- *D DOOR, FRAME AND HARDWARE FURNISHED BY BUILDING MANUFACTURER

Paul D. Leonard
CWI
2013-06

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	NA NA
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:31:12 -06'00'
TECHNICAL CHECK: EGS	NA NA
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	NA NA
DESIGN LEAD: N.K. ROGERS, P.E.	NA NA
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:36:57 -06'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 326838	

Idaho Cleanup Project CH2MHILL IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
WMF-1617 AL5
AIRLOCK 5
INTERIOR WALL PLAN

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	00	136	761194	2

SCALE: NOTED SHEET 1 OF 1

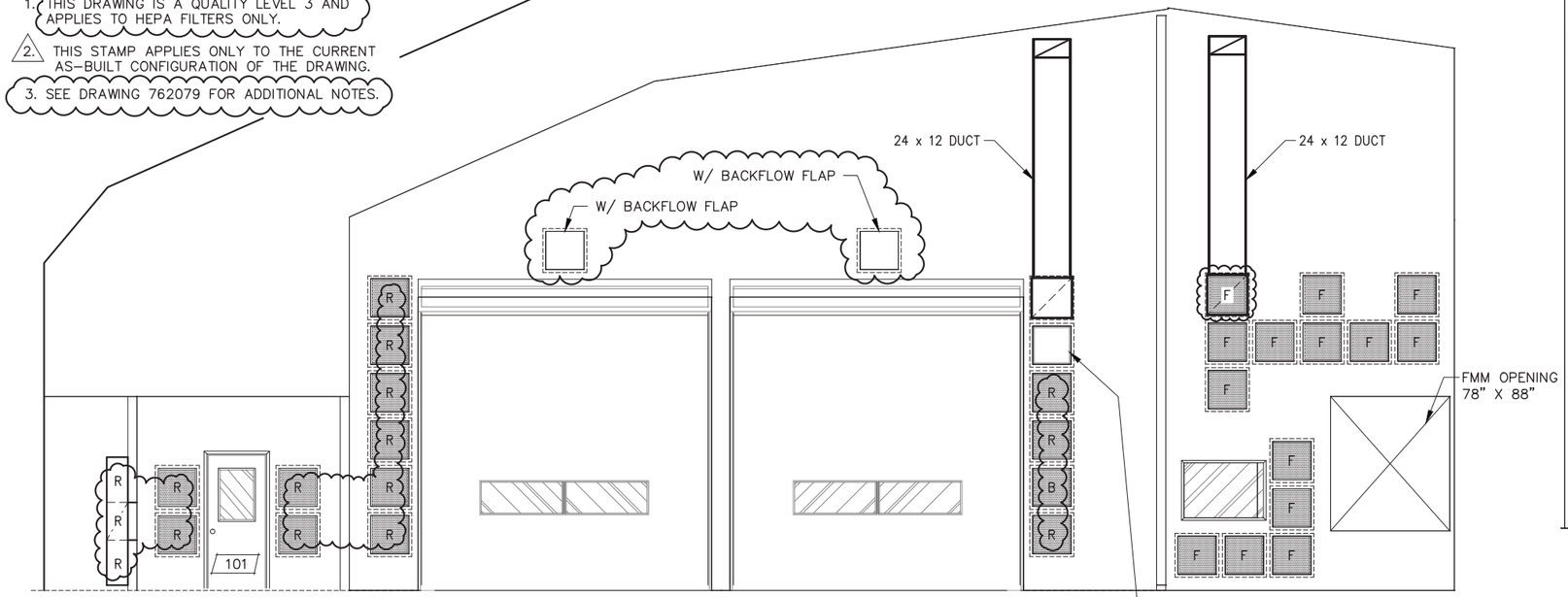
File: 761194-2.dwg
Path: L:\RE-5\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/12/13 – 1:20 PM Layout Name: A-3 ID: BKS

FMT-D1-REV 2012-02-14

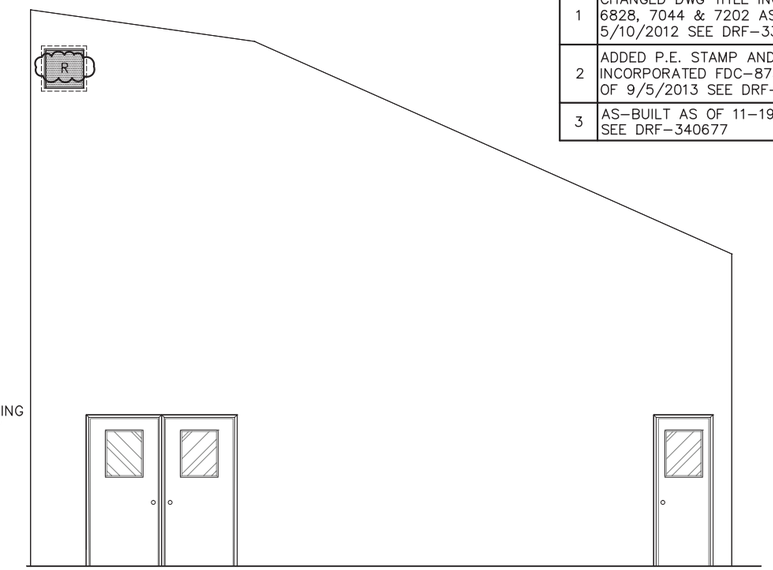
NOTES:

1. THIS DRAWING IS A QUALITY LEVEL 3 AND APPLIES TO HEPA FILTERS ONLY.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.
3. SEE DRAWING 762079 FOR ADDITIONAL NOTES.

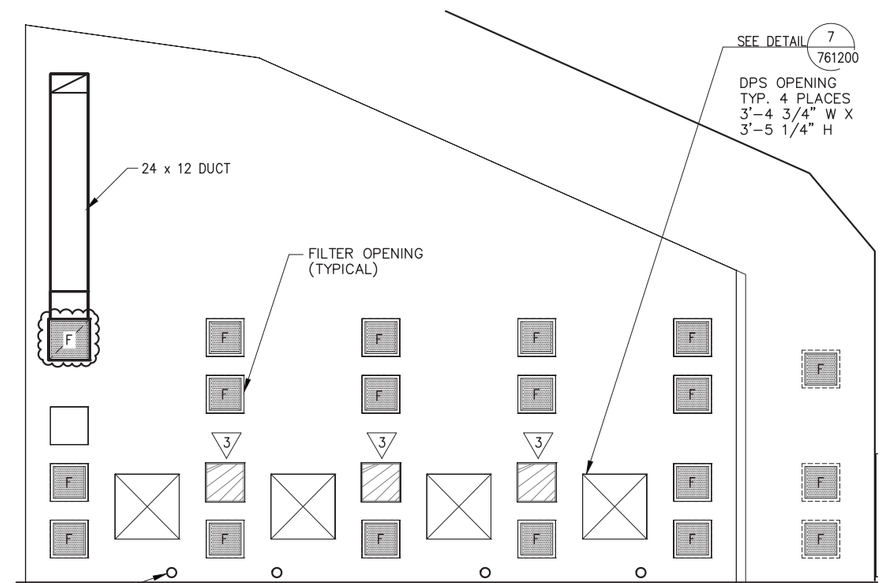
REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC 6828, 7044 & 7202 AS-BUILT AS OF 5/10/2012 SEE DRF-336389
2	ADDED P.E. STAMP AND NOTE 2. INCORPORATED FDC-8750. AS-BUILT AS OF 9/5/2013 SEE DRF-340004
3	AS-BUILT AS OF 11-19-2013, SEE DRF-340677



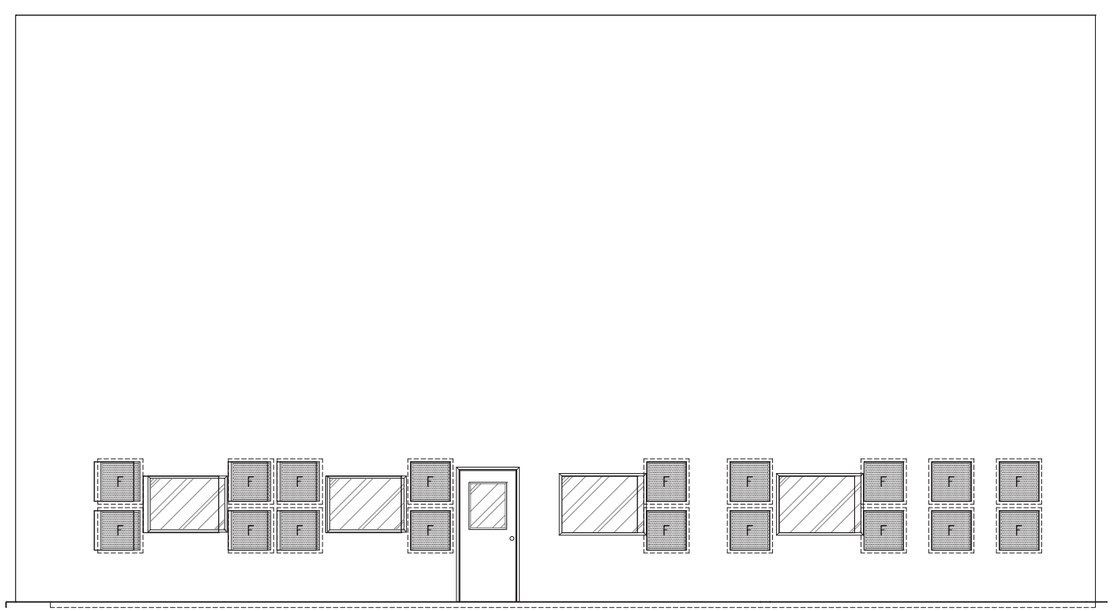
ELEVATION J 761194
ROOM 103 EAST WALL



ELEVATION E 761194
ROOM 106 EAST WALL



ELEVATION L 761194
ROOM 105 EAST WALL



ELEVATION K 761194
ROOM 106 NORTH WALL

LEGEND

- FILTER FRAME ONLY
- F — HEPA FILTER
- R — ROUGHING FILTER W/ BACKFLOW FLAP
- B — FILTER BLANKED OFF
- X — WINDOW NUMBER

SEE WINDOW AND FRAMED OPENING SCHEDULE ON DWG 761199

Paul D. Leonard
CWI
2014.03.03 08:00:00 -07'00'

PROFESSIONAL ENGINEER 13530 STATE OF IDAHO PAUL D. LEONARD

2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	NA NA
DRAFTER: B.L. SCOTT	Barry Scott CWI 2014.02.27 08:21:46 -07'00'
TECHNICAL CHECK: EGS	NA NA
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	NA NA
DESIGN LEAD: D.F. KENNEDY	Dan F. Kennedy CWI 2014.03.03 11:04:45 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson CWI 2014.03.03 11:07:38 -07'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 327002	

Idaho Cleanup Project CH2M HILL WG Idaho, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
WMF-1617 AL5
AIRLOCK 5
INTERIOR ELEVATIONS

SIZE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	01	136	761195	3

SCALE: NOTED — SHEET 1 OF 1

RW-1269

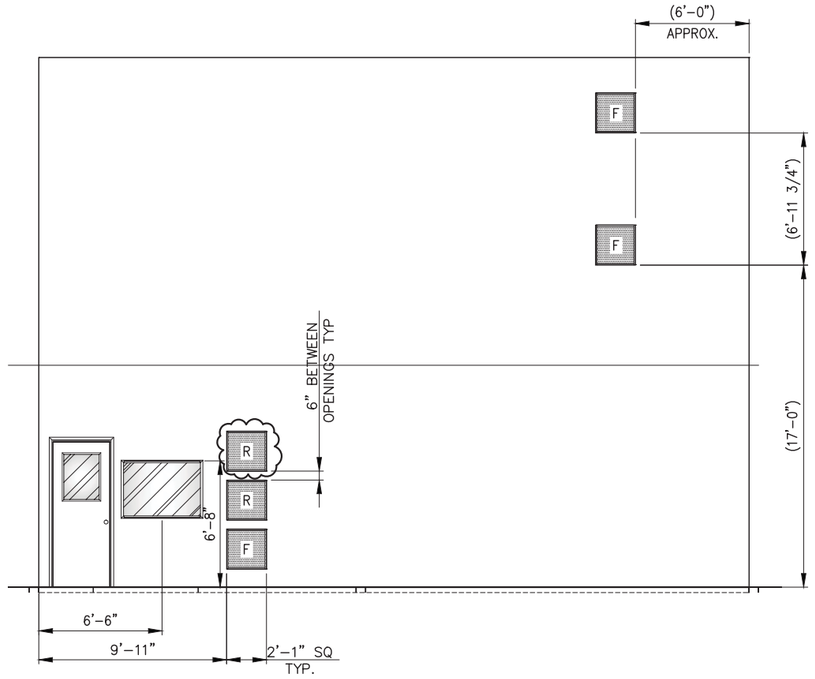
File: 761195-4.dwg
Path: K:\0-Signoff\RWMC Checking\
Date: 02/27/14 - 8:03 AM | Layout Name: A-4 | ID: BSL
DRF-340677

FMT-D1-REV 2012-02-14

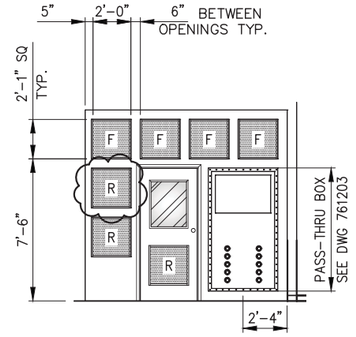
NOTES:

1. THIS DRAWING IS QUALITY LEVEL 3 AND APPLIES ONLY TO THE HEPA FILTERS.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.
3. SEE DRAWING 762079 FOR ADDITIONAL NOTES.

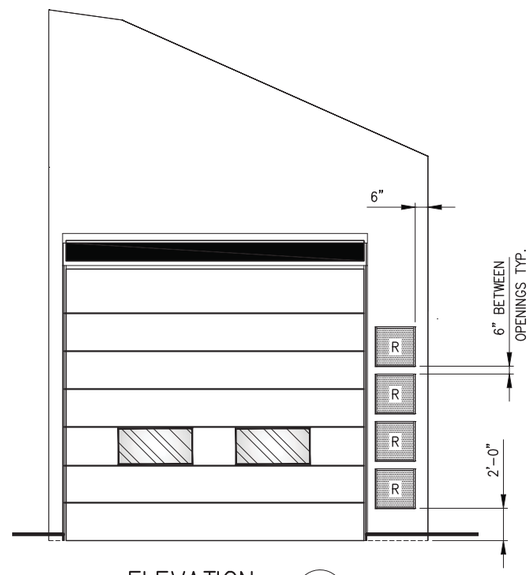
REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC 6523, 6753, 6907 & 7044 AS-BUILT AS OF 5/10/2012 SEE DRF-336389
2	ADDED P.E. STAMP & NOTE 2. AS-BUILT AS OF 9/5/2013 SEE DRF-340004
3	INCORPORATED FDC-9445, AS-BUILT AS OF 2-18-2014, SEE DRF-341385
4	CHANGED DWG TITLE, INCORPORATED FDC-10283, AS-BUILT AS OF 2-9-2015, SEE DRF-344541



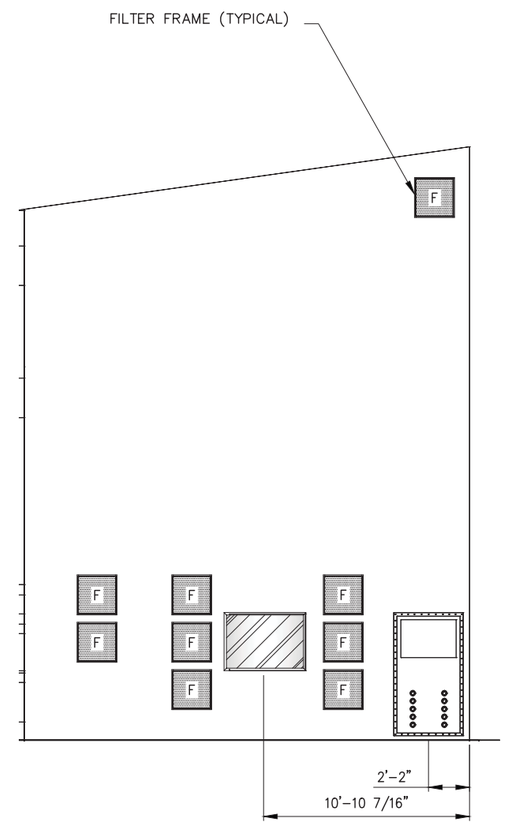
ELEVATION G 761194
ROOM 104 SOUTH WALL



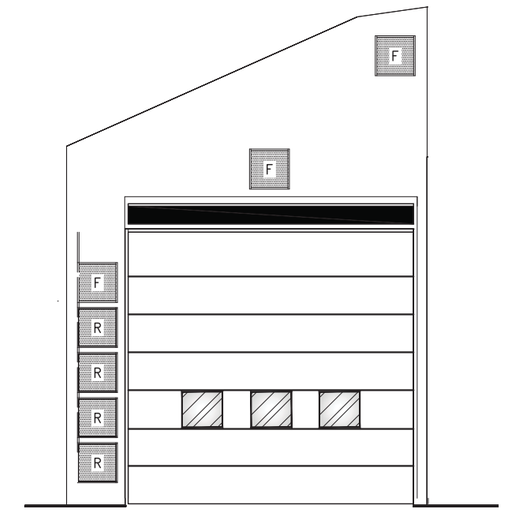
ELEVATION C 761194
ROOM 101 WEST WALL



ELEVATION H 761194
ROOM 104 WEST WALL



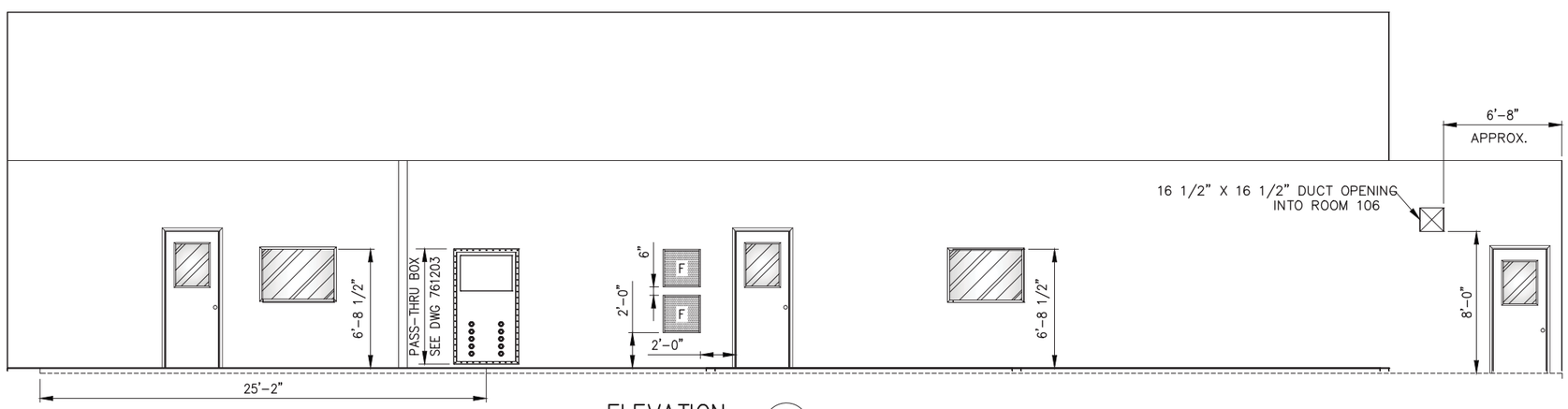
ELEVATION D 761194
ROOM 106 EAST WALL



ELEVATION F 761194
ROOM 104 EAST WALL

LEGEND

- FILTER FRAME ONLY
- F — HEPA FILTER
- R — ROUGHING FILTER W/ BACKFLOW FLAP
- B — FILTER BLANKED OFF



ELEVATION B 761194
ROOM 102 SOUTH WALL

Paul D. Leonard
CWI
2015.02.23 09:22:12 -07'00'

PROFESSIONAL ENGINEER GREENER 13530 STATE OF IDAHO PAUL D. LEONARD

2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: F.S. WARD	NA NA
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.02.23 07:54:34 -07'00'
TECHNICAL CHECK: EGS	NA NA
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	NA NA
DESIGN LEAD: D.F. KENNEDY	Dan F. Kennedy CWI 2015.02.23 09:22:12 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson CWI 2015.02.23 13:13:58 -07'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 326838	

Idaho Cleanup Project CH2M+WG IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
WMF-1617
AIRLOCK 5
INTERIOR ELEVATIONS

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	01	136	761196	4

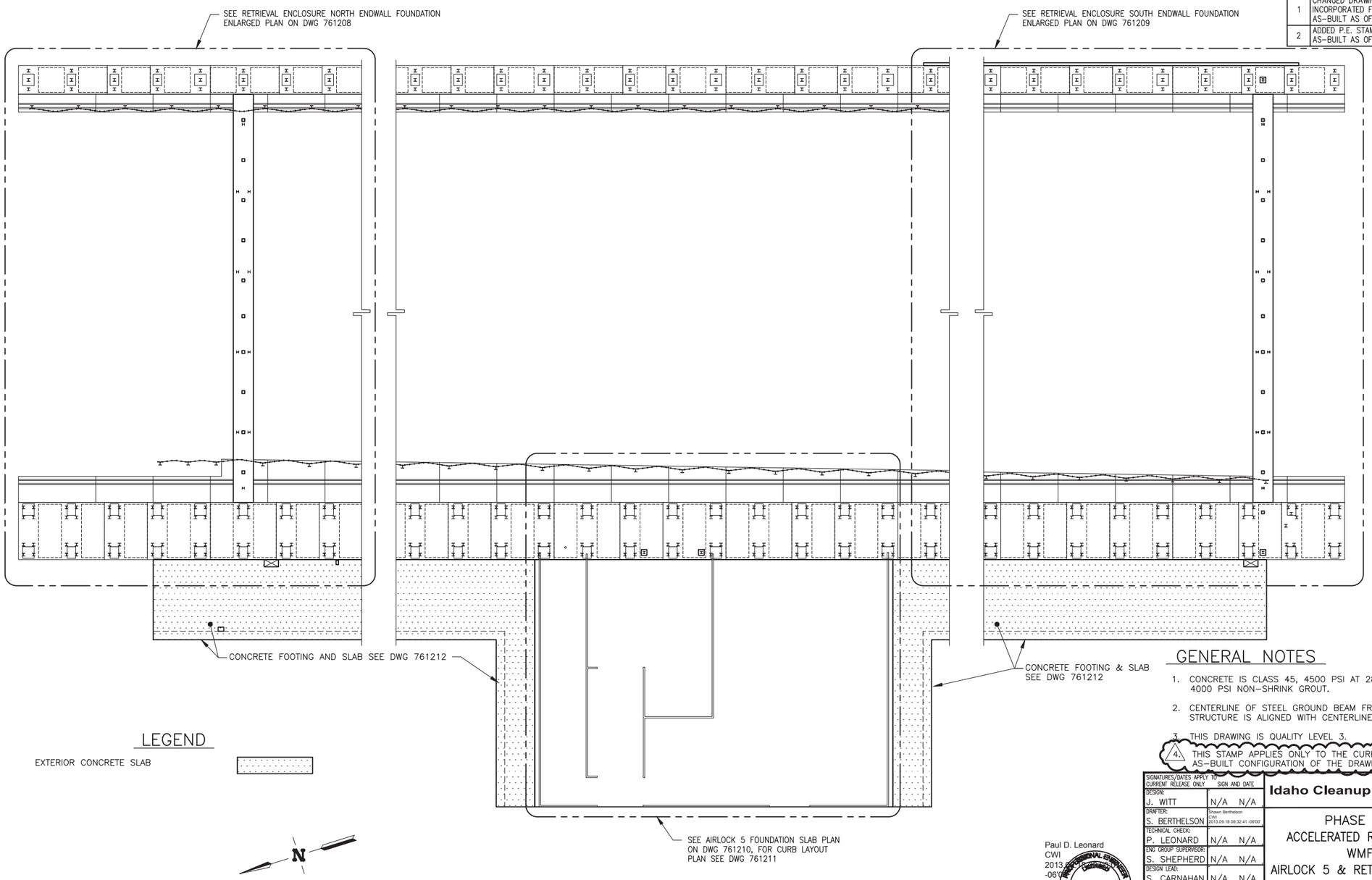
SCALE: NOTED — SHEET 1 OF 1

RW-1271

File: 761196-4.dwg
Path: C:\Users\bxs\Documents\BXS\RW-1271 (ARPs Start 11-3-2014)
Date: 02/19/15 – 2:11 PM | Layout Name: A-5
ID: BXS

FMT-D1-REV 2012-02-14

REVISIONS	
REV.	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-6472, AS-BUILT AS OF 5-10-2012, SEE DRF-336389
2	ADDED P.E. STAMP AND NOTE 4. AS-BUILT AS OF 9-5-2013, SEE DRF-340004



LEGEND

EXTERIOR CONCRETE SLAB

GENERAL NOTES

1. CONCRETE IS CLASS 45, 4500 PSI AT 28 DAYS. GROUT IS 4000 PSI NON-SHRINK GROUT.
2. CENTERLINE OF STEEL GROUND BEAM FROM RETRIEVAL ENCLOSURE STRUCTURE IS ALIGNED WITH CENTERLINE OF GRADE BEAMS.
3. THIS DRAWING IS QUALITY LEVEL 3.
4. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

AIRLOCK & RETRIEVAL ENCLOSURE FOUNDATION PLAN

SCALE: 1/16"=1'-0"

Paul D. Leonard
CWI
2013.09.18 09:32:41 -06'00'

PROFESSIONAL ENGINEER CERTIFICATE 13530 STATE OF IDAHO PAUL D. LEONARD

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT	N/A N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:32:41 -06'00'
TECHNICAL CHECK: P. LEONARD	N/A N/A
ENG GROUP SUPERVISOR: S. SHEPHERD	N/A N/A
DESIGN LEAD: S. CARNAHAN	N/A N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:39:45 -06'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 326838	

Idaho Cleanup Project CH2M HILL BWG IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
WMF-1617
AIRLOCK 5 & RETRIEVAL ENCLOSURE 5
FOUNDATION PLAN AND LEGEND

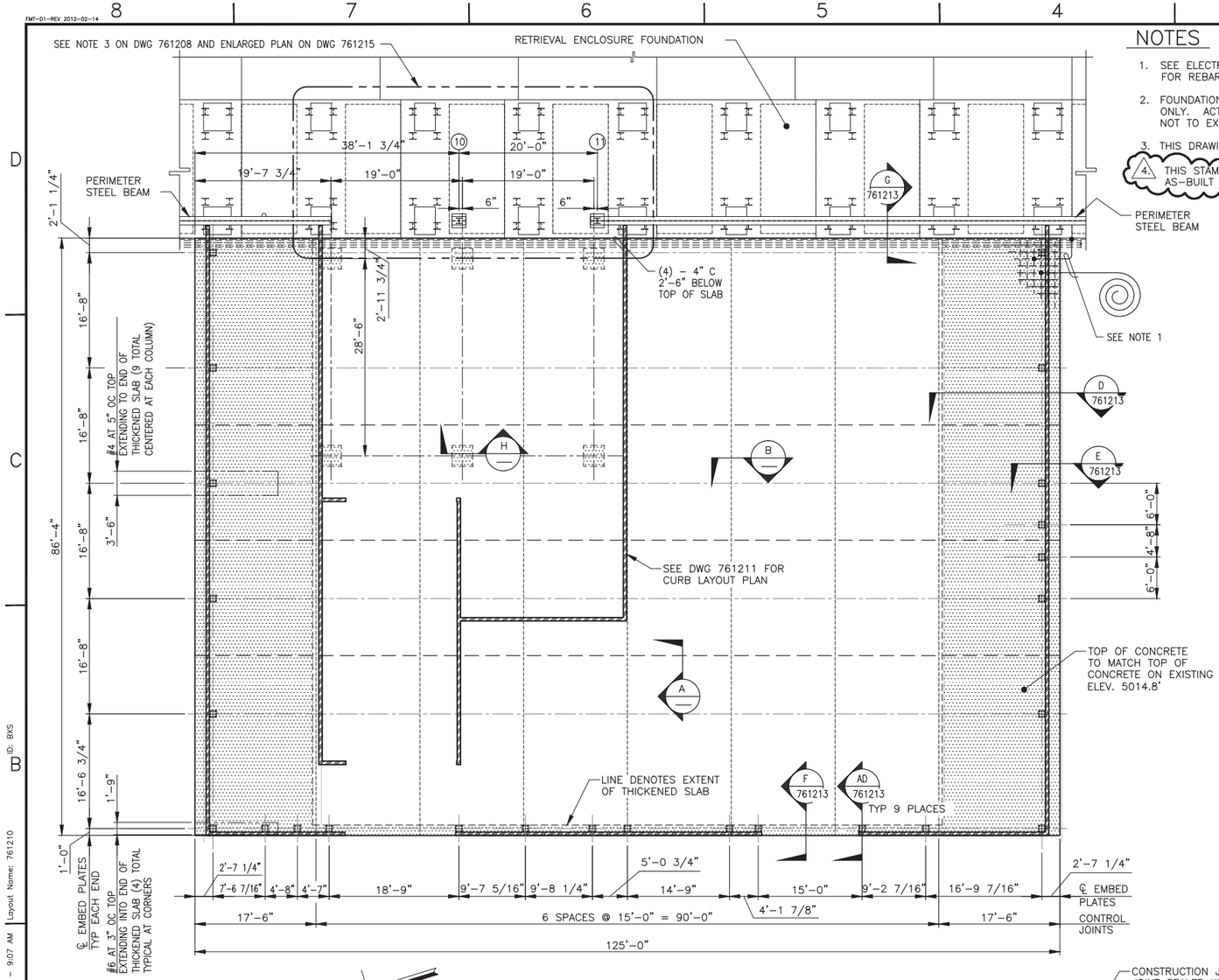
SIZE	INDEX CODE NUMBER (AREA / TYPE / CI / ORIG)	DWG-	REV
D	098 1617 60 136	761207	2

SCALE: NOTED SHEET 1 OF 1

RW-1267

Plot: 761207-2.dwg
Path: L:\RE-S\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/12/13 - 9:05 AM | Layout Name: 761207
ID: BXS

FMT-D1-REV 2012-02-14



AIRLOCK FOUNDATION SLAB PLAN

SCALE: 1/8"=1'-0"

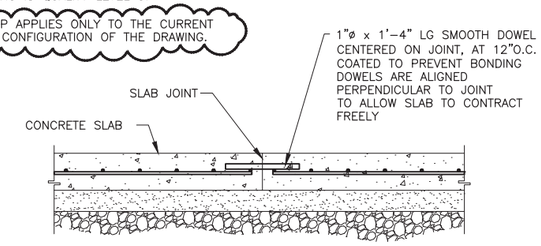
LEGEND

- CONCRETE CURB
- CONSTRUCTION JOINT
- CONTROL JOINT
- THICKENED SLAB

NOTES

1. SEE ELECTRICAL DRAWINGS 761217 AND 761218 FOR REBAR GROUNDING.
2. FOUNDATION DESIGN SHOWN IS BASED ON ESTIMATED BUILDING REACTIONS ONLY. ACTUAL SERVICE LEVEL BUILDING REACTIONS FOR THE AIRLOCK ARE NOT TO EXCEED 30 KIPS UPLIFT, 35 KIPS LATERAL.
3. THIS DRAWING IS QUALITY LEVEL 3.
4. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

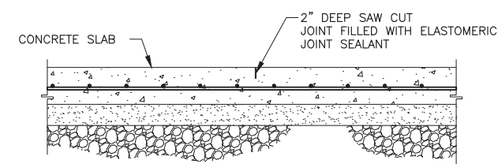
REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-6282, -6342, -6573 & -6587, AS-BUILT AS OF 5-10-2012, SEE DRF-336389
2	ADDED P.E. STAMP AND NOTE 4. AS-BUILT AS OF 9-5-2013, SEE DRF-340004



CONSTRUCTION JOINT (CENTERED BETWEEN COLUMNS)

SECTION A

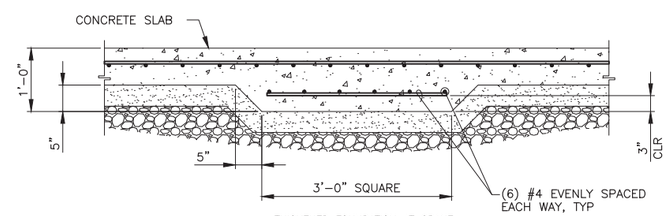
SCALE: 1"=1'-0"



CONTROL JOINT

SECTION B B 761212

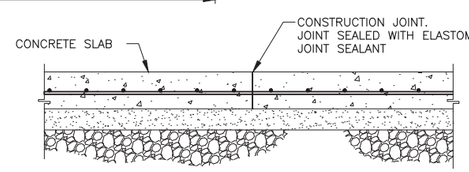
SCALE: 1"=1'-0"



THICKENED FOUNDATION AT CRANE

SECTION H

SCALE: 1"=1'-0"



CONSTRUCTION JOINT IN SNOW CANOPY

SECTION AE 761212

SCALE: 1"=1'-0"

1' 0 1' 2' 3' 4' 5' 10' 15'

SCALE: 1/8" = 1'-0"

1' 0 1'

SCALE: 1" = 1'-0"

Paul D. Leonard
CWI
2013.09.18 08:32:28 -06'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

4

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: P. LEONARD	N/A	N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:32:28 -06'00'	
TECHNICAL CHECK: J. WITT	N/A	N/A
ENG GROUP SUPERVISOR: S. SHEPHERD	N/A	N/A
DESIGN LEAD: S. CARNAHAN	N/A	N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:40:40 -06'00'	
PROJECT NUMBER: 30198		
DRF NUMBER: 326838		

Idaho Cleanup Project CH2MHILL

PHASE V OF THE ACCELERATED RETRIEVAL PROJECT WMF-1617 AIRLOCK 5 FOUNDATION SLAB PLAN, LEGEND AND SECTIONS

SIZE	INDEX CODE NUMBER	DWG-	REV
D	AREA TYPE CI DISC 098 1617 62 136	761210	2
SCALE: NOTED		SHEET 1 OF 1	

RW-1267

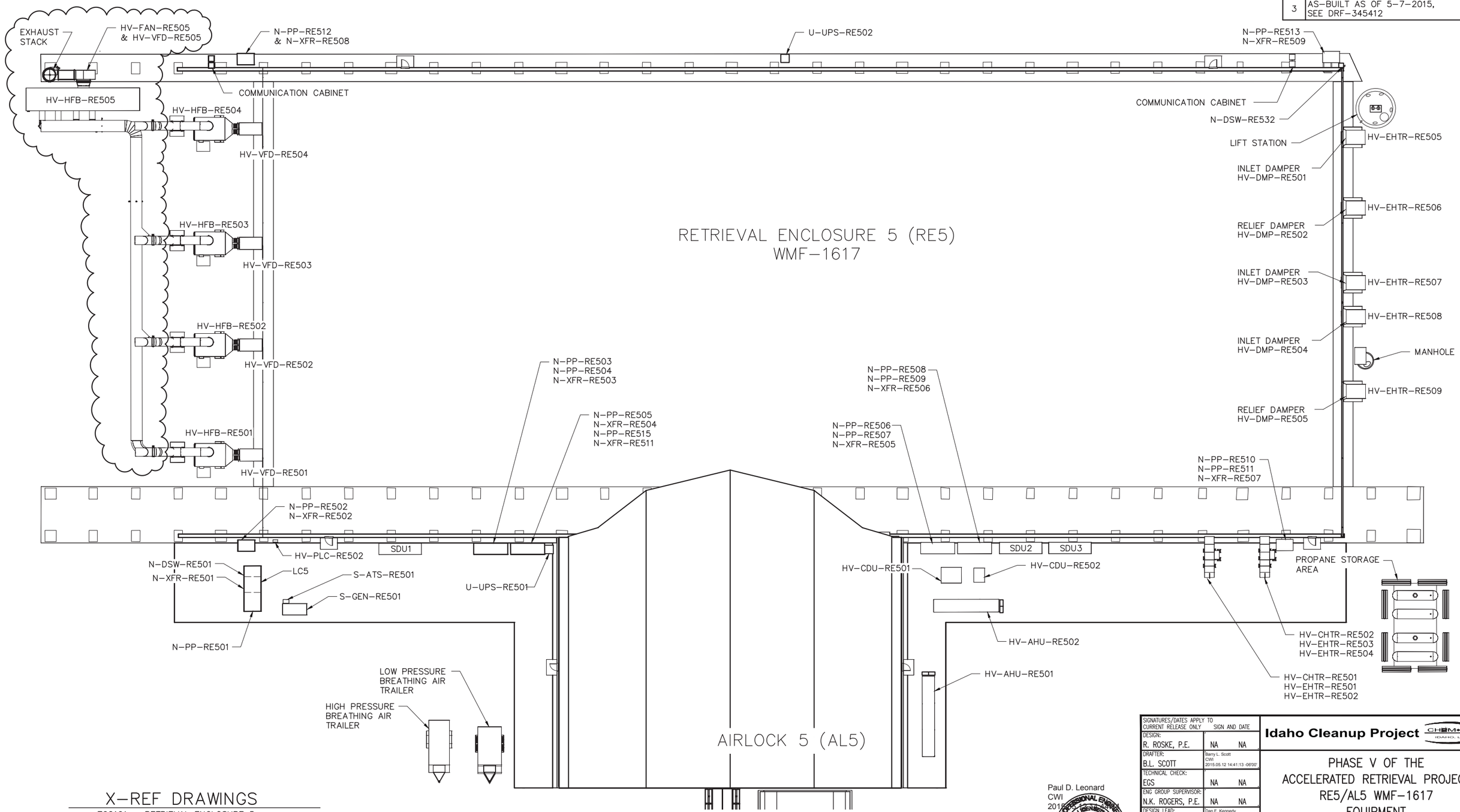
File: 761210-2.dwg Path: L:\KE-S\RCRA\RCRA-DRAWINGS\S-5-13 Date: 09/12/13 - 9:07 AM Layout Name: 761210 ID: BXS

FMT-D1-REV 2012-02-14

NOTES:

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC 6732, 7022, 7119 & 7155 AS-BUILT AS OF 5/2/2012 SEE DRF-336389
2	ADDED P.E. STAMP & NOTE 2. AS-BUILT AS OF 9/5/2013 SEE DRF-340004
3	AS-BUILT AS OF 5-7-2015, SEE DRF-345412



X-REF DRAWINGS

762161 – RETRIEVAL ENCLOSURE 5
762162 – RETRIEVAL ENCLOSURE 5 EQUIPMENT
762163 – AIRLOCK 5
762164 – AIRLOCK 5 EQUIPMENT

RETRIEVAL ENCLOSURE 5 EQUIPMENT LOCATION PLAN

SCALE: 1/16" = 1'-0"

Paul D. Leonard
CWI
2015.05.12 14:41:13 -06'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: R. ROSKE, P.E.	NA	NA
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.05.12 14:41:13 -06'00'	
TECHNICAL CHECK: EGS	NA	NA
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	NA	NA
DESIGN LEAD: D.F. KENNEDY	Dain F. Kennedy CWI 2015.05.12 14:48:26 -06'00'	
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson CWI 2015.05.12 14:51:46 -06'00'	
PROJECT NUMBER: 30198		
DRF NUMBER: 327002		

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
RE5/AL5 WMF-1617
EQUIPMENT
LOCATION PLAN

SIZE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	02	136	762023	3

SCALE: NOTED SHEET 1 OF 1

RW-1271

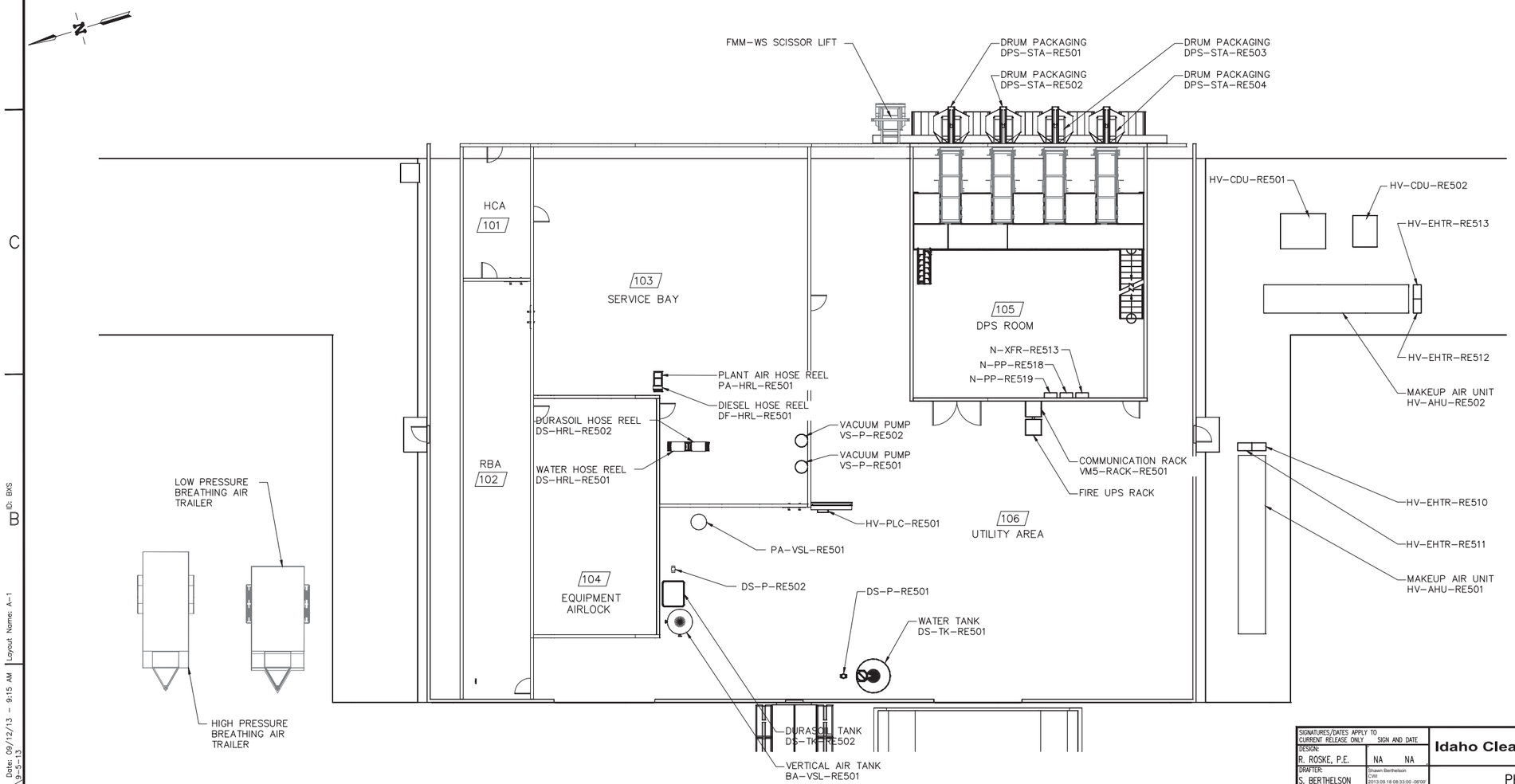
File: 762023-3.dwg
Path: C:\Users\bxs\Documents\BXS RW-1271 (ARPs Start 11-3-2014)
Date: 05/12/15 – 2:23 PM | Layout Name: Layout1 | ID: BXS

FMT-D1-REV 2012-02-14

NOTES:

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC 6573, 6871, 6902 & 7155 AS-BUILT AS OF 5/2/2012 SEE DRF-336389
2	ADDED P.E. STAMP & NOTE 2. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



AIRLOCK 5 EQUIPMENT LOCATION PLAN

SCALE: 1/8"=1'-0"

Paul D. Leonard
CWI
2013.09.18 09:39:00 -06'00'

PROFESSIONAL ENGINEER
STATE OF IDAHO
13530
PAUL D. LEONARD

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: R. ROSKE, P.E.	NA NA
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:33:00 -06'00'
TECHNICAL CHECK: EGS	NA NA
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	NA NA
DESIGN LEAD: N.K. ROGERS, P.E.	NA NA
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:41:51 -06'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 327002	

Idaho Cleanup Project CH2M HILL BWXT IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
WMF-1617 AL5
AIRLOCK 5
EQUIPMENT LOCATION PLAN

SIZE	INDEX CODE NUMBER AREA	TYPE	CI	ORIG	DWG-	REV
D	098	1617	02	136	762024	2

SCALE: NOTED SHEET 1 OF 1

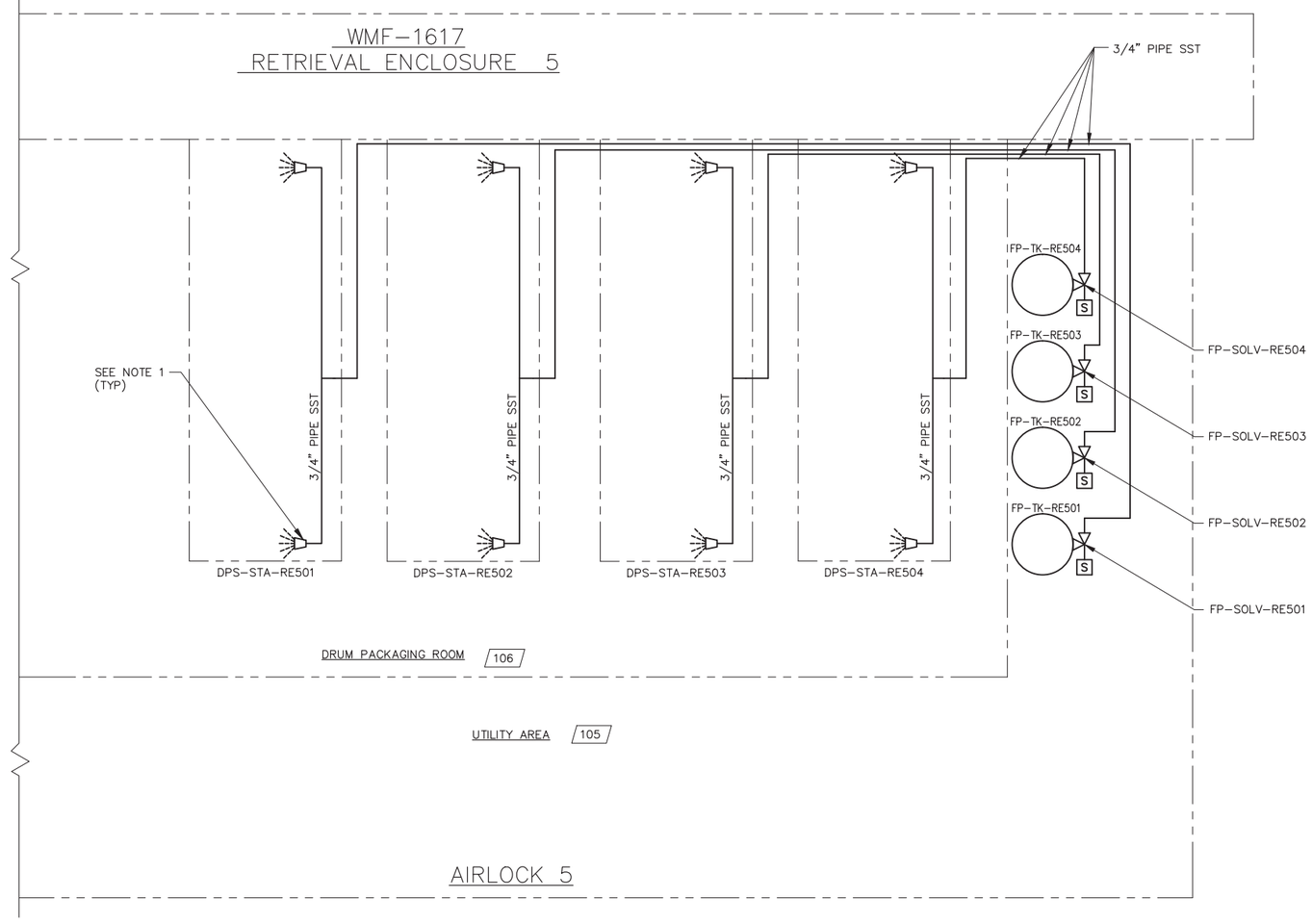
File: 762024-2.dwg
Path: S:\WE-3\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/12/13 - 9:15 AM | Layout Name: A-1 | ID: BXS

FMT-D1-REV 5.2

NOTES:

1. DISCHARGE NOZZLE HEADS SPRAY DOWNWARD.
2. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
3. THIS STAMP AND SIGNATURE VERIFIES THAT THE FIRE PROTECTION EQUIPMENT IS INSTALLED IN THE GENERAL LOCATIONS SHOWN ON THIS DRAWING.

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, AS-BUILT AS OF 9/16/2010 SEE DRF-331288
2	DRAWING ASSESSED AND VERIFIED AS-BUILT AS OF 5/3/2012 SEE DRF-336389
3	ADDED P.E. STAMP AND NOTE 3. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



FIRE PROTECTION SYSTEM DIAGRAM

NTS

LEGEND

S — CHEMICAL STORAGE CYLINDER WITH INTEGRAL SOLENOID VALVE

DISCHARGE NOZZLE

Douglas Clark
CWI
2013.09.18 09:42:29 -06'00'

PROFESSIONAL ENGINEER REGISTERED 11200 STATE OF IDAHO DOUGLAS W. CLARK

3

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: H. VESELKA	NA	NA
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:24:48 -06'00'	
TECHNICAL CHECK: D. CLARK, P.E.	NA	NA
ENG GROUP SUPERVISOR: R. ROSKE, P.E.	NA	NA
DESIGN LEAD: N.K. ROGERS, P.E.	NA	NA
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:42:29 -06'00'	
PROJECT NUMBER: 30198		
DRF NUMBER: 327002		

Idaho Cleanup Project CH2M HILL WG IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
RE5/AL5 WMF-1617
DPS FIRE PROTECTION SYSTEM
DRY CHEMICAL DIAGRAM

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	12	136	762067	3

SCALE: NONE SHEET 1 OF 1

File: 762067-3.dwg
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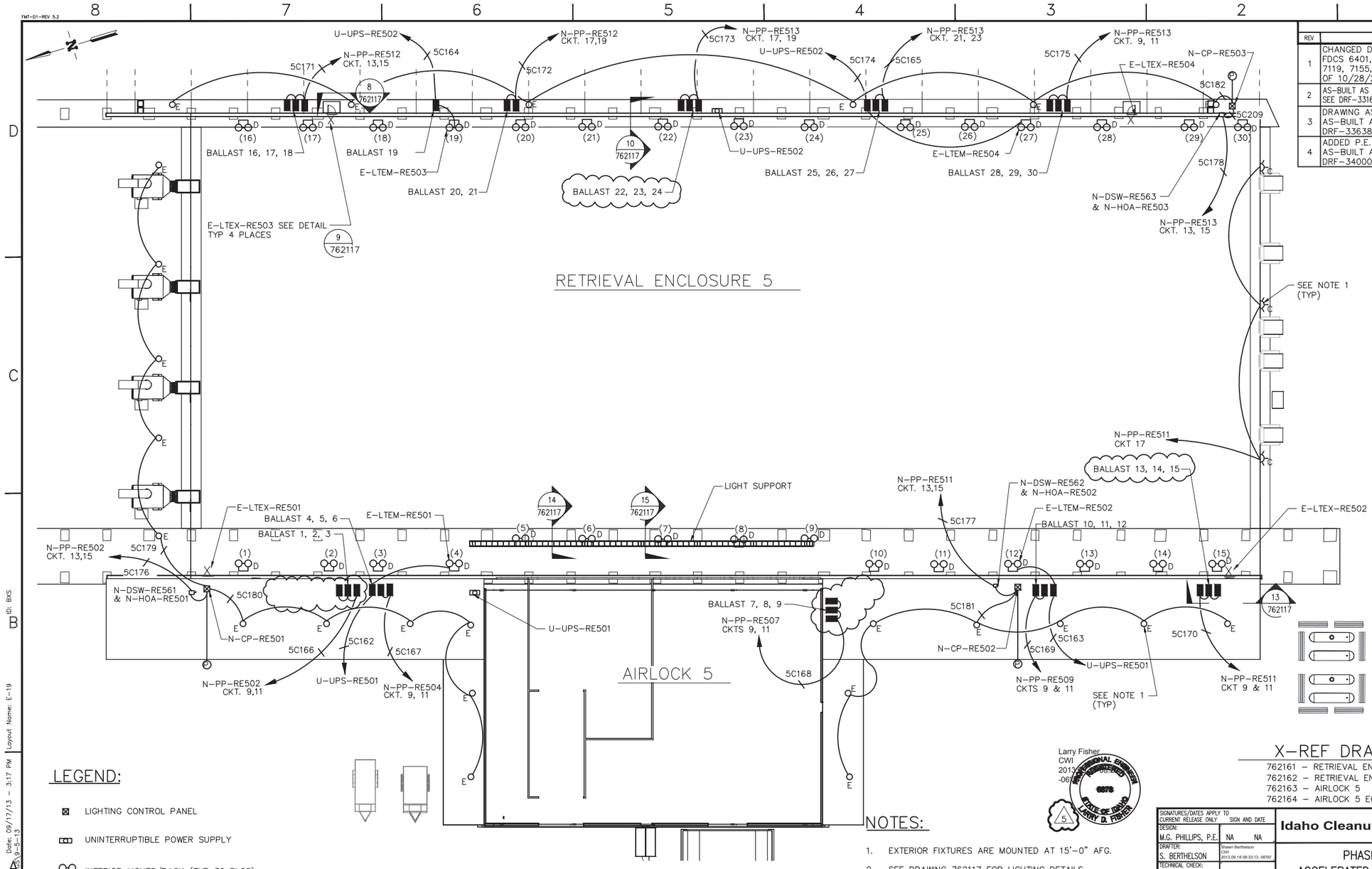
Date: 09/17/13 - 1:59 PM | Layout Name: FP-1 | ID: BSL



LEGEND:

- LIGHTING CONTROL PANEL
- UNINTERRUPTIBLE POWER SUPPLY
- INTERIOR LIGHTS/RACK (TYP 30 PLCS)
- BALLAST, LIGHTING, REMOTE
- PHOTO-EYE SENSOR (PES)
- EXIT SIGN PHOTO LUMINESCENT MOUNT ABOVE DOOR ACCUFORM #PLW275GN

RETRIEVAL ENCLOSURE 5 LIGHTING PLAN

SCALE: 1/16"=1'-0"

NOTES:

1. EXTERIOR FIXTURES ARE MOUNTED AT 15'-0" AFG.
2. SEE DRAWING 762117 FOR LIGHTING DETAILS.
3. SEE DRAWINGS 762119, 762120, 762121, 762122 & 762123 FOR CABLE & CONDUIT SCHEDULES.
4. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
5. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

Larry Fisher
CWI
2013-06-20

X-REF DRAWINGS

762161 – RETRIEVAL ENCLOSURE 5
762162 – RETRIEVAL ENCLOSURE 5 EQUIPMENT
762163 – AIRLOCK 5
762164 – AIRLOCK 5 EQUIPMENT

REV.	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDCS 6401, 6680, 6732, 6923, 7022, 7119, 7155, 7267 & 7276 AS-BUILT AS OF 10/28/2010 SEE DRF-331574
2	AS-BUILT AS OF 11/9/2010 SEE DRF-331696
3	DRAWING ASSESSED AND VERIFIED AS-BUILT AS OF 5/9/2012 SEE DRF-336389
4	ADDED P.E. STAMP AND NOTE 5 AS-BUILT AS OF 9/5/2013 SEE DRF-340004

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: M.G. PHILLIPS, P.E.	NA NA
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:33:13 -06'00'
TECHNICAL CHECK: L.D. FISHER, P.E.	NA NA
ENG GROUP SUPERVISOR: W.H. REED, P.E.	NA NA
DESIGN LEAD: N.K. ROGERS, P.E.	NA NA
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:43:09 -06'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 327002	

Idaho Cleanup Project CH2M HILL BechtelWG

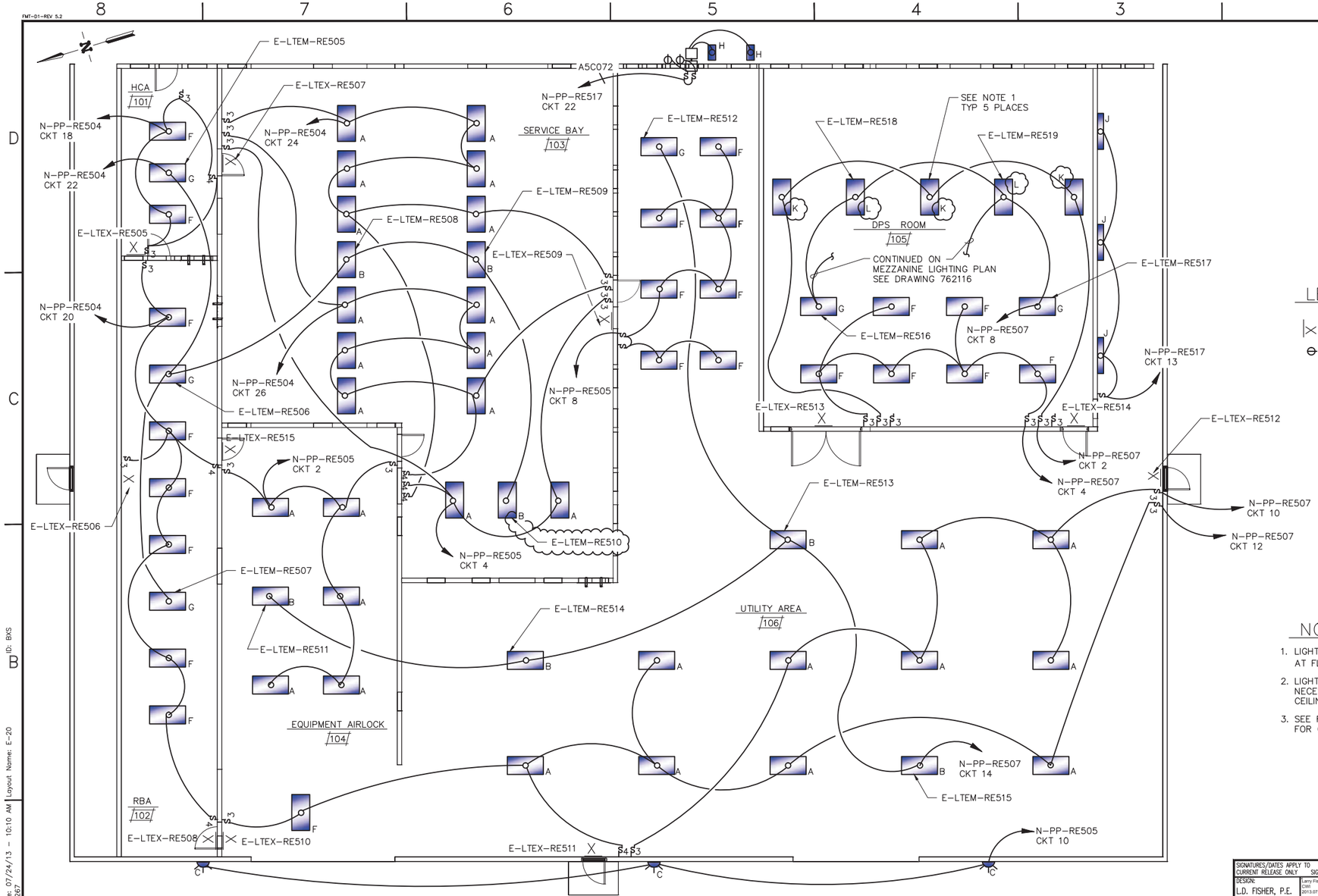
PHASE V OF THE ACCELERATED RETRIEVAL PROJECT RE5/AL5 WMF-1617

RE5 LIGHTING PLAN

SIZE	INDEX CODE NUMBER: AREA	TYPE	CI	DRG	DWG-	REV
D	098	1617	10	136	762114	4

SCALE: NOTED — SHEET 1 OF 1

File: 762114-4.dwg
Path: L:\RE-5\ECRA\ECRA-DRAWINGS\9-5-13
Date: 09/17/13 – 3:17 PM | Layout Name: E-19
ID: BXS



AIRLOCK 5 LIGHTING PLAN

SCALE: 3/16" = 1'-0"

X-REF DRAWINGS

762163 – AIRLOCK 5

REVISIONS	
REV.	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDCS 6865, 6956, 7009, 7020, 7021, 7028, 7265 & 7296 AS-BUILT AS OF 10/29/2010 SEE DRF-331574
2	DRAWING ASSESSED AND VERIFIED AS-BUILT AS OF 5/9/2012 SEE DRF-336389
3	INCORPORATED FDC-9000, AS-BUILT AS OF 6-27-2013, SEE DRF-339468

LEGEND

EXIT SIGN, PHOTO-LUMINESCENT PERMANENTLY MOUNT ABOVE DOOR ACCUFORM #PLW275GN

20A SINGLE RECEPTACLE

NOTES:

1. LIGHTS ARE MOUNTED UNDER THE DPS DECK PLATE AT FLOOR LEVEL.
2. LIGHTING MOUNTING HEIGHT WAS ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS AND/OR CEILING SLOPE
3. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.

Larry Fisher
CWI
2013
-06

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: L.D. FISHER, P.E.	Larry Fisher CWI 2013.07.24 15:09:34 -06'00'
DRAFTER: B.L. SCOTT	Barry Scott CWI 2013.07.24 12:32:46 -06'00'
TECHNICAL CHECK: N/A	NA NA
ENG GROUP SUPERVISOR: N/A	NA NA
DESIGN LEAD: N/A	NA NA
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson CWI 2013.07.25 07:29:31 -06'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 327002	

Idaho Cleanup Project CH2M HILL BechtelWG

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
RE5/AL5 WMF-1617

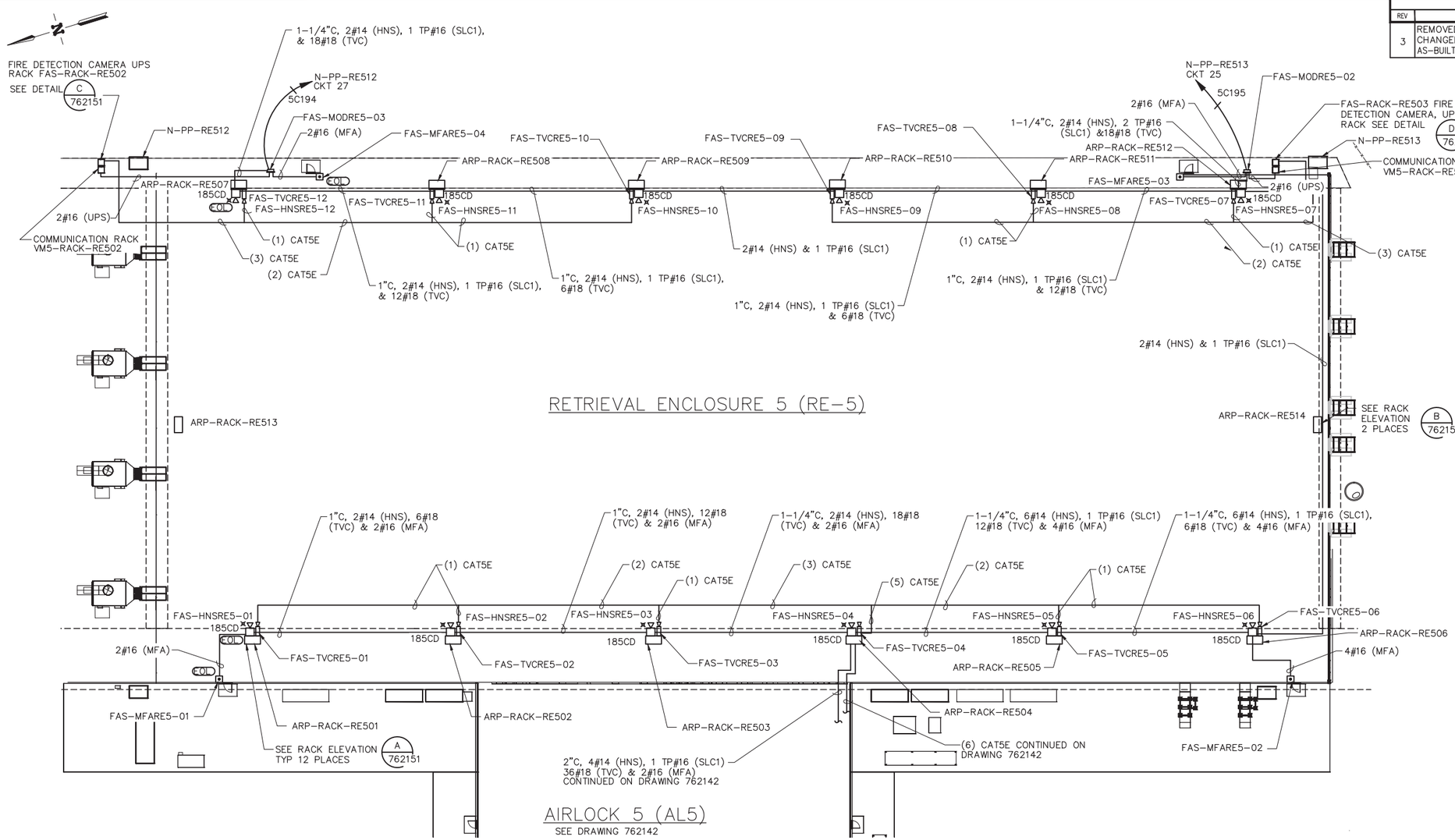
AL5 LIGHTING PLAN

SIZE	INDEX CODE NUMBER				DWG-	REV
	AREA	TYPE	SI	ORIG		
D	098	1617	10	136	762115	3

SCALE: NOTED SHEET 1 OF 1

File: 762115-3.dwg
Path: C:\Users\bxs\Documents\BXS\WM-1617
Date: 07/24/13 – 10:10 AM Layout Name: E-20
ID: BXS

REVISIONS	
REV.	DESCRIPTION
3	REMOVED PRIOR REVISION HISTORY, CHANGED DRAWING TITLE, AS-BUILT AS OF 9-5-2013, SEE DRF-340004



RE5 FIRE ALARM FLOOR PLAN

SCALE: 1/16" = 1'-0"

LEGEND

- MANUAL FIRE ALARM STATION
- HORN/STROBE
- EOL END OF LINE RESISTOR
- SMOKE/FIRE DETECTION CAMERA WITH HOUSING

NOTES:

1. ALL CONDUCTORS ARE IN 3/4"C UNLESS SHOWN OTHERWISE ON THE DRAWING.
2. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
3. THIS STAMP AND SIGNATURE VERIFIES THAT THE FIRE PROTECTION EQUIPMENT IS INSTALLED IN THE GENERAL LOCATIONS SHOWN ON THIS DRAWING.

Douglas W. Clark
CWI
2013.09.18 09:11:00 -06'00'
PROFESSIONAL ENGINEER REGISTERED 11200 STATE OF IDAHO DOUGLAS W. CLARK

X-REF DRAWINGS

762161 – RETRIEVAL ENCLOSURE 5
762162 – RETRIEVAL ENCLOSURE 5 EQUIPMENT
762163 – AIRLOCK 5

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: W.B. FARMER	NA	NA
DRAFTER: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:01:34 -06'00'	
TECHNICAL CHECK: D.W. CLARK, P.E.	NA	NA
ENG GROUP SUPERVISOR: W.H. REED, P.E.	NA	NA
DESIGN LEAD: N.K. ROGERS, P.E.	NA	NA
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson CWI 2013.09.18 09:25:15 -06'00'	
PROJECT NUMBER: 30198		
DRF NUMBER: 327002		

Idaho Cleanup Project CH2M HILL WG IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
RE5/AL5 WMF-1617
RETRIEVAL ENCLOSURE 5
FIRE ALARM PLAN

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	12	136	762141	3

SCALE: NOTED SHEET 1 OF 1

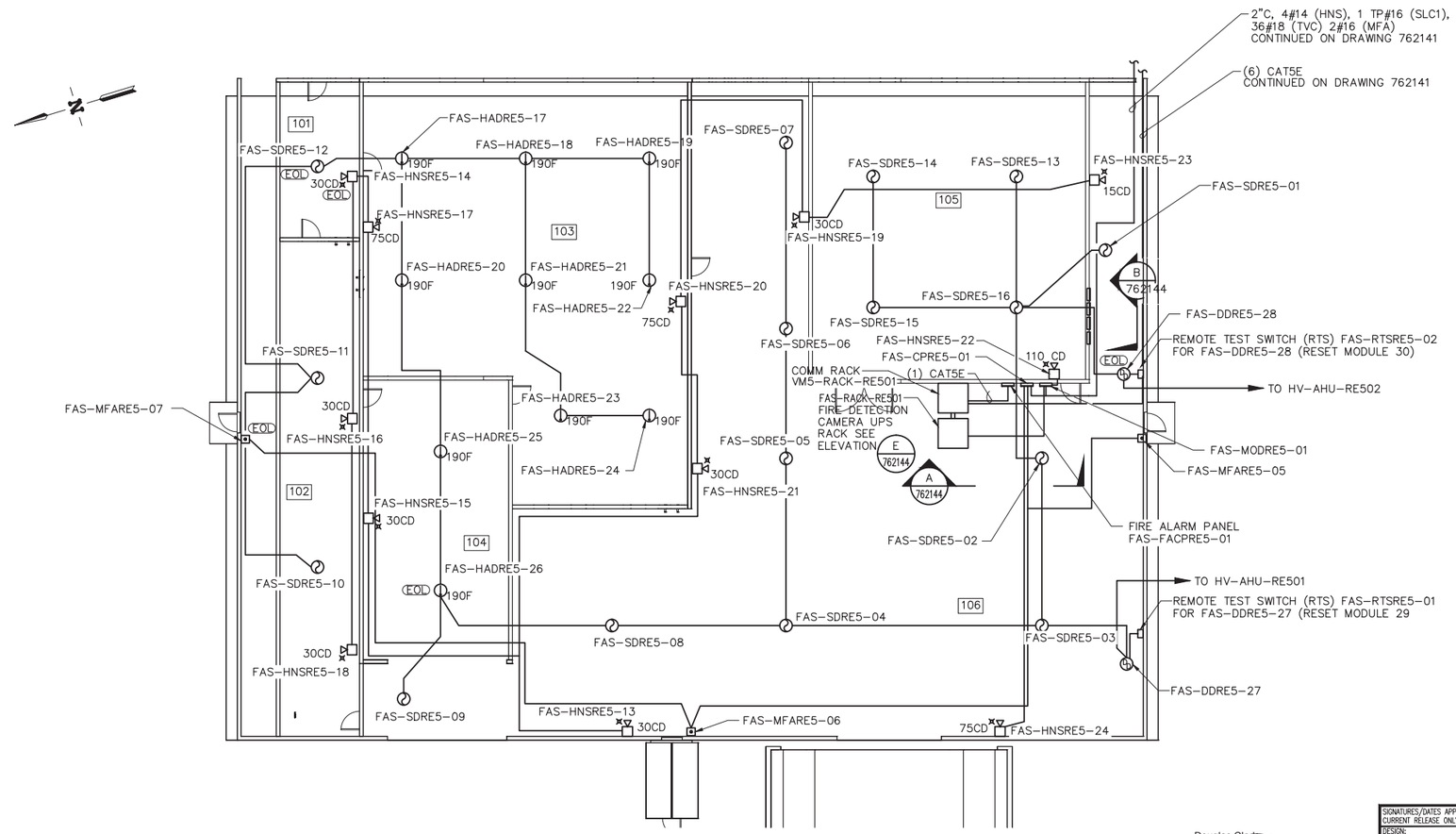
File: 762141-3.dwg
Path: S:\RE-5\RCRA\RCRA-DRAWINGS
Date: 09/17/13 - 2:01 PM
Layout Name: FA-1
ID: BSL

FMT-D1-REV 5.2

REVISIONS	
REV.	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDCS 6412, 6921 & 7173 AS-BUILT AS OF 10/13/2010 SEE DRF-331493
2	DRAWING ASSESSED AND VERIFIED AS-BUILT AS OF 5/7/2012 SEE DRF-336389
3	AS-BUILT AS OF 9-5-2013, SEE DRF-340004

NOTES:

1. ALL CONDUCTORS ARE IN 3/4"C UNLESS SHOWN OTHERWISE.
2. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
3. THIS DRAWING IS TO BE USED IN CONJUNCTION WITH DWGS:
   762145 FIRE ALARM CONTROL PANEL FAS-FACPRE5-01 CONNECTION DIAGRAM
   762146 FAS-CPRE5-01 WIRING DIAGRAM, FAS-DDRE5-27 & FAS-DDRE5-28 WIRING DIAGRAM.
4. THIS STAMP AND SIGNATURE VERIFIES THAT THE FIRE PROTECTION EQUIPMENT IS INSTALLED IN THE GENERAL LOCATIONS SHOWN ON THIS DRAWING.



AIRLOCK 5 FLOOR PLAN

SCALE 1/8" = 1'-0"

LEGEND

- MANUAL FIRE ALARM STATION
- HORN/STROBE
- END OF LINE RESISTOR
- SMOKE DETECTOR
- HEAT DETECTOR (190F)
- DUCT SMOKE DETECTOR
- FIRE ALARM PANEL

X-REF DRAWING

762163 – AIRLOCK 5

Douglas Clark CWI 2013.09.18 09:12:08 -06'00'

PROFESSIONAL ENGINEER REGISTERED 11200 STATE OF IDAHO DOUGLAS W. CLARK

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: W.B. FARMER	NA	NA
DRAFTER: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:01:03 -06'00'	
TECHNICAL CHECK: D.W. CLARK, P.E.	NA	NA
ENG GROUP SUPERVISOR: W.H. REED, P.E.	NA	NA
DESIGN LEAD: N.K.ROGERS, P.E.	NA	NA
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson CWI 2013.09.18 09:22:27 -06'00'	
PROJECT NUMBER: 30198		
DRF NUMBER: 327002		

Idaho Cleanup Project CH2MHILL IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
RE5/AL5 WMF-1617
AIRLOCK 5
FIRE ALARM PLAN

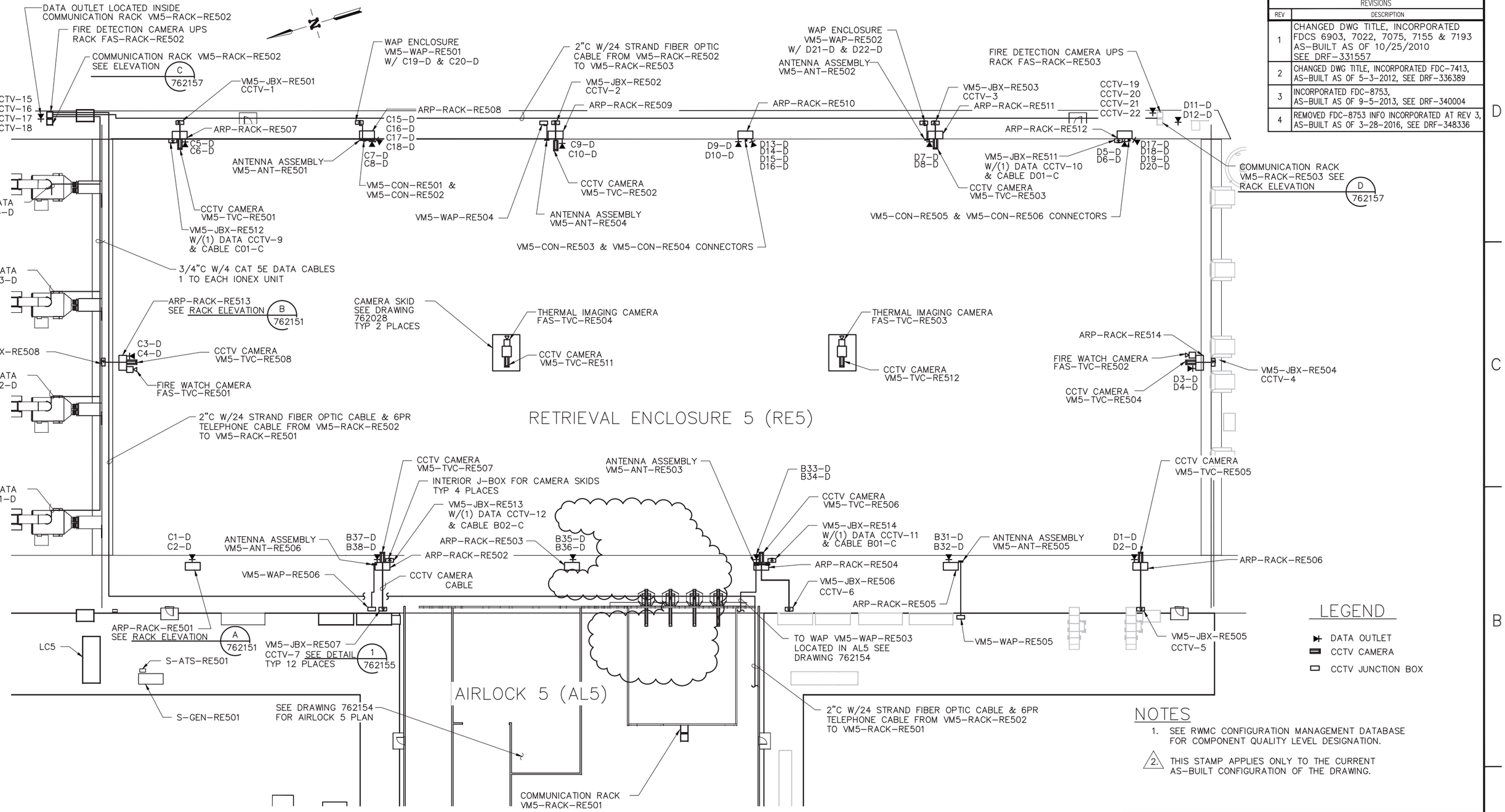
SIZE	INDEX CODE NUMBER				DWG-	REV
	AREA	TYPE	CL	ORIG		
D	098	1617	12	136	762142	3

SCALE: NOTED — SHEET 1 OF 1

File: 762142-3.dwg
Path: S:\RE-5\RCRA\RCRA-DRAWINGS\
Date: 09/17/13 – 1:56 PM | Layout Name: FA-2 | ID: BSL

FMT-D1-REV 5.2

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDCS 6903, 7022, 7075, 7155 & 7193 AS-BUILT AS OF 10/25/2010 SEE DRF-331557
2	CHANGED DWG TITLE, INCORPORATED FDC-7413, AS-BUILT AS OF 5-3-2012, SEE DRF-336389
3	INCORPORATED FDC-8753, AS-BUILT AS OF 9-5-2013, SEE DRF-340004
4	REMOVED FDC-8753 INFO INCORPORATED AT REV 3, AS-BUILT AS OF 3-28-2016, SEE DRF-348336



LEGEND

- DATA OUTLET
- CCTV CAMERA
- CCTV JUNCTION BOX

NOTES

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

RE5 DATA/DATA CCTV FLOOR PLAN

SCALE: 1/16" = 1'-0"

LAST NO. USED

DATA/DATA	B38-D
DATA/DATA	C20-D
DATA/DATA	D22-D
DATA	CCTV-22

X-REF DRAWINGS

762161 – RETRIEVAL ENCLOSURE 5
762162 – RETRIEVAL ENCLOSURE 5 EQUIPMENT
762163 – AIRLOCK 5
762164 – AIRLOCK 5 EQUIPMENT

Larry Fisher
CWI
2016.04.12 -06'00'

PROFESSIONAL ENGINEER REGISTERED 6878 STATE OF IDAHO LARRY D. FISHER

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: W.B. FARMER	NA NA
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2016.04.11 15:54:18 -06'00'
TECHNICAL CHECK: EGS	NA NA
ENG GROUP SUPERVISOR: W.H. REED, P.E.	NA NA
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2016.04.11 16:02:35 -06'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2016.04.11 16:30:41 -06'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 327002	

Idaho Cleanup Project CH2M+WG IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
WMF-1617
RETRIEVAL ENCLOSURE 5
DATA/DATA CCTV FLOOR PLAN

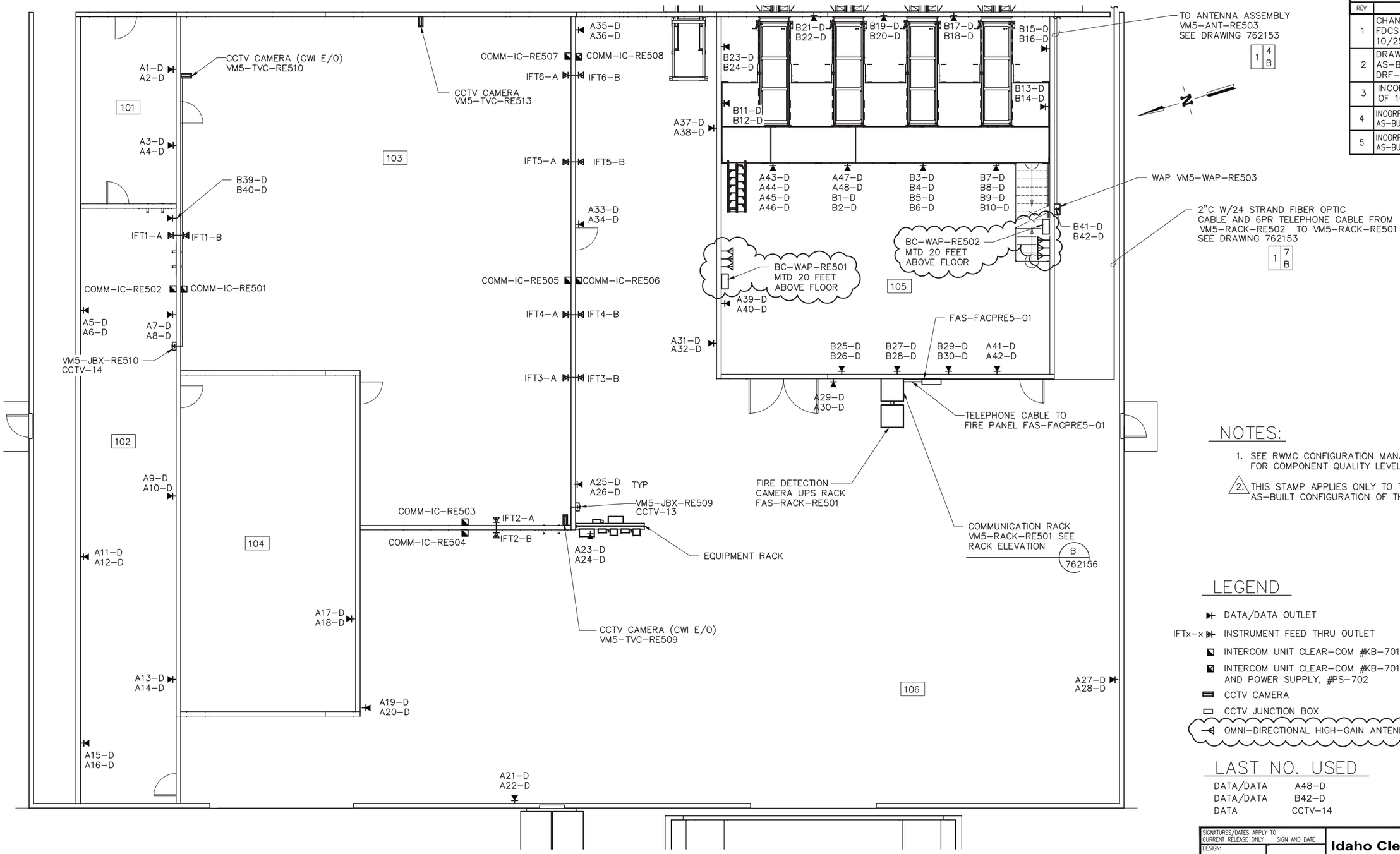
SIZE	INDEX CODE NUMBER (AREA / TYPE / CL / ORIG)	DWG-	REV
D	098 / 1617 / 06 / 136	762153	4

SCALE: NOTED — SHEET 1 OF 1

RW-1273

File: 762153-4.dwg
Path: C:\Users\bxs\Documents\BXS\RW-1273 (ARPs Start 1-12-2016)
Date: 04/11/16 – 3:47 PM | Layout Name: Layout1 | ID: BXS

FMT-D1-REV 5.2



AIRLOCK 5 FLOOR PLAN

SCALE: 3/16" = 1'-0"

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDCS 6871 & 6903 AS-BUILT AS OF 10/25/2010 SEE DRF-331557
2	DRAWING ASSESSED AND VERIFIED AS-BUILT AS OF 5/7/2012 SEE DRF-336389
3	INCORPORATED FDC-8657 AS-BUILT AS OF 10/25/2012 SEE DRF-337759
4	INCORPORATED FDC-8752, AS-BUILT AS OF 9-5-2013, SEE DRF-340004
5	INCORPORATED FDC-10570, AS-BUILT AS OF 10-13-2015, SEE DRF-347089

NOTES:

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

LEGEND

- DATA/DATA OUTLET
- IFTx-x INSTRUMENT FEED THRU OUTLET
- INTERCOM UNIT CLEAR-COM #KB-701
- INTERCOM UNIT CLEAR-COM #KB-701 AND POWER SUPPLY, #PS-702
- CCTV CAMERA
- CCTV JUNCTION BOX
- OMNI-DIRECTIONAL HIGH-GAIN ANTENNA

LAST NO. USED

DATA/DATA	A48-D
DATA/DATA	B42-D
DATA	CCTV-14

X-REF DRAWINGS

762163 – AIRLOCK 5
762164 – AIRLOCK 5 EQUIPMENT

Larry Fisher
CWI
2015.11.16 12:38:13 -07'00'

PROFESSIONAL ENGINEER REGISTERED 6878 STATE OF IDAHO LARRY D. FISHER

2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: W.B. FARMER	NA NA
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.16 12:05:06 -07'00'
TECHNICAL CHECK: EGS	NA NA
ENG GROUP SUPERVISOR: W.H. REED, P.E.	NA NA
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.16 12:11:46 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.16 14:57:26 -07'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 327002	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

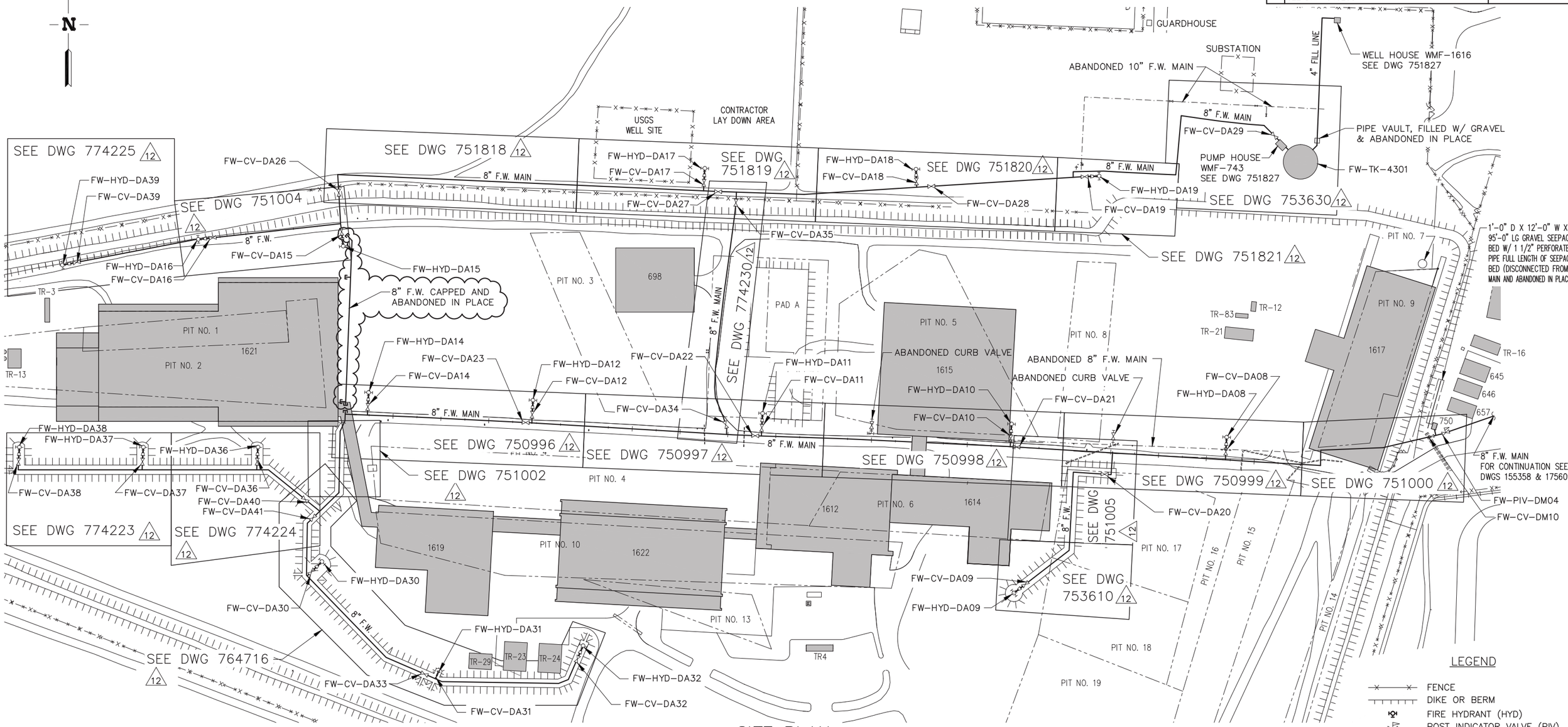
PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
RE5/AL5 WMF-1617
DATA/DATA, CCTV AND
INTERCOM FLOOR PLAN

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	06	136	762154	5

SCALE: NOTED — SHEET 1 OF 1

File: 762154-5.dwg
Path: C:\Users\bxs\Documents\BXS\RW-1271 (ARPs Start 11-3-2014)
Date: 11/16/15 – 11:54 AM | Layout Name: Layout1
ID: BXS

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
19	REMOVED PRIOR REVISION HISTORY, INCORPORATED FDC-10683, AS-BUILT AS OF 1-19-2016, SEE DRF-347622	3-15-2016	
20	AS-BUILT AS OF 3-24-2016, SEE DRF-348288	3-30-2016	



SITE PLAN

NOTES

1. ALL UNDERGROUND F.W. PIPING IS CL. 200 C.I. W/ MJ FITTINGS OR TYTON JT. FITTINGS (SEE SPECS) IN ACCORDANCE W/ NFPA 24.
2. THRUST BLOCKS ARE PROVIDED IN ACCORDANCE W/ NFPA 24. THRUST BLOCKS ARE CAST IN PLACE AGAINST UNDISTURBED TRENCH WALLS WHEN NOT UTILIZING THRUST RESTRAINT SYSTEM PIPING.
3. REMOVED
4. REMOVED
5. REMOVED
6. LAYOUT OF FIREWATER PIPING IS BASED UPON RWMC SITE SPECIFIC DATUM TO AGREE WITH THE RWMC NORTH AND SOUTH CONTROL POINTS WHICH HAVE BEEN MEASURED WITH A 1991 GPS FIRST LEVEL CONTROL. FOR THE LOCATION OF PIPING COMPONENTS SEE RWMC DRAFTING. FIELD VERIFY BEFORE BEGINNING SUBSURFACE WORK.
7. REMOVED
8. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
9. SEE DRAWING 415445 SHEET 3 FOR THE OPERATIONS AREA PRIMARY FIREWATER PUMP HOUSE P & ID.
10. THE PRIMARY RWMC FIRE WATER SUPPLY SYSTEM FROM WMF-639 CONSISTS OF TWO 2000 GPM PUMPS OPERATING AT 125 PSI NET DISCHARGE PRESSURE (ONE DIESEL ENGINE DRIVEN, ONE ELECTRIC MOTOR DRIVEN 480 VAC) TAKING SUCTION FROM A 250,000 GALLON (MINIMUM LEVEL 207,413 GALLON) GRADE LEVEL WATER STORAGE TANK. THE ELECTRIC MOTOR DRIVEN PUMP AUTOMATICALLY STARTS AT 120 PSIG. THE DIESEL ENGINE DRIVEN PUMP AUTOMATICALLY STARTS WHEN THE SYSTEM PRESSURE DROPS TO BELOW 110 PSIG AND AFTER A 24 SECOND TIME DELAY.
11. THE SECONDARY WATER SUPPLY FROM WMF-743 CONSISTS OF A 1500 GPM AT 85 PSIG NET, AUTOMATIC STARTING, DIESEL ENGINE DRIVEN FIRE PUMP TAKING SUCTION FROM FW-TK-4301 GRADE LEVEL SUCTION TANK.

12. REFERENCE DRAWING ONLY.

13. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

Paul D. Leonard
CWI
2016.03.30 08:15:16 -06'00'
PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

13

PROJECT NO. 015575

QTY. REQD.	QUAL. LEVEL	PART OR IDENTIFYING NO.	DESCRIPTION/MATERIAL/SPECIFICATION	ITEM/ FIND

PARTS LIST

DIMENSIONING AND SYMBOLOGY ARE AMERICAN NATIONAL STANDARD UNLESS OTHERWISE SPECIFIED
SURFACE ROUGHNESS 125
DIMENSIONS AND TOLERANCES ARE IN INCHES
TOLERANCES: .X = ±.1
DECIMALS: .XX = ±.03
.XXX = ±.010
FRACTIONS ±1/8
ANGULAR ±2°
DO NOT SCALE DRAWING

NEXT ASSY/REF DWG	N/A	
P.M.	D.L. FRENCH	11/5/92
DESIGN MGR	J.C. KVAMME	11/5/92
DESIGN	D.R. SCHIESS	DATE 11/9/92
CHECKED	D.R. SCHIESS	DATE 11/9/92
DRAWN	B.L. SCOTT	DATE 5/27/92
RELEASE	A.L. WATLINGTON	DATE 11-9-92

EG&G Idaho, Inc.

RWMC — SDA AREA

RADIOACTIVE WASTE MANAGEMENT COMPLEX
SDA FIREWATER PIPING
PLOT PLAN

SIZE	INDEX CODE NUMBER (AREA / TYPE / CL / ORIG)	DRAWING NO.	REV
D	098 0200 52 220	177425	20
SCALE 1'=100' & NOTED		SPEC CODE	SHT 1 OF 1

RW-1273

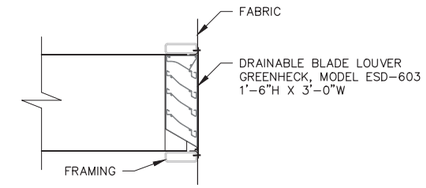
File: 177425-20.dwg
Path: C:\Users\bxs\Documents\BXS\RW-1273 (ARPs Start 1-12-2016)
Date: 03/30/16 – 8:09 AM Layout Name: Sheet 1 ID: BXS

FMT-D1-REV 4

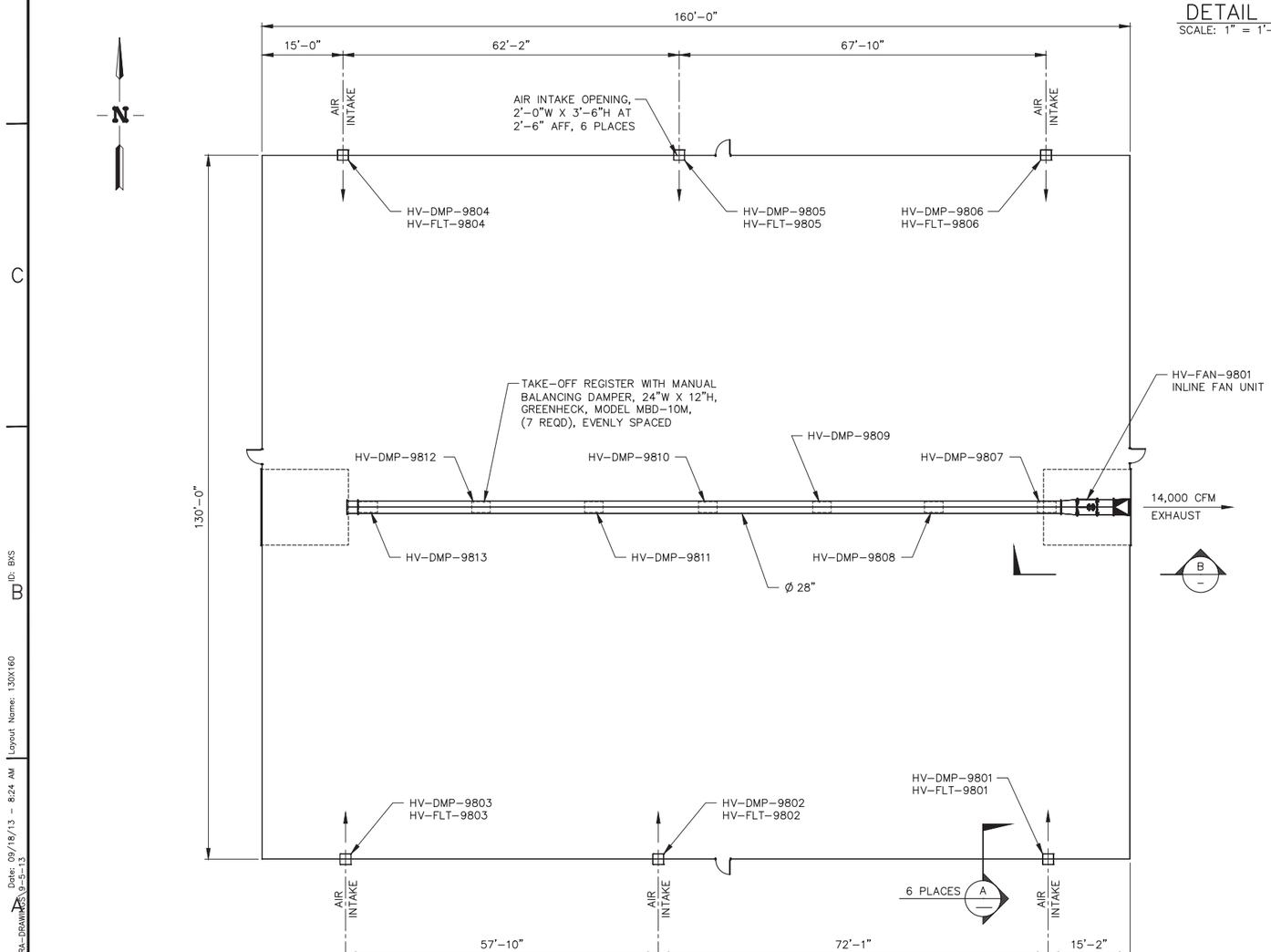
NOTES

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT SAFETY CATEGORY DESIGNATION
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

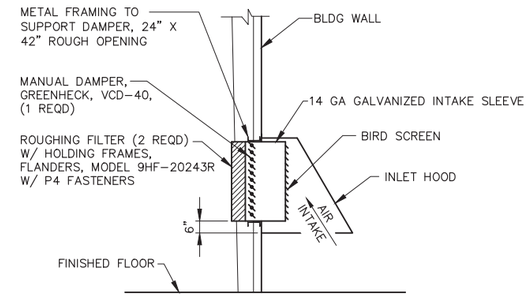
REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
1	CHANGED DRAWING TITLE & INDEX CODE CLASS, INCORPORATED PERTINENT INFO FROM DWG 631229, AS-BUILT AS OF 9-29-2005, SEE DAR-125738	10-6-2005
2	DRAWING ASSESSED AND VERIFIED AS-BUILT AS OF 1/26/2012 SEE DRF-335441	2/6/2012
3	ADDED P.E. STAMP AND NOTE 2. AS-BUILT AS OF 9/5/2013 SEE DRF-340004	9-18-2013



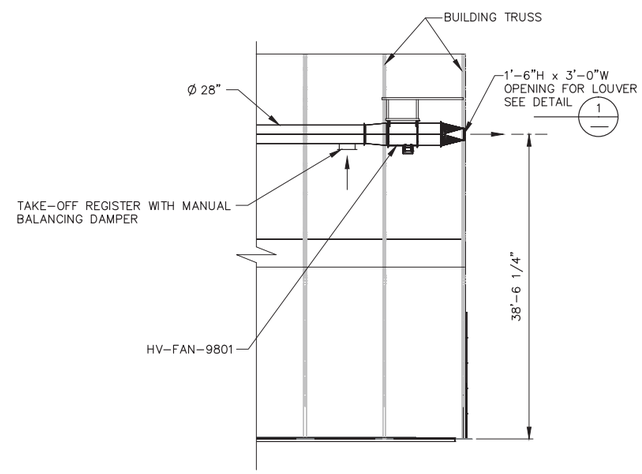
DETAIL 1
SCALE: 1" = 1'-0"



HVAC FLOOR PLAN
SCALE: 3/32" = 1'-0"



SECTION A
SCALE: 3/8" = 1'-0"



SECTION B
SCALE: 1/8" = 1'-0"

Paul D. Leonard
CWI
2013
-0610

PROFESSIONAL ENGINEER 13530 STATE OF IDAHO PAUL D. LEONARD

REQUESTER: S.L. AUSTAD	
DESIGN: L.E. GUILLEN	
DRAWN: E.L. TOMLIN	
PROJECT NO.	23927
SPCL CODE	
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 124246	
EFFECTIVE DATE: 7-20-05	

Idaho Cleanup Project CH2M HILL

RWMC
TARGETED WASTE REMOVAL
AND DISPOSITION PROJECT
STORAGE ENCLOSURE
VENTILATION PLAN, SECTIONS AND DETAIL

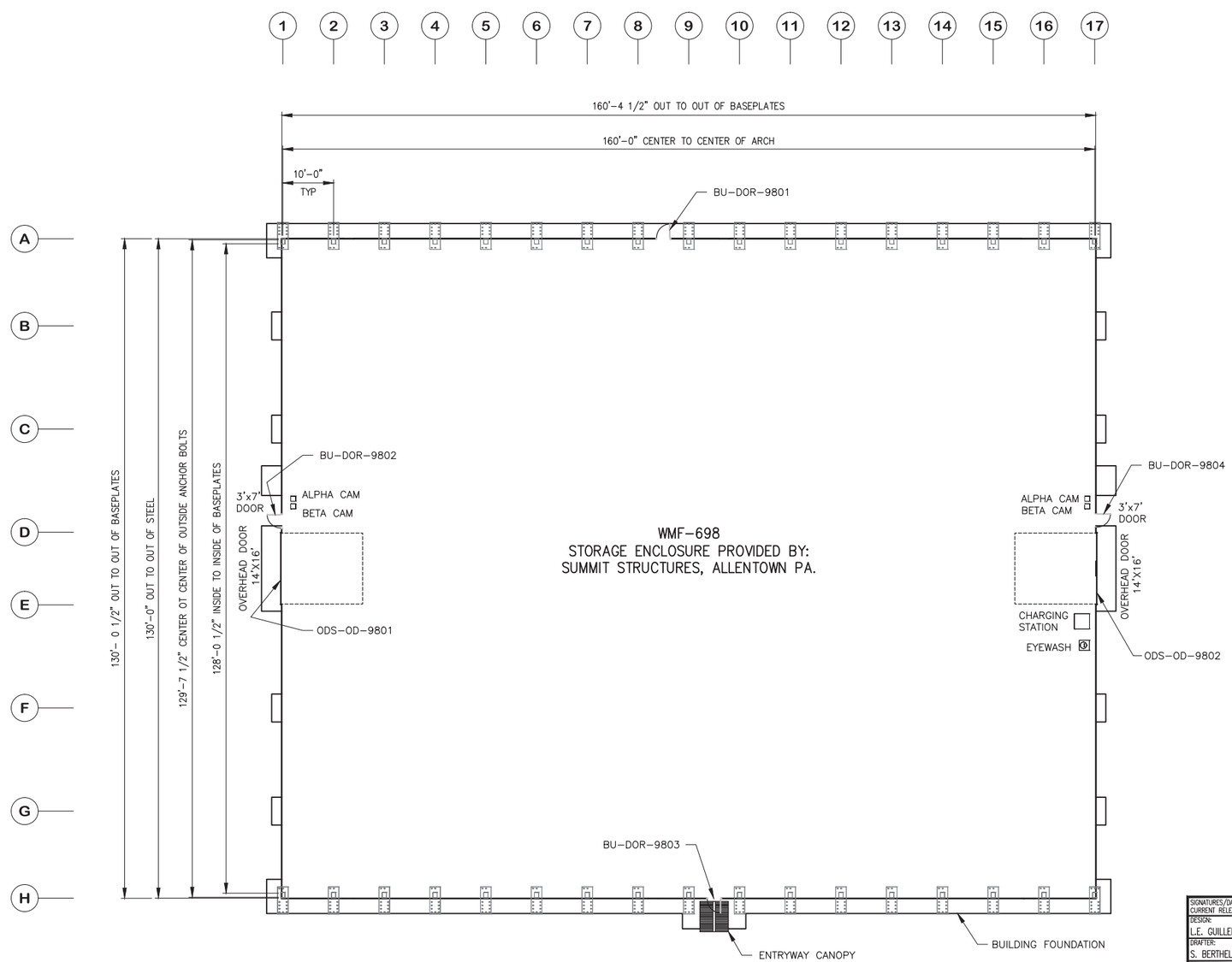
SIZE	INDEX CODE NUMBER					DWG-	REV
	AREA	TYPE	CL	DISC			
D	098	0698	22	136		631228	3

SCALE: NOTED
SHEET 1 OF 1

File: 631228-3.dwg
Path: L:\KE-S\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/18/13 - 8:24 AM | Layout Name: 130X160
ID: BKS

FMT-D1-REV 5.2

REVISIONS	
REV.	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-6025, AS-BUILT AS OF 11-17-2009, SEE DRF-328954
2	INCORPORATED FDC-7494, AS-BUILT AS OF 1-17-2011, SEE DRF-332225
3	DRAWING ASSESSED AND VERIFIED AS-BUILT AS OF 1/26/2012 SEE DRF-335441
4	ADDED P.E. STAMP AND NOTE 2. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



WMF-698
STORAGE ENCLOSURE PROVIDED BY:
SUMMIT STRUCTURES, ALLENTOWN PA.

STORAGE ENCLOSURE PLAN

SCALE: 3/32"=1'-0"
12,480 DRUM MAX COUNT

NOTES

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

GENERAL NOTES

1. GENERAL DESIGN:
   DESIGN CODES:
   - GENERAL – INTERNATION BUILDING CODE (2003 EDITION)
   - CONCRETE – ACI-318-00
   - STEEL – AISC (NINTH EDITION)
   - IBC OCCUPANCY: S-2
   - IBC BUILDING TYPE: IIB
   - NFPA 101 OCCUPANCY: ORDINARY HAZARD STORAGE
   - DESIGN LOADS: SEE SPC-521

Paul D. Leonard
CWI
2013.09.18 09:26:54 -06'00'

PROFESSIONAL ENGINEER LICENSED 13530 PROFESSIONAL ENGINEER PAUL D. LEONARD

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: L.E. GUILLEN	N/A	N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:26:54 -06'00'	
TECHNICAL CHECK: EGS	N/A	N/A
ENG GROUP SUPERVISOR: S.L. AUSTAD	N/A	N/A
DESIGN LEAD: S.L. AUSTAD	N/A	N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:14:47 -06'00'	
PROJECT NUMBER: 23927		
DRF NUMBER: 124246		

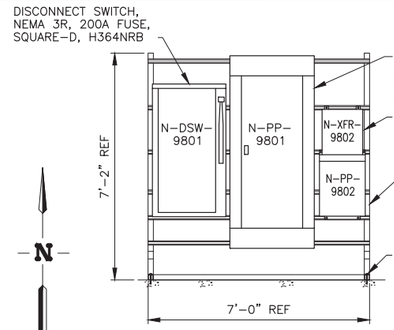
Idaho Cleanup Project CH2M HILL WG IDAHO, LLC

RWMC
TARGETED WASTE REMOVAL
AND DISPOSITION PROJECT
STORAGE ENCLOSURE
PLAN

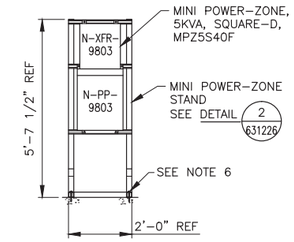
SIZE	INDEX CODE NUMBER (AREA / TYPE / CL / DRBC)	DWG-	REV
D	098 / 0698 / 00 / 136	631225	4
SCALE: NOTED		SHEET 1 OF 1	

RW-1265

File: 631225-4.dwg
Path: L:\CE-S\RCRA\RCRA-DRAWINGS\S-3
Date: 09/12/13 – 11:46 AM | Layout Name: S-3
ID: BXS



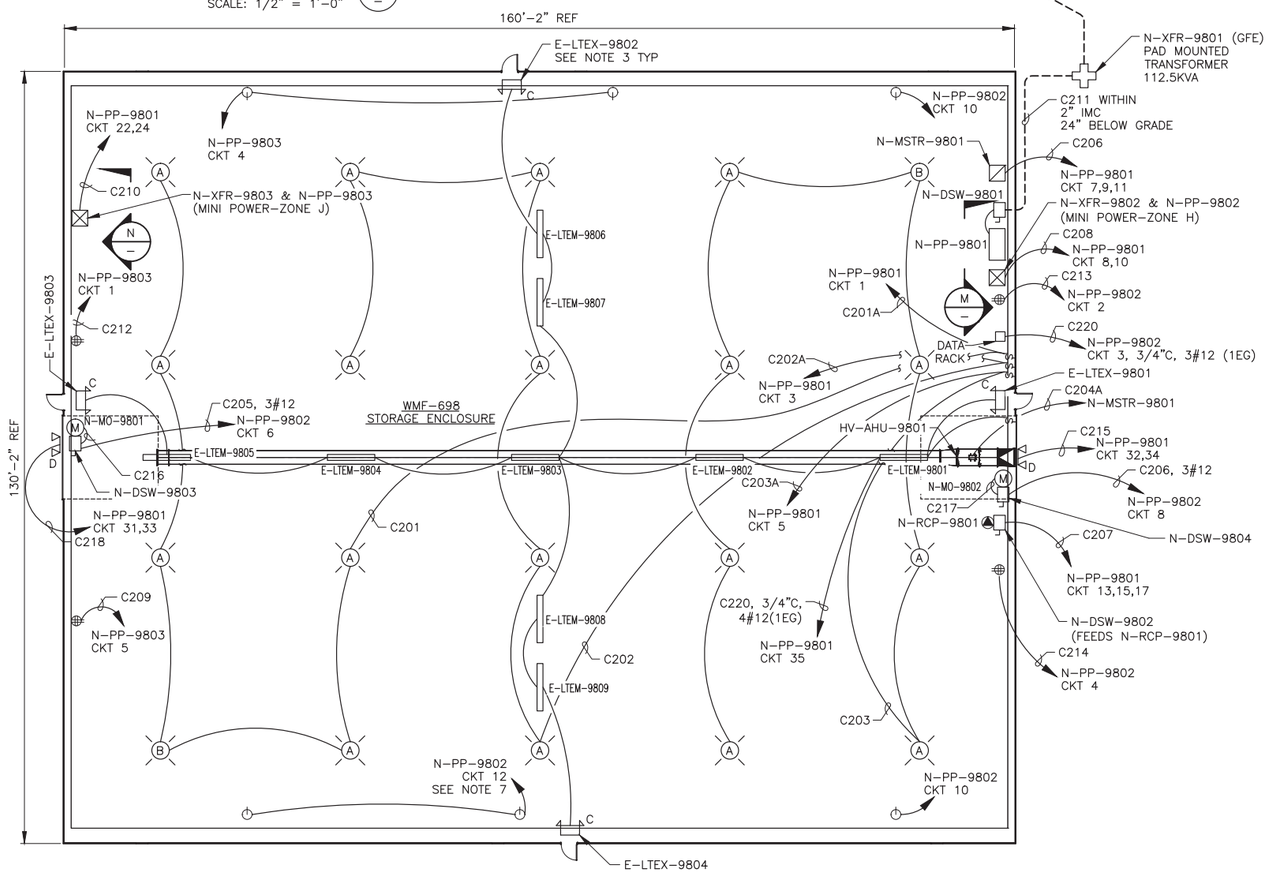
ELEVATION (M)
SCALE: 1/2" = 1'-0"



ELEVATION (N)
SCALE: 1/2" = 1'-0"

EXISTING POWER POLE 49-28 (12.47KV LINE), SEE NOTE 4

C200 3#2 & 1#6EG, CLX TYPE MC-HL, 15KV 24" BELOW GRADE OR 24" COMPACTED COVER AT ROAD CROSSING THEN SURFACE RUN TO TRANSFORMER SEE NOTE 5



NORMAL POWER AND LIGHTING
SCALE: 3/32" = 1'-0"

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
4	REMOVED PRIOR REVISION HISTORY, AS-BUILT AS OF 1/26/2012, SEE DRF-335441	2/6/2012
5	ADDED P.E. STAMP AND NOTE 9. AS-BUILT AS OF 9/5/2013, SEE DRF-340004	9-18-2013

NOTES

1. LUMINAIRE LOCATION IS APPROXIMATE. LUMINAIRES ARE SUPPORTED FROM THE TRUSSES. MOUNT PER MANUFACTURER'S INSTRUCTIONS.
2. UPPER CASE LETTERS WITHIN OR NEAR LUMINAIRE INDICATE LUMINAIRE TYPE, SEE LUMINAIRE SCHEDULE, SEE SHEET E-1.
3. EMERGENCY EXIT LIGHTS AND SIGNS ARE NOT TO BE SWITCHED AND MUST BE ON AT ALL TIMES.
4. USE EXISTING/AVAILABLE RISER AND CUTOUTS.
5. IF ROCK IS ENCOUNTERED AND 24" BELOW GRADE IS NOT POSSIBLE THEN COVER CONDUIT IN CONCRETE PER FDC-SD-11. CONNECT TO TRANSFORMER WITH 200A LOAD BREAK ELBOWS.
6. ANCHOR STAND TO CONCRETE FLOOR USING ø3/8" EXPANSION ANCHORS WITH 1 1/2" MIN EMBEDMENT. FIELD LOCATE AS REQD. ANCHOR STAND PRIOR TO INSTALLING EQUIPMENT.
7. USE #10 AWG (VOLTAGE DROP).
8. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
9. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

LEGEND

- SINGLE 5-20R RCPT; MARKED "CAM USE"
- POWER POLE
- GFCI PROTECTED QUAD RECEPTACLE
- CHARGING STATION RECEPTACLE (480V, 3ø)
- POWER PANEL
- MINI POWER-ZONE
- TRANSFORMER
- DISCONNECT SWITCH
- MOTOR STARTER
- MOTOR FOR ROLL UP DOOR
- CEILING MOUNT LUMINAIRE, LETTER INDICATES FIXTURE TYPE
- EMERGENCY EXIT LIGHT & SIGN WITH BATTERY BACKUP
- EXTERIOR LIGHTING, LETTER INDICATES FIXTURE TYPE
- UNDERGROUND RACEWAY
- ABOVE GROUND RACEWAY

X-REF DRAWING

631242

Larry Fisher
CWI
2013
-067

FOR DRAWING INDEX SEE DRAWING NO. 631223

SCALE: 1/2" = 1'-0"
SCALE: 3/32" = 1'-0"

DESIGN PHASE: N/A
SAFETY CATEGORY: NOTE 8

REQUESTER: S.L. AUSTAD
DESIGN: M.G. PHILLIPS
DRAWN: J.L. ROBERTS
PROJECT NO. 23927
SPCL CODE
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 124246
EFFECTIVE DATE: 7/20/05

Idaho Cleanup Project CH2M HILL WG IDAHO, LLC

RWMC
TARGETED WASTE REMOVAL
& DISPOSITION PROJECT
WMF-698 STORAGE ENCLOSURE
NORMAL POWER AND LIGHTING PLAN

SIZE	INDEX CODE NUMBER				DWG-	REV
	AREA	TYPE	G	ORIG		
D	098	0698	10	136	631233	5

SCALE: NOTED
SHEET 1 OF 1

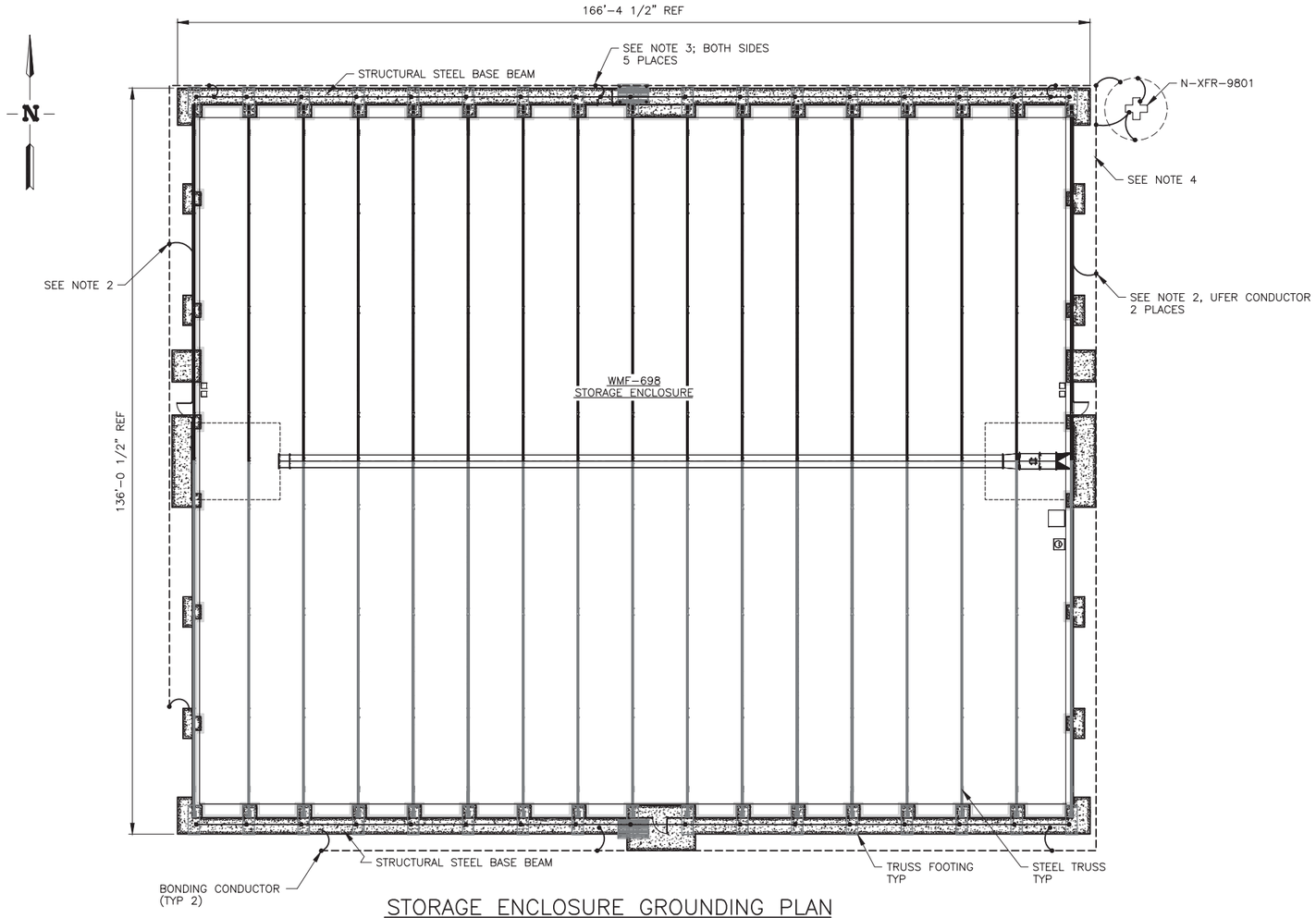
RW-1264

FMT-D1-REV 4

File: 631233-5.dwg
Path: L:\KE-S\RCRA\RCRA-DRAWINGS
Date: 09/16/13 - 8:26 AM
Layout Name: D Size
ID: BKS

FMT-D1-REV 5.2

REVISIONS	
REV.	DESCRIPTION
1	CHANGED DWG TITLE AS-BUILT AS OF 1/26/2012 SEE DRF-335441
2	ADDED P.E. STAMP AND NOTE 7. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



STORAGE ENCLOSURE GROUNDING PLAN

SCALE: 3/32" = 1'-0"

NOTES

1. ALL LIGHTNING PROTECTION AND GROUNDING CONDUCTORS ARE #2/0 AWG BARE COPPER.
2. CONCRETE-ENCASED ELECTRODE (UFER) CONDUCTOR IS BONDED TO BUILDING GROUNDING RING.
3. BUILDING GROUNDING RING IS BONDED TO STRUCTURAL STEEL BASE BEAM.
4. BUILDING GROUNDING RING IS AGAINST THE PERIMETER SIDE OF STEM WALL 30" BELOW GROUND LEVEL AROUND THE STORAGE ENCLOSURE AS SHOWN.
5. STRUCTURAL STEEL BASE BEAM GROUND CONDUCTOR IS BONDED TO STRUCTURAL STEEL.
6. THIS IS A QUALITY LEVEL 4 SYSTEM.
7. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

LEGEND

- GROUND CONNECTION
- BURIED GROUND WIRE
- EXPOSED GROUND BONDING CONDUCTOR
- TRANSFORMER

Larry Fisher
CWI
2013.09.18 09:17:41
-06'00'

7

X-REF DRAWING

631242

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: M.G. PHILLIPS	N/A	N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:28:39 -06'00'	
TECHNICAL CHECK: M.W. VAUGHN	N/A	N/A
ENG GROUP SUPERVISOR: T.M. HIPP	N/A	N/A
DESIGN LEAD: S.L. AUSTAD	N/A	N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:17:45 -06'00'	
PROJECT NUMBER: 23927		
DRF NUMBER: 124246		

Idaho Cleanup Project CH2M HILL IDAHO, LLC

RWMC
TARGETED WASTE REMOVAL
AND DISPOSITION PROJECT
STORAGE ENCLOSURE
GROUNDING PLAN

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	0698	10	136	631234	2

SCALE: NOTED SHEET 1 OF 1

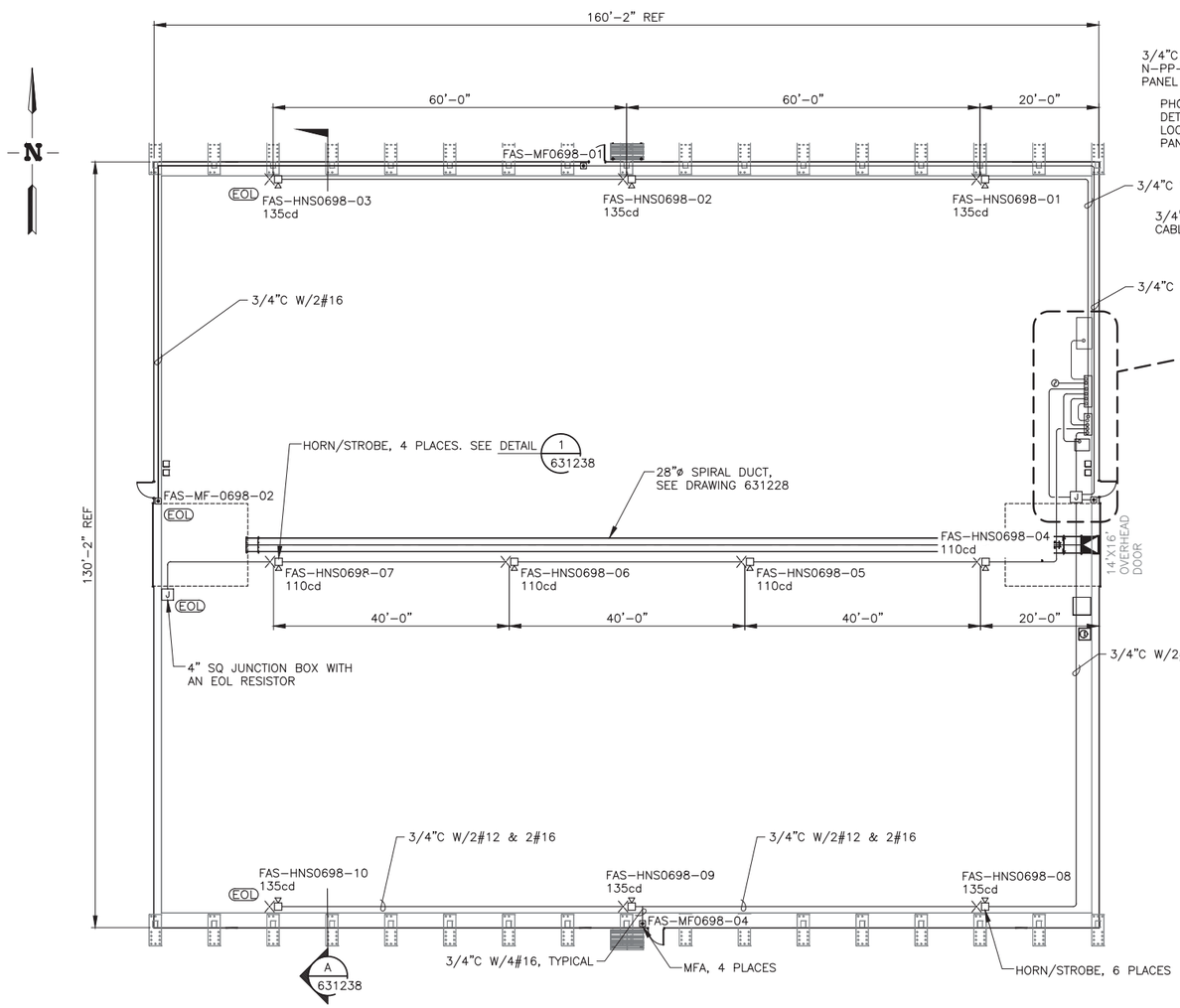
File: 631234-2.dwg
Path: L:\RE-S\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/12/13 - 11:48 AM | Layout Name: D Size
ID: BKS

FMT-D1-REV 5.2

NOTES

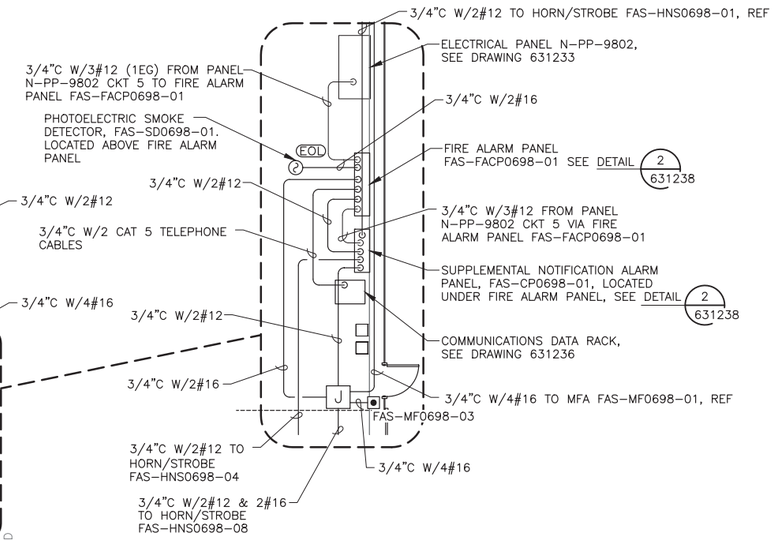
1. SEE DRAWINGS 631239 & 631240 FOR WIRING DIAGRAMS AND DRAWING 631241 FOR BATTERY CALCULATIONS.
2. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
3. THIS STAMP AND SIGNATURE VERIFIES THAT THE FIRE PROTECTION EQUIPMENT IS INSTALLED IN THE GENERAL LOCATIONS SHOWN ON THIS DRAWING.

REVISIONS	
REV.	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC 2884 AS-BUILT AS OF 1/26/2012 SEE DRF-335441
2	ADDED P.E. STAMP AND NOTE 3. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



STORAGE ENCLOSURE PLAN

SCALE: 3/32" = 1'-0"



LEGEND

- MANUAL FIRE ALARM STATION
- HORN/STROBE
- EOL — END OF LINE RESISTOR
- SMOKE DETECTOR

Douglas Clark
CWI
2013-06

PROFESSIONAL ENGINEER REGISTERED 11200 STATE OF IDAHO DOUGLAS W. CLARK

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: BRUNSON	N/A N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:24:10 -06'00'
TECHNICAL CHECK: D.W. CLARK	N/A N/A
ENG GROUP SUPERVISOR: W.H. REED	N/A N/A
DESIGN LEAD: T. LANGENWALTER	N/A N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:18:35 -06'00'
PROJECT NUMBER: 23927	
DRF NUMBER: 124426	

Idaho Cleanup Project CH2MHILL IDAHO, LLC

RWMC
TARGETED WASTE REMOVAL
AND DISPOSITION PROJECT
STORAGE ENCLOSURE
FIRE ALARM PLAN

SIZE	INDEX CODE NUMBER AREA	TYPE	CA	CODE	DWG-	REV
D	098	0698	12	136	631237	2

SCALE: NOTED — SHEET 1 OF 1

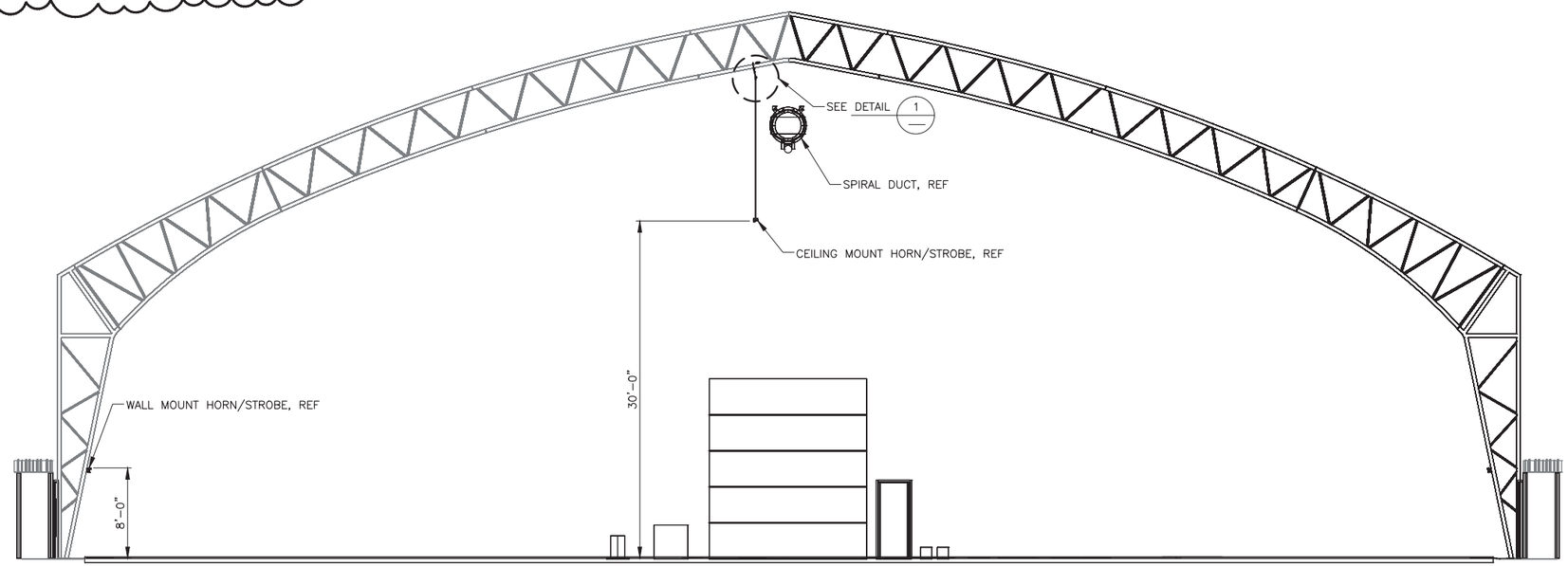
File: 631237-2.dwg
Path: S:\RE-S\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/17/13 - 1:45 PM | Layout Name: Layout1 | ID: BSL

FMT-D1-REV 5.2

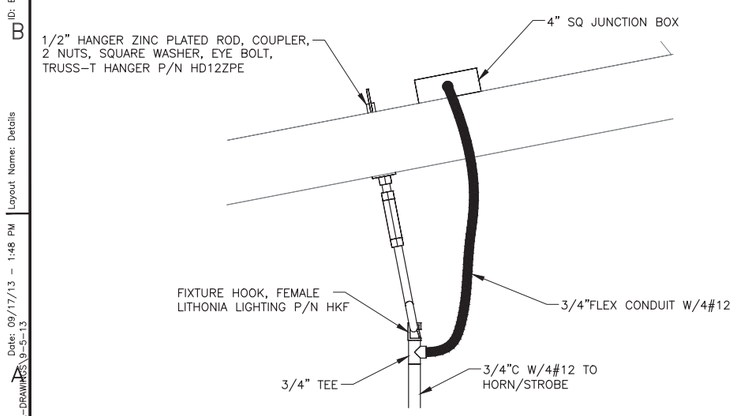
NOTES

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT LEVEL DESIGNATION.
2. THIS STAMP AND SIGNATURE VERIFIES THAT THE FIRE PROTECTION EQUIPMENT IS INSTALLED IN THE GENERAL LOCATIONS SHOWN ON THIS DRAWING.

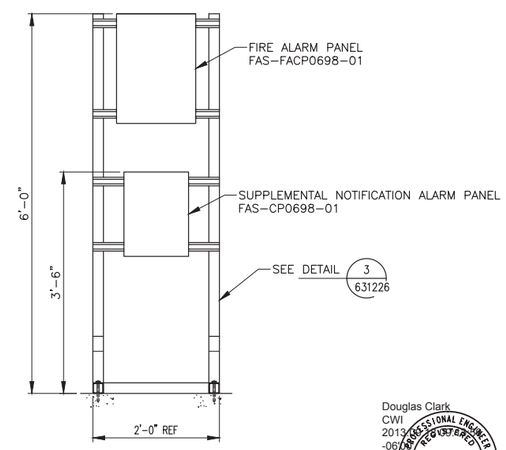
REVISIONS	
REV.	DESCRIPTION
1	CHANGED DWG TITLE AS-BUILT AS OF 1/26/2012 SEE DRF-335441
2	ADDED P.E. STAMP AND NOTE 2. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



SECTION A 631237
SCALE 3/16 = 1'-0"



DETAIL 1
SCALE: 3"=1'-0"



DETAIL 2 631237
SCALE: 3"=1'-0"

Douglas Clark
CWI
2013.09.18 08:24:26 -06'00'

PROFESSIONAL ENGINEER REGISTERED 11200 STATE OF IDAHO DOUGLAS W. CLARK

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: BRUNSON	N/A	N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:24:26 -06'00'	
TECHNICAL CHECK: D.W. CLARK	N/A	N/A
ENG GROUP SUPERVISOR: W.H. REED	N/A	N/A
DESIGN LEAD: T. LANGEWALTER	N/A	N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:33:18 -06'00'	
PROJECT NUMBER: 23927		
DRF NUMBER: 124426		

Idaho Cleanup Project CH2M HILL BWXT IDAHO, LLC

RWMC
TARGETED WASTE REMOVAL
AND DISPOSITION PROJECT
STORAGE ENCLOSURE
FIRE ALARM SECTION AND DETAILS

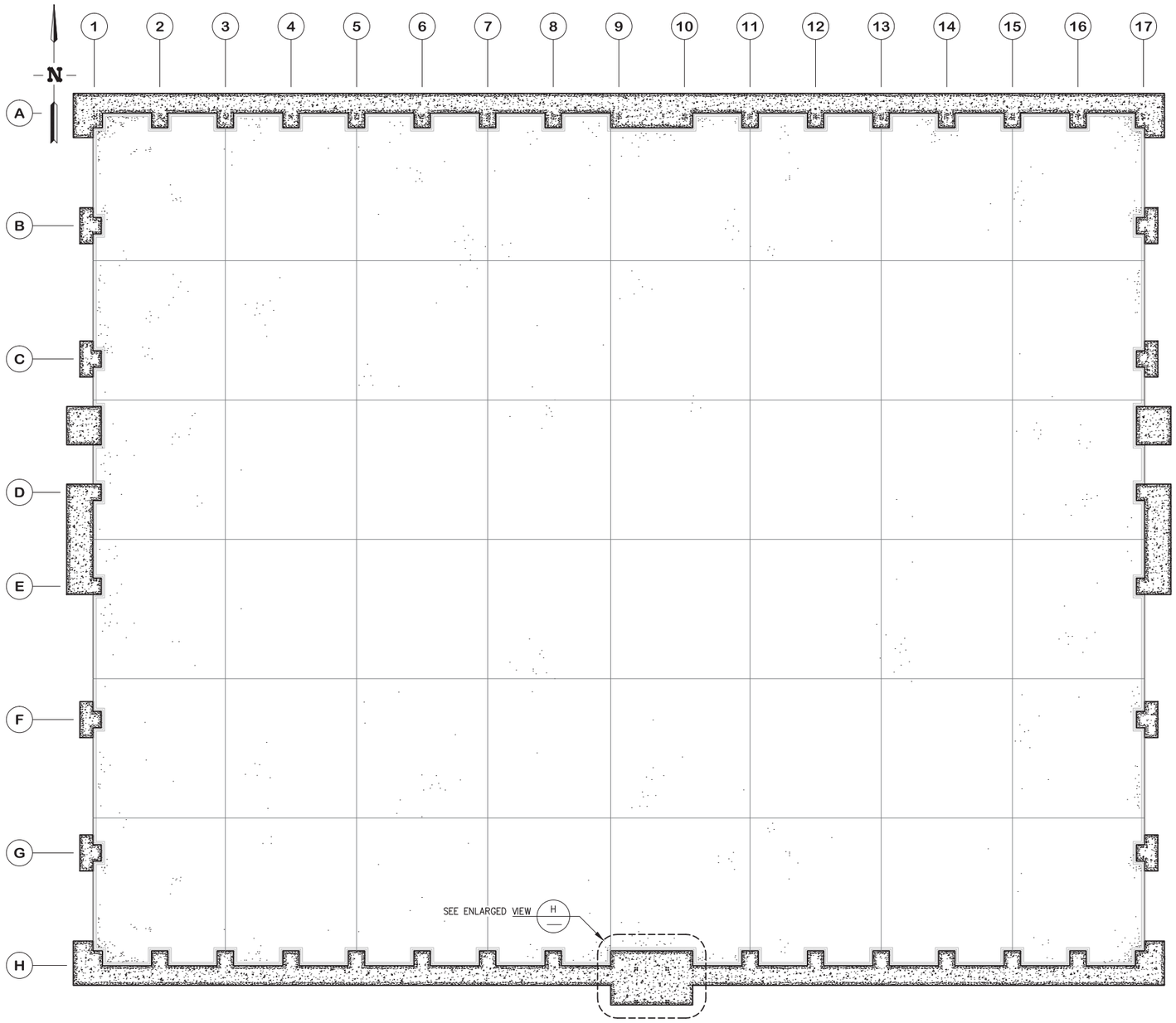
SIZE	INDEX CODE NUMBER				DWG-	REV
	AREA	TYPE	CI	ORG		
D	098	0698	12	136	631238	2

SCALE: NOTED
SHEET 1 OF 1

File: 631238-2.dwg
Path: S:\WE-S\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/17/13 – 1:48 PM | Layout Name: Details
ID: BSL

FMT-D1-REV 5.2

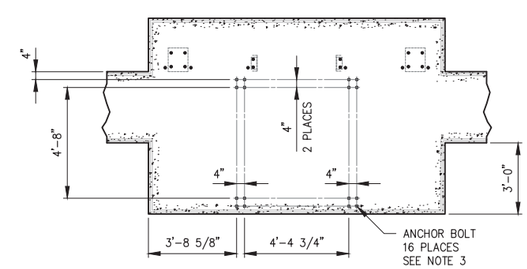
REVISIONS	
REV.	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC-SE-6 AS-BUILT AS OF 1/26/2012 SEE DRF-335441
2	ADDED P.E. STAMP AND NOTE 7. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



FOUNDATION INSTALLATION PLAN
SCALE: 1/8"=1'-0"

NOTES:

1. REINFORCEMENT IS #4 REBAR AT 12" OC MAXIMUM SPACING EACH WAY, EACH FACE.
2. ENCLOSURE ANCHOR BOLTS ARE 5/8" DIAMETER ASTM A325 BOLTS. PROJECT 2" ABOVE CONCRETE. EMBEDMENT IS A MINIMUM OF 9". FLAT WASHERS ARE 1 1/2" DIAMETER .
3. CANOPY ANCHOR BOLTS ARE 1/2" DIAMETER ASTM A307 OR ASTM A325 BOLTS. PROJECTED 2" ABOVE CONCRETE. EMBEDMENT IS A MINIMUM OF 4". FLAT WASHERS ARE 1 3/8" DIAMETER
4. SEE PAD REFERENCE DRAWINGS 627916 & 627917 FOR ADDITIONAL INFORMATION.
5. SEE DRAWING 631234 FOR GROUNDING PLAN.
6. THIS IS A QUALITY LEVEL 4 SYSTEM.
7. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.



ENLARGED VIEW H
SCALE: 3/8"=1'-0"

Paul D. Leonard
CWI
2013.09.18 08:26:24 -06'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: S.A. JENSEN	N/A N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:26:24 -06'00'
TECHNICAL CHECK: EGS	N/A N/A
ENG GROUP SUPERVISOR: V.J. BALLS	N/A N/A
DESIGN LEAD: C.J. HURST	N/A N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:13:38 -06'00'
PROJECT NUMBER: 023927	
DRF NUMBER: 123945	

Idaho Cleanup Project — CH2M HILL BechtelBWXT Idaho, LLC

RWMC
TARGETED WASTE REMOVAL AND DISPOSITION PROJECT
STORAGE ENCLOSURE
FOUNDATION PLAN

SIZE	INDEX CODE NUMBER: AREA	TYPE	ID	DISC	DWG-	REV
D	098	0698	62	136	631130	2

SCALE: NOTED — SHEET 1 OF 1

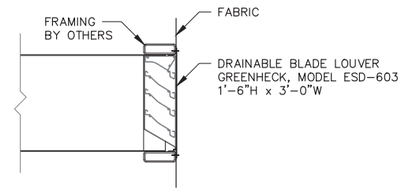
File: 631130-2.dwg
Path: L:\RE-S\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/12/13 – 1:13 PM | Layout Name: S-1 | ID: BXS

FWT-D1-REV. 5.2

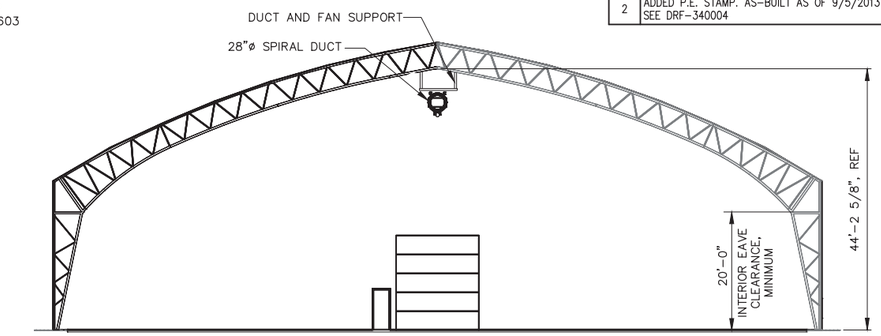
NOTES:

1. THIS IS A QUALITY LEVEL 4 SYSTEM.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

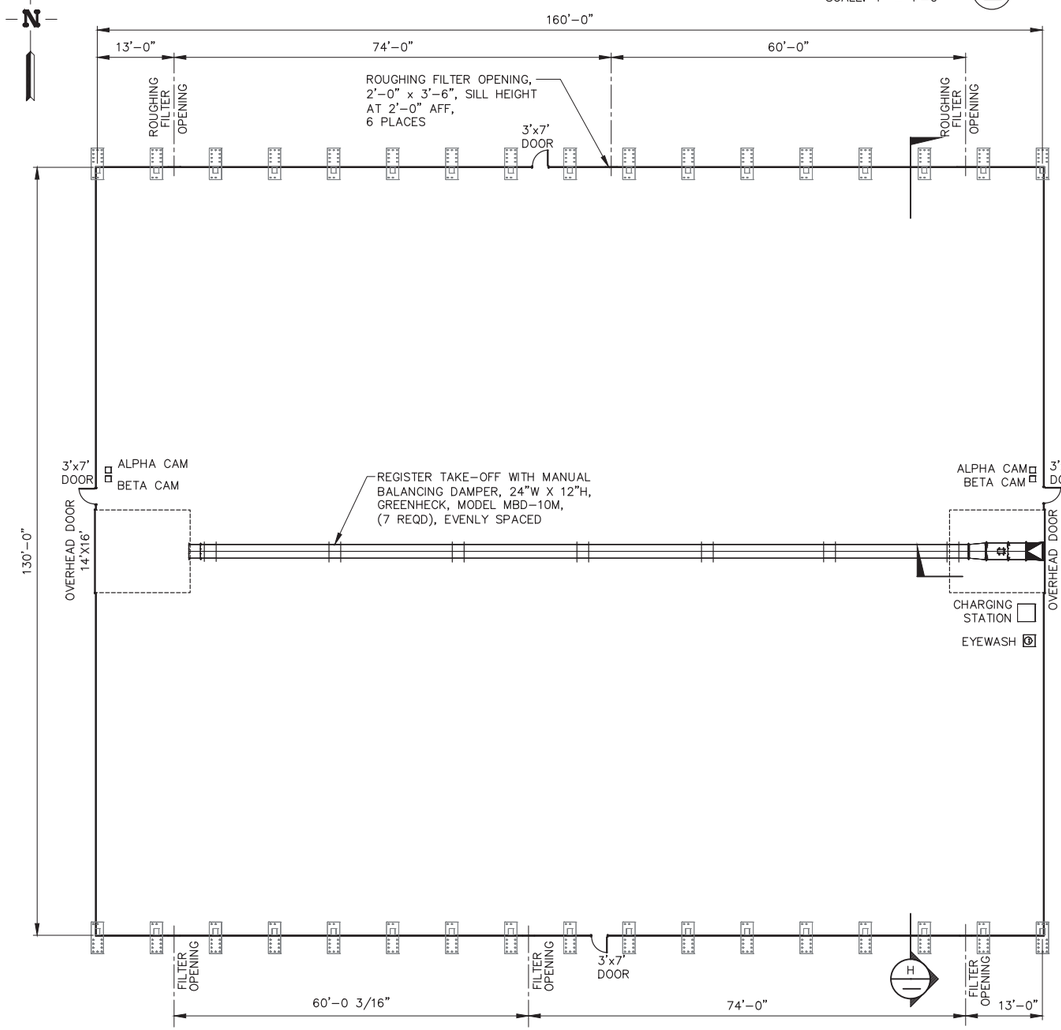
REVISIONS	
REV.	DESCRIPTION
1	CHANGED DWG TITLE AS-BUILT AS OF 1/26/2012 SEE DRF-335441
2	ADDED P.E. STAMP. AS-BUILT AS OF 9/5/2013 SEE DRF-340004



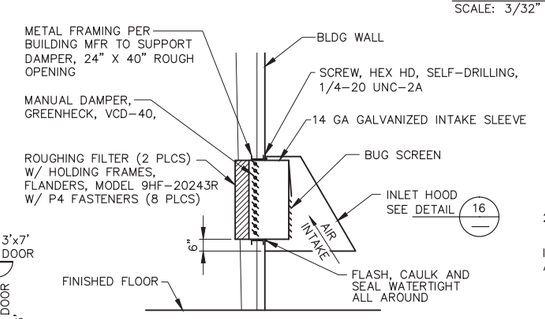
DETAIL (30)
SCALE: 1" = 1'-0"



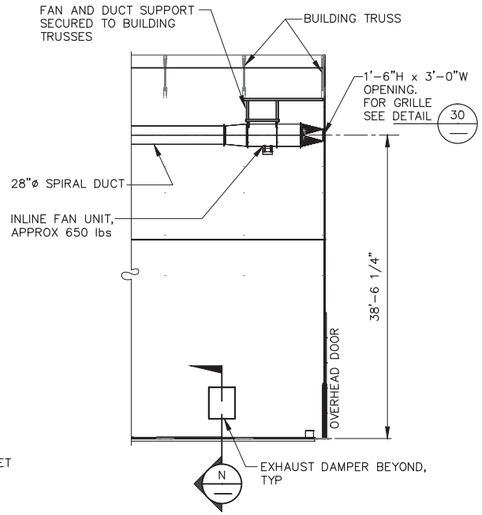
SECTION (H)
SCALE: 3/32" = 1'-0"



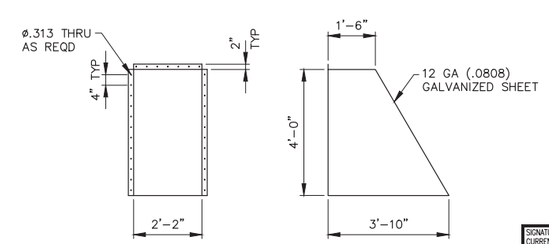
STORAGE ENCLOSURE PLAN
SCALE: 3/32" = 1'-0"
12,480 DRUM MAX COUNT



SECTION (N) (N 631228)
SCALE: 3/8" = 1'-0"



SECTION (M) (M 631228)
SCALE: 1/8" = 1'-0"



DETAIL (16)
SCALE: 1/2" = 1'-0"

Paul D. Leonard
CWI
2013.09.18 08:25:52 -06'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: D.E. NISHOKA	N/A	N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:25:52 -06'00'	
TECHNICAL CHECK: EGS	N/A	N/A
ENG GROUP SUPERVISOR: S.L. AUSTAD	N/A	N/A
DESIGN LEAD: S.L. AUSTAD	N/A	N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:11:02 -06'00'	

INDEX CODE NUMBER			
AREA	TYPE	CL	ORIG
098	0698	22	090

PROJECT NUMBER: 23927
DRF NUMBER: 112500

Idaho Cleanup Project CH2M-WG IDAHO, LLC

RWMC
TARGETED WASTE REMOVAL AND DISPOSITION PROJECT
STORAGE ENCLOSURE
PLAN AND SECTIONS

SIZE	INDEX CODE NUMBER				DWG-	REV
	AREA	TYPE	CL	ORIG		
D	098	0698	00	136	627752	2

SCALE: NOTED
SHEET 1 OF 1

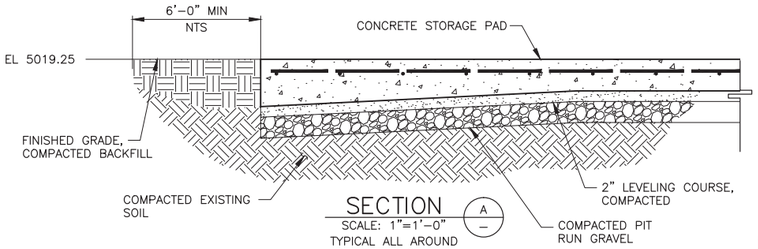
File: 627752-2.dwg
Path: L:\RE-5\RCRA\RCRA-DRAWINGS\V5-5-13
ID: BXS | Layout Name: 130X160 | Date: 09/12/13 – 11:54 AM

FMT-D1-REV 5.2

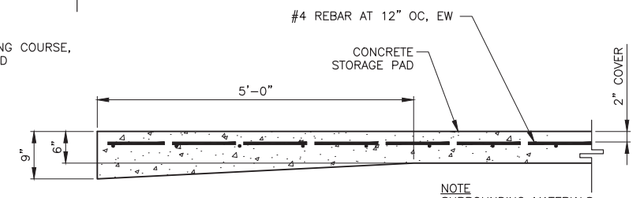
NOTES

1. THIS IS A QUALITY LEVEL 4 SYSTEM.
2. HORIZONTAL DATUM IS RWMC SITE SPECIFIC.
3. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE INCORPORATED FDC-RI-12 AS-BUILT AS OF 1/26/2012 SEE DRF-335441
2	ADDED P.E. STAMP AND NOTE 3. AS-BUILT AS OF 9/5/2013 SEE DRF-340004

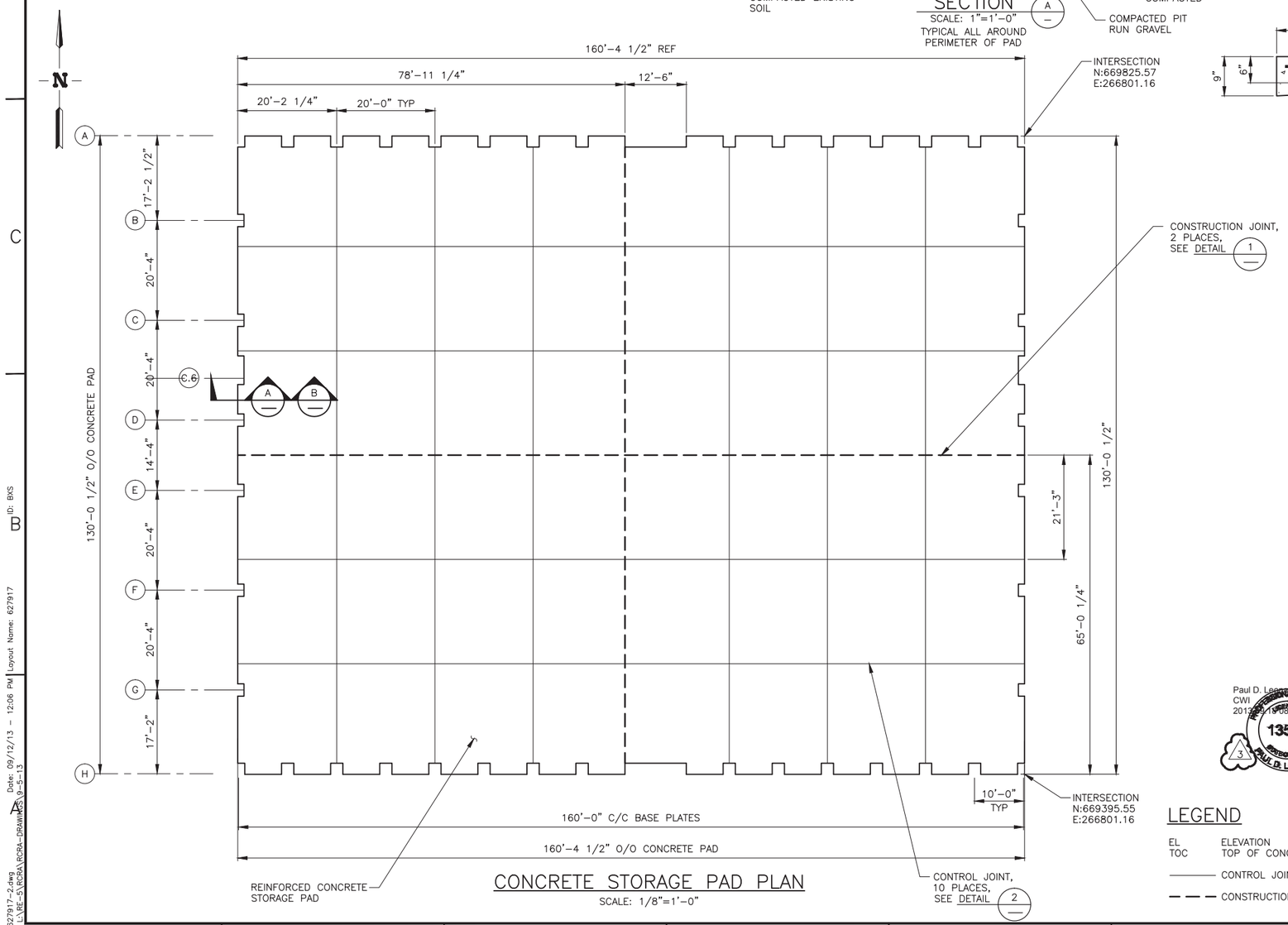


SECTION (A/—)
SCALE: 1"=1'-0"
TYPICAL ALL AROUND PERIMETER OF PAD

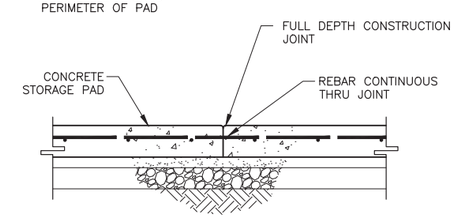


NOTE
SURROUNDING MATERIALS NOT SHOWN FOR CLARITY

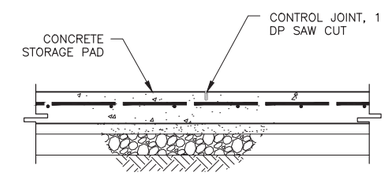
SECTION (B/—)
SCALE: 1"=1'-0"
TYPICAL ALL AROUND PERIMETER OF PAD



CONCRETE STORAGE PAD PLAN
SCALE: 1/8"=1'-0"



CONSTRUCTION JOINT DETAIL (1/—)
SCALE: 1"=1'-0"



CONTROL JOINT DETAIL (2/—)
SCALE: 1"=1'-0"

Paul D. Leonard
CWI
2013.09.18 08:45:26 -06'00'

PROFESSIONAL ENGINEER 13530 STATE OF IDAHO PAUL D. LEONARD

LEGEND

EL	ELEVATION
TOC	TOP OF CONCRETE
———	CONTROL JOINT
— — —	CONSTRUCTION JOINT

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: R.F. LIPPERT	N/A	N/A
DRAFTER: S. BERTHELSON	Shawn Berthelson CWI 2013.09.18 08:26:39 -06'00'	
TECHNICAL CHECK: N/A	N/A	N/A
ENG GROUP SUPERVISOR: N/A	N/A	N/A
DESIGN LEAD: N/A	N/A	N/A
DRAFTING CHECK/ EFFECTIVE DATE: B.L. SCOTT	Barry Scott CWI 2013.09.18 09:12:20 -06'00'	
PROJECT NUMBER: 23927		
DRF NUMBER: 112500		

Idaho Cleanup Project CH2M HILL BOOZ ALLEN

RWMC
TARGETED WASTE REMOVAL AND DISPOSITION PROJECT
STORAGE ENCLOSURE
PAD PLAN, SECTIONS, AND DETAILS

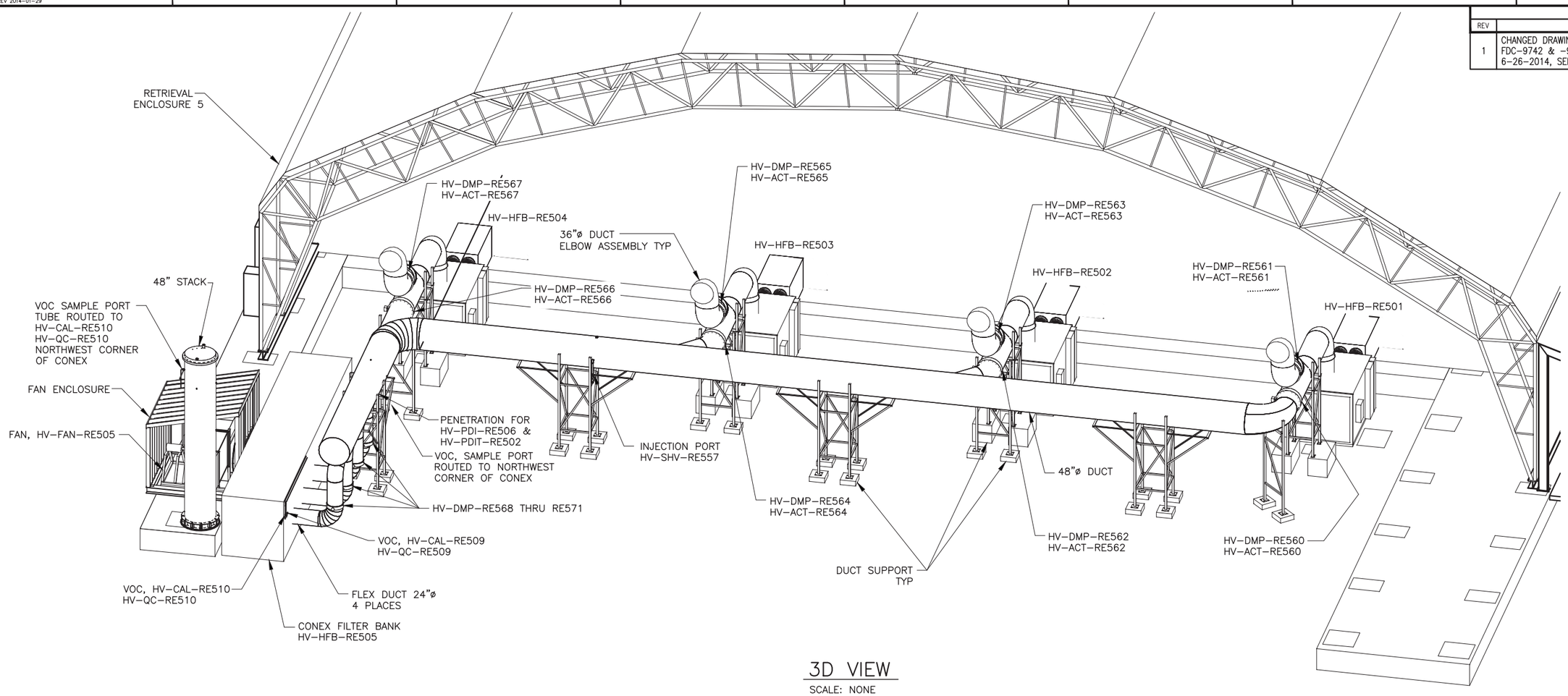
SIZE	INDEX CODE NUMBER: AREA	TYPE	CI	ORIG	DWG-	REV
D	098	100	02	090	627917	2

SCALE: NOTED
SHEET 1 OF 1

File: 627917-2.dwg
Path: L:\KE-S\RCRA\RCRA-DRAWINGS\9-5-13
Date: 09/12/13 - 12:06 PM | Layout Name: 627917
ID: BXS

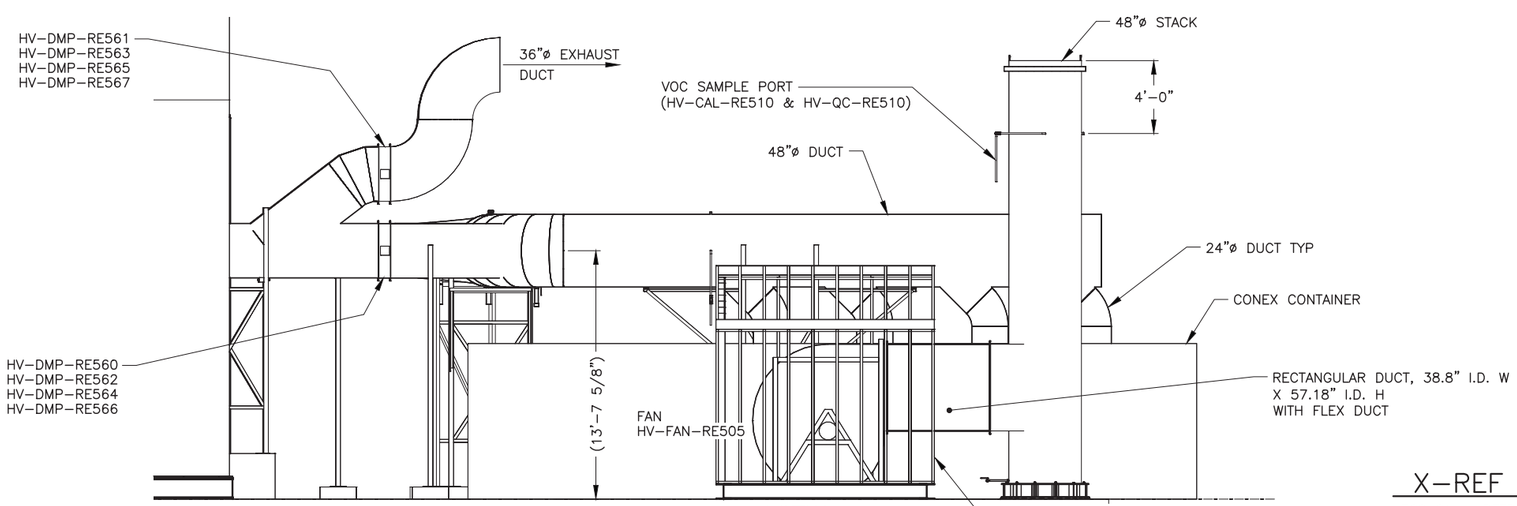
FMT-D1-REV 2014-01-29

REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-9742 & -9752, AS-BUILT AS OF 6-26-2014, SEE DRF-342452



3D VIEW

SCALE: NONE



VIEW F

SCALE: 1/4"=1'-0" 783976

X-REF DRAWINGS

762161 – RETRIEVAL ENCLOSURE 5
762162 – RETRIEVAL ENCLOSURE 5 EQUIPMENT

NOTES:

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. FOR SUPPORT OF TUBING AND/OR SMALL PIPE SEE DETAIL 11 / 783969

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: N.O. SEAVER	N/A N/A
DRAFTER: B.L. SCOTT	Barry Scott CWI 2014.07.22 16:27:32 -06'00'
TECHNICAL CHECK: D.E. KELLER, P.E.	N/A N/A
ENG GROUP SUPERVISOR: R.L. EASTMAN, P.E.	N/A N/A
DESIGN LEAD/AUTHORITY: D.F. KENNEDY	Dan F. Kennedy CWI 2014.07.24 10:59:41 -06'00'
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson CWI 2014.07.24 11:04:51 -06'00'
PROJECT NUMBER: 30198	
DRF NUMBER: 341219	

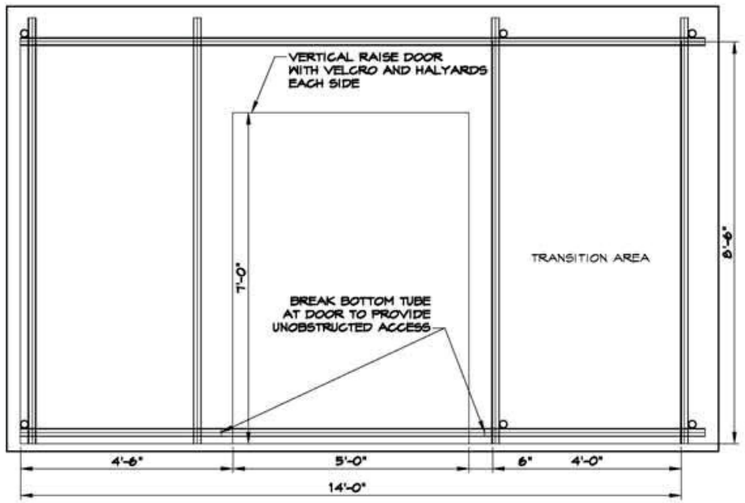
Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE V OF THE
ACCELERATED RETRIEVAL PROJECT
RE5/AL5 WMF-1617
RE5 VENTILATION
3D VIEW AND EAST VIEW

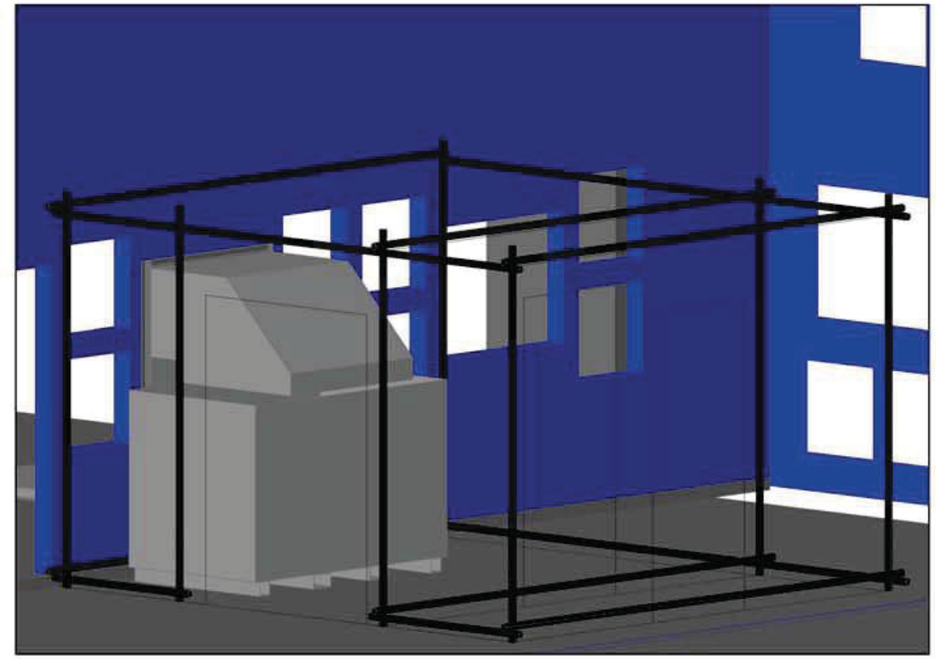
SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1617	20	136	783977	1

SCALE: NOTED SHEET 1 OF 1

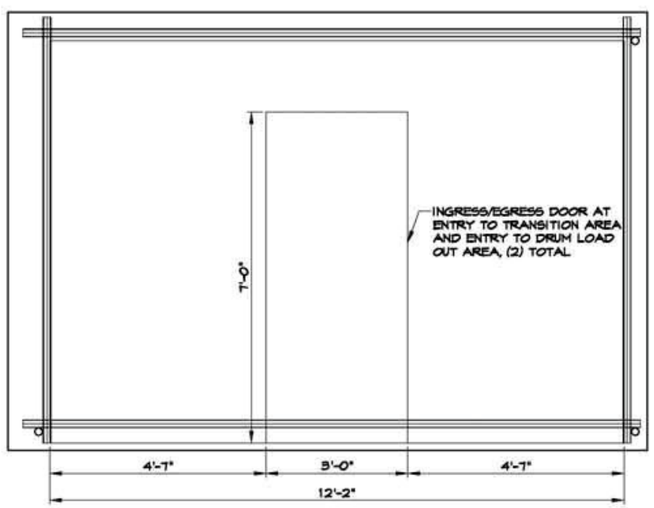
File: 783977-1.dwg
Path: C:\Users\bxs\Documents\BXS-RW-1269 (ARPs)
Date: 07/22/14 – 3:02 PM Layout Name: V-2 ID: BXS



SIDE VIEW LOOKING EAST



DRUM OUT "TUBE AND KNUCKLE" ENCLOSURE



FRONT VIEW LOOKING NORTH

EXHIBIT 1. RWMC WMF-1617 RE5/AL5 DRUM OUT ENCLOSURE VIEW

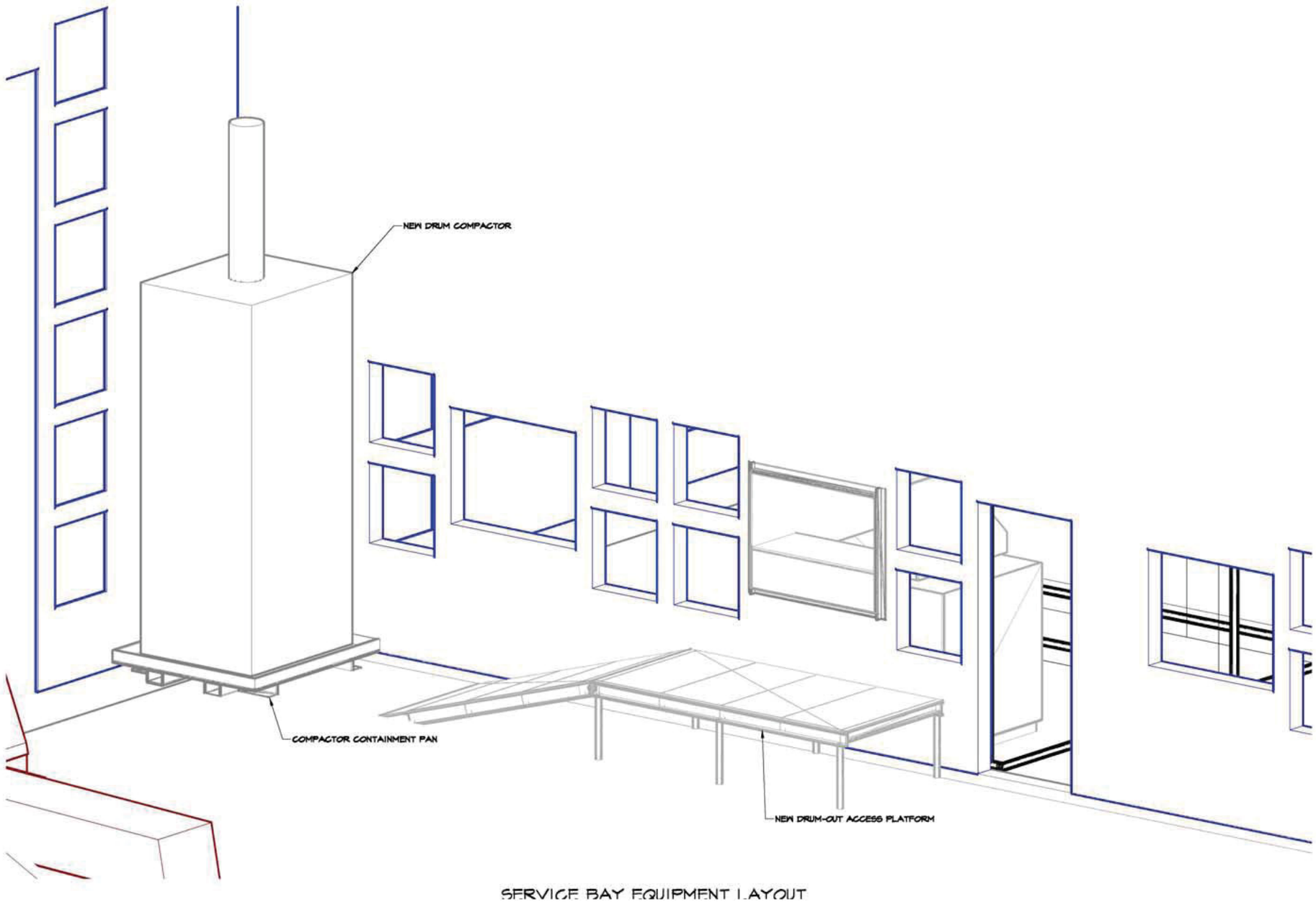
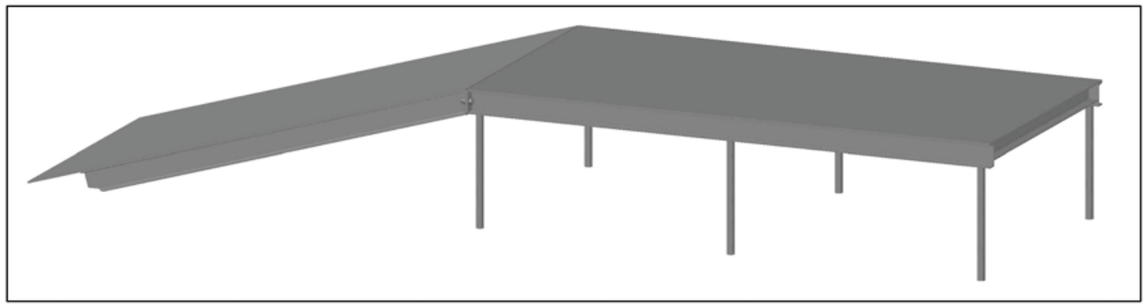
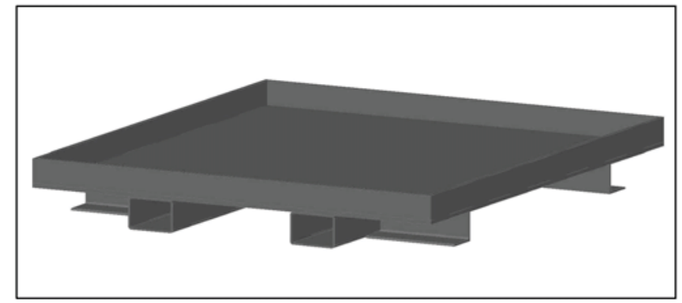


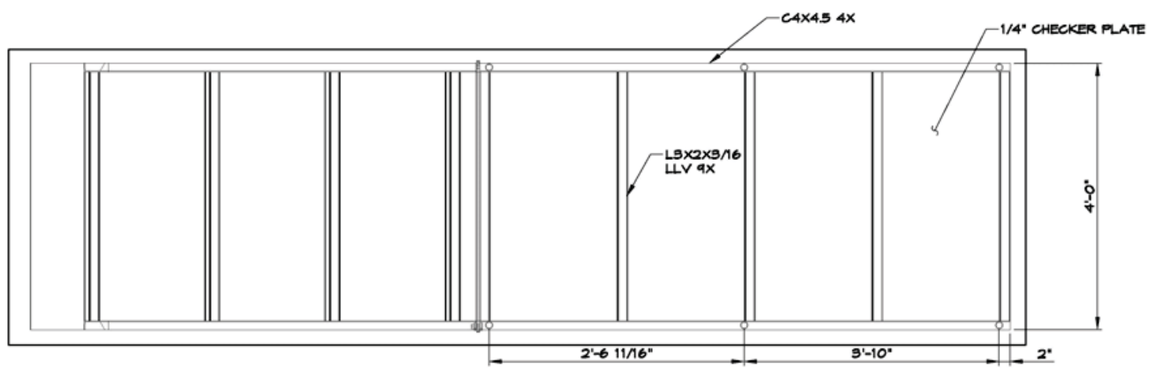
EXHIBIT 2. RWMC WMF-1617 RE5/AL5 SERVICE BAY EQUIPMENT LAYOUT

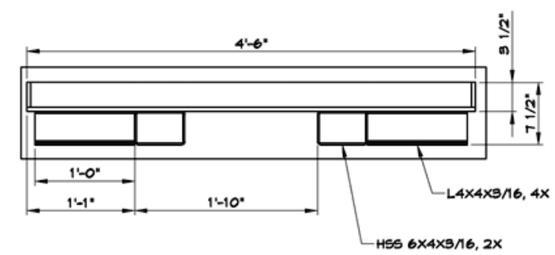


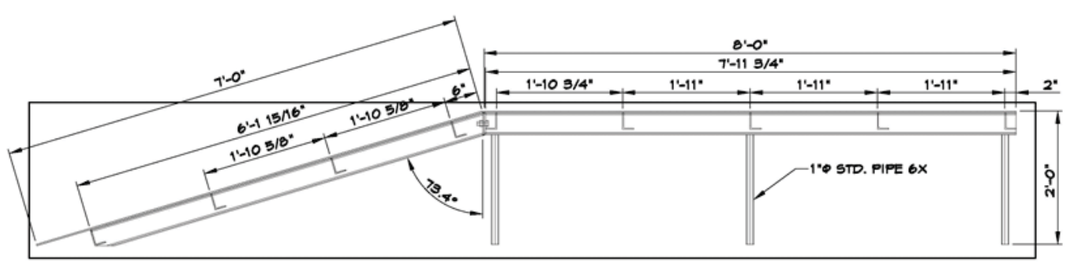
DRUM OUT ACCESS PLATFORM



COMPACTOR CONTAINMENT PAN







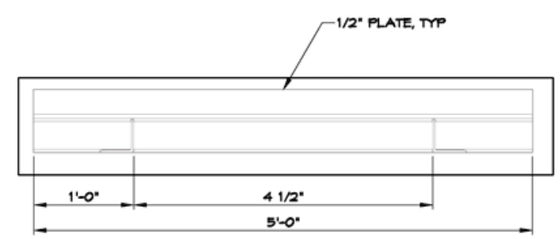
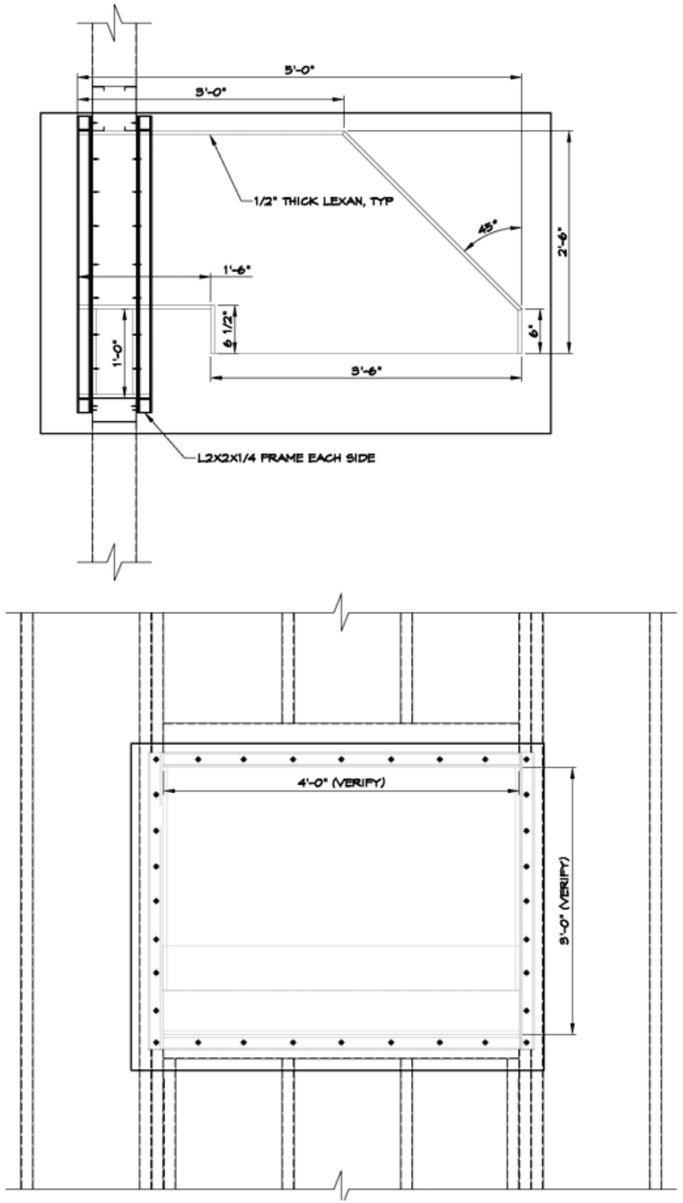
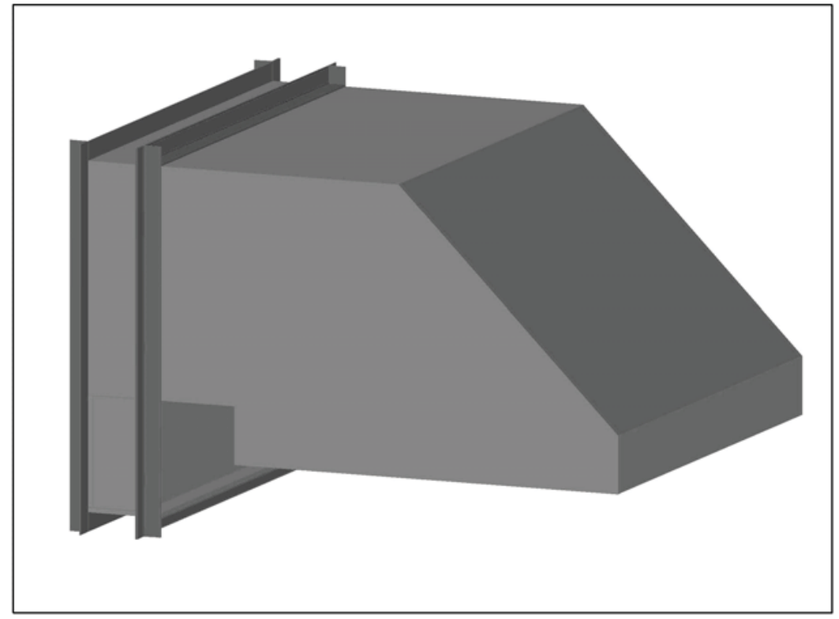


EXHIBIT 3. RWMC WMF-1617 RE5/AL5 DRUM OUT ACCESS PLATFORM AND COMPACTOR CONTAINMENT PAN DETAILS





DRUM OUT HOPPER

EXHIBIT 4. RWMC WMF-1617 RE5/AL5 DRUM OUT HOPPER AND DETAILS

DRUM STORAGE SECONDARY CONTAINMENT
ENGINEERING SKETCH #11

EXHIBIT 5. DRUM STORAGE SECONDARY CONTAINMENT

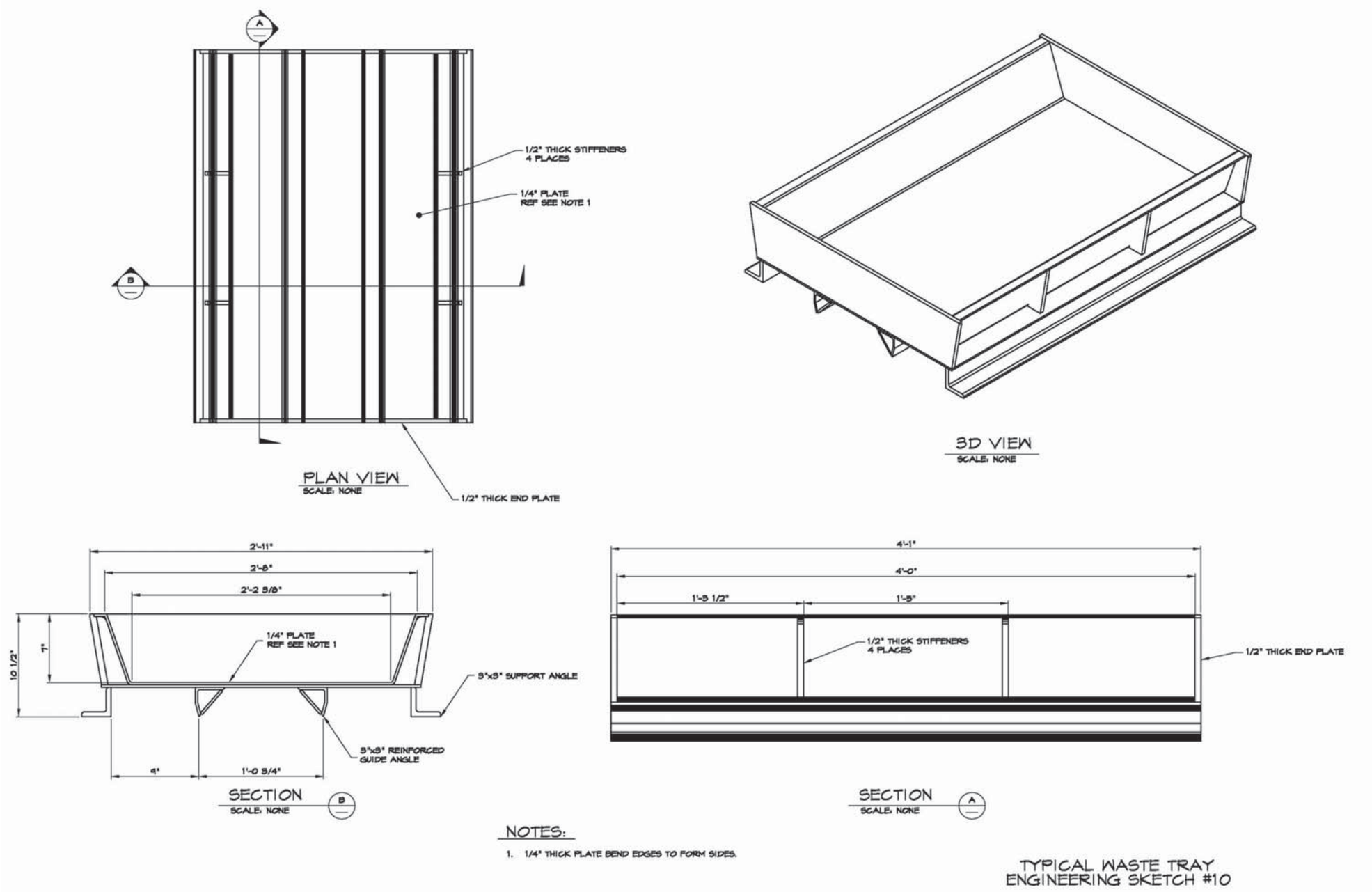


EXHIBIT 6. TYPICAL WASTE TRAY

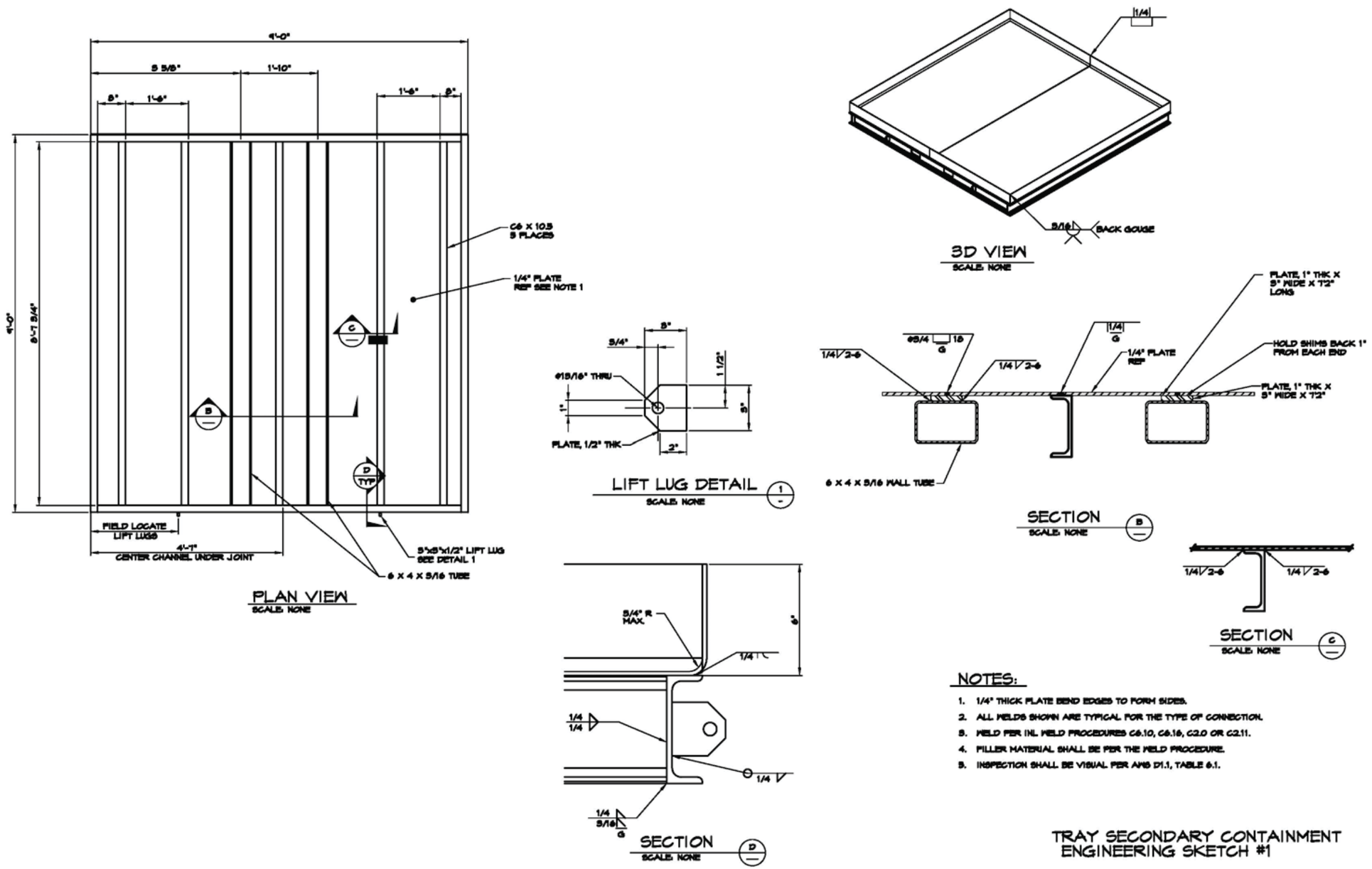


EXHIBIT 7. TRAY SECONDARY CONTAINMENT

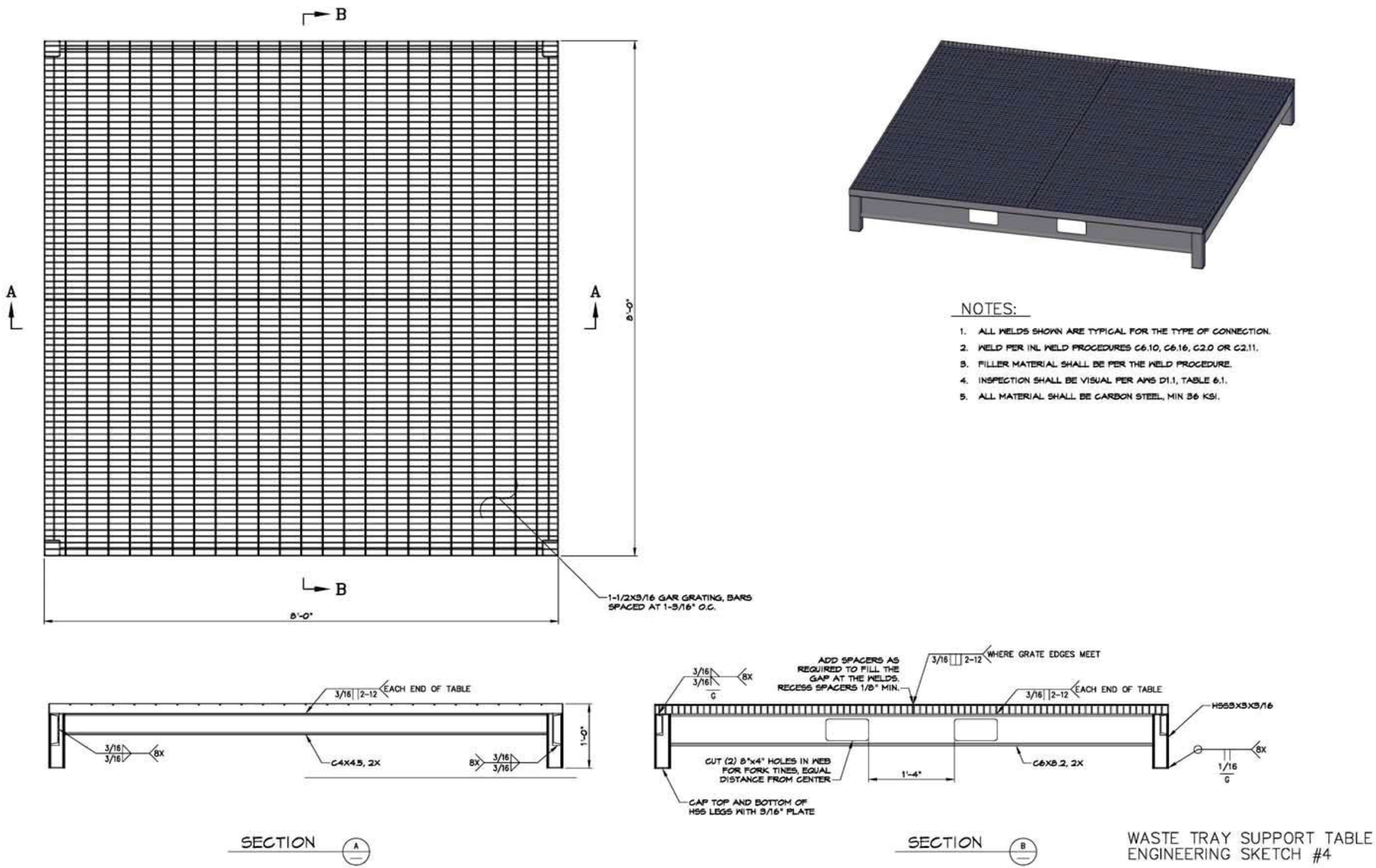
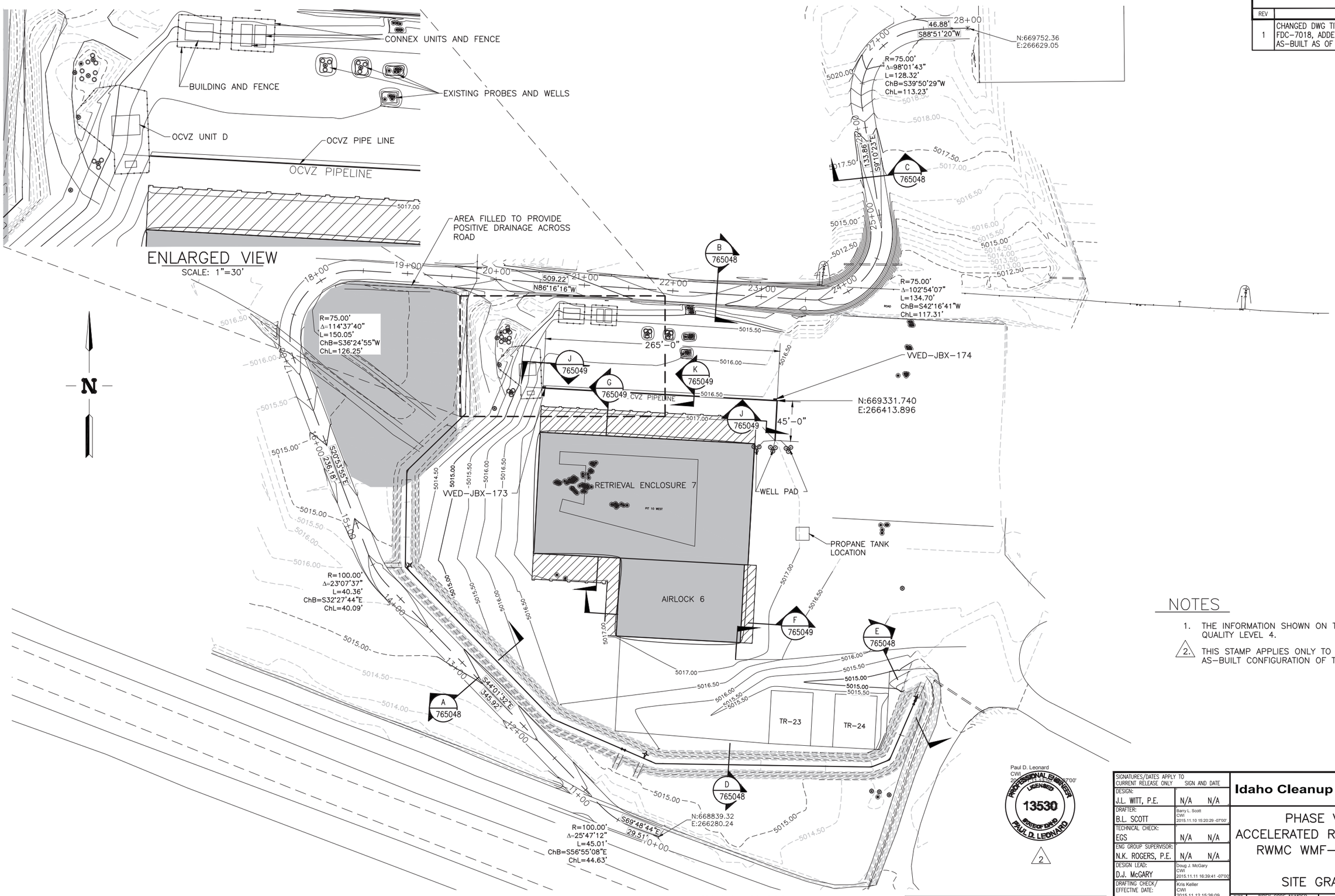


EXHIBIT 8. WASTE TRAY SUPPORT TABLE

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDC-6933 & FDC-7018, ADDED P.E. SEAL AND NOTE 2, AS-BUILT AS OF 10-14-2015, SEE DRF-347017



SITE PLAN

SCALE: 1"=50'

DATUM: HORIZONTAL: RWMC SITE SPECIFIC
VERTICAL: NAVD-88

NOTES

1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 4.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J.L. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:20:29 -07'00'
TECHNICAL CHECK: EGS	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:39:41 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:26:09 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 328838	

Idaho Cleanup Project CH2M•WG Idaho, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6

SITE GRADING PLAN

SIZE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	02	136	765045	1

SCALE: NOTED SHEET 1 OF 1

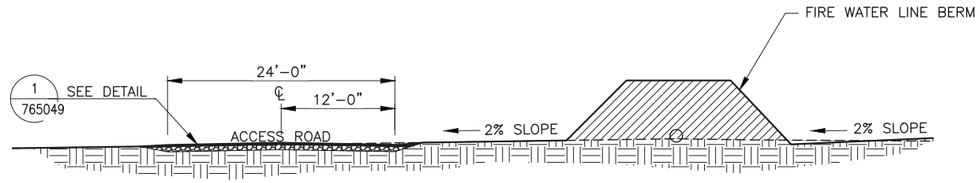
File: 765045-1.dwg
Path: Y:\RE-7\RCRA\RCRA Drawings
Date: 11/03/15 - 9:39 AM Layout Name: 765045
ID: KJ1

FMT-D1-REV 2012-02-14

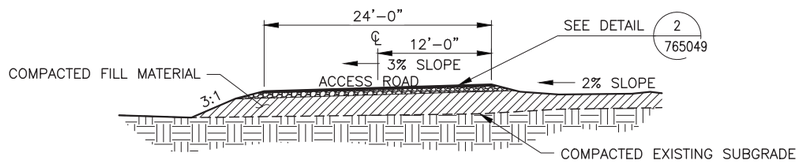
REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE & INDEX CODE, INCORPORATED FDC-6827, SEE DRF-337302
2	CHANGED DRAWING TITLE, ADDED P.E. STAMP AND NOTE 2, AS-BUILT AS OF 10-14-2015, SEE DRF-347017

NOTES

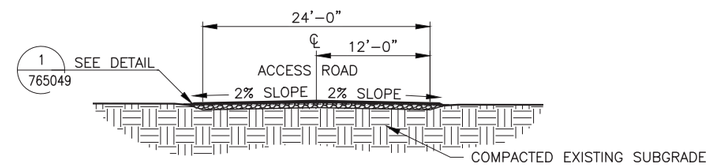
1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 4.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.



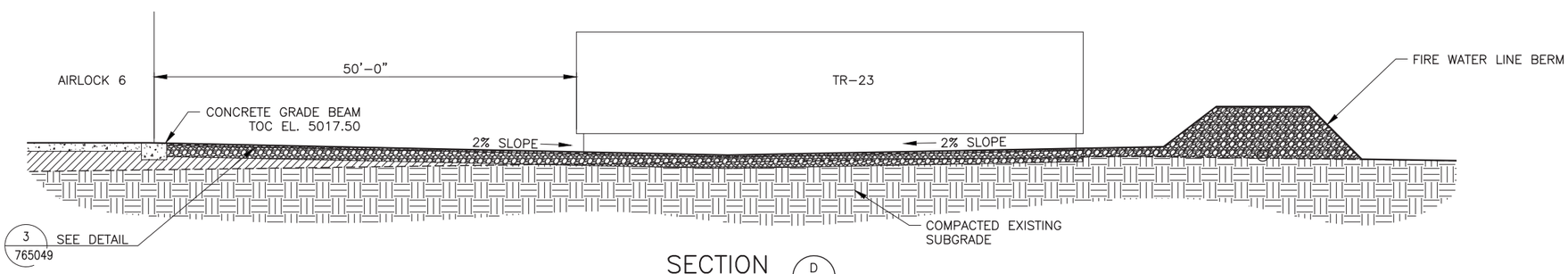
SECTION A 765045
SCALE: NTS



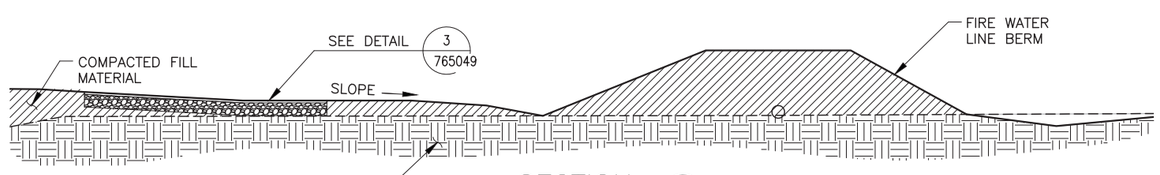
SECTION B 765045
SCALE: NTS



SECTION C 765045
SCALE: NTS



SECTION D 765045
SCALE: NTS



SECTION E 765045
SCALE: NTS

Paul D. Leonard
CWI
2015.11.12 15:26:17 -07'00'
PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD
2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J.L. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:21:10 -07'00'
TECHNICAL CHECK: EGS	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:40:17 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:26:17 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 328838	

Idaho Cleanup Project CH2M+WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 GRADING SECTIONS

SIZE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	02	136	765048	2

SCALE: NOTED
SHEET 1 OF 1

RW-1271

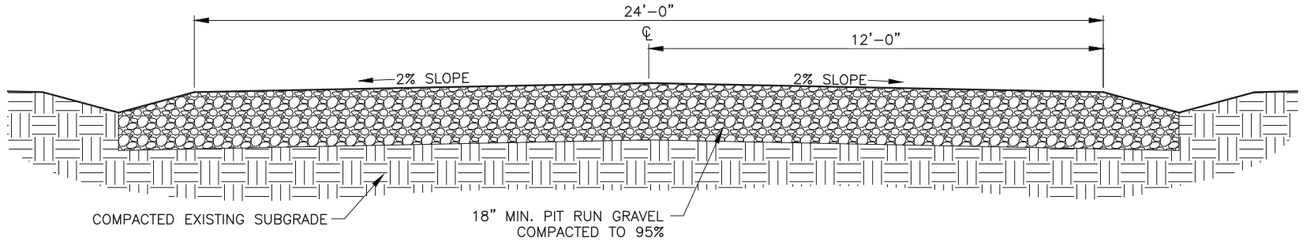
File: 765048-2.dwg
Path: I:\RE-7\RCRA\RCRA Drawings
Date: 11/09/15 - 9:06 AM | Layout Name: C-6 | ID: BXS

FMT-D1-REV 2012-02-14

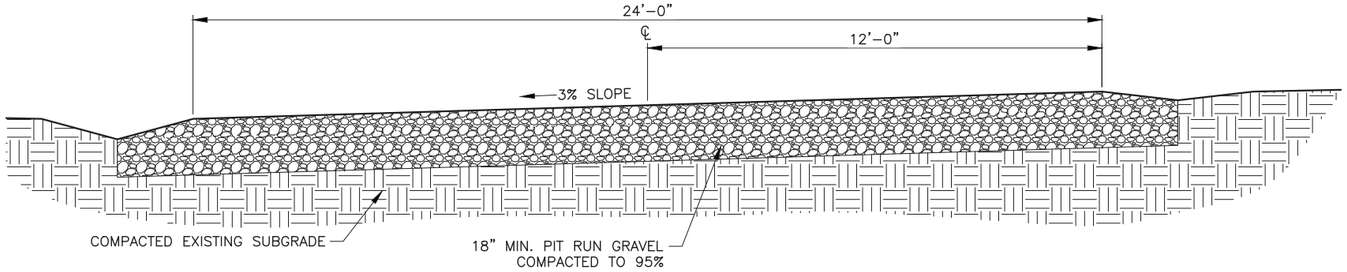
REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE & INDEX CODE, INCORPORATED FDC-6827, -6933 & -7018, SEE DRF-337302
2	CHANGED DWG TITLE, CORRECTED PER FDC-7018, ADDED P.E. STAMP AND NOTE 2, AS-BUILT AS OF 10-14-2015, SEE DRF-347017

NOTES

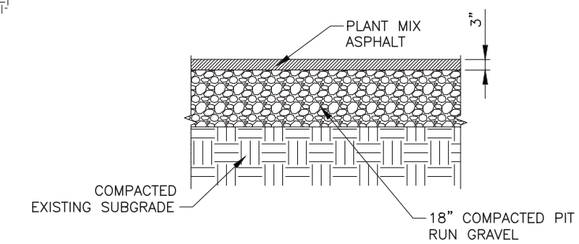
1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 4.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.



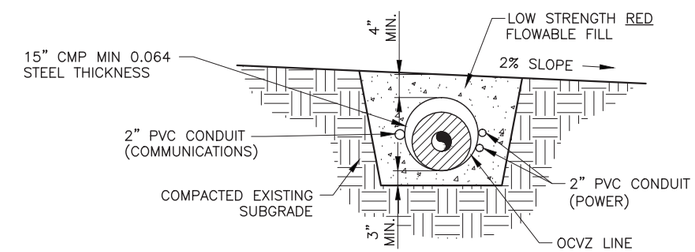
TYPICAL ACCESS ROAD CROSS SECTION (1 / 765048)
SCALE: 3"=1'-0"



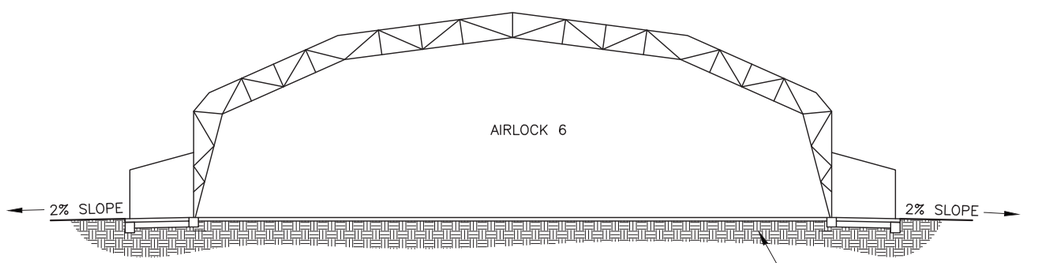
TYPICAL ACCESS ROAD SUPER ELEVATION (2 / 765048)
SCALE: 3"=1'-0"



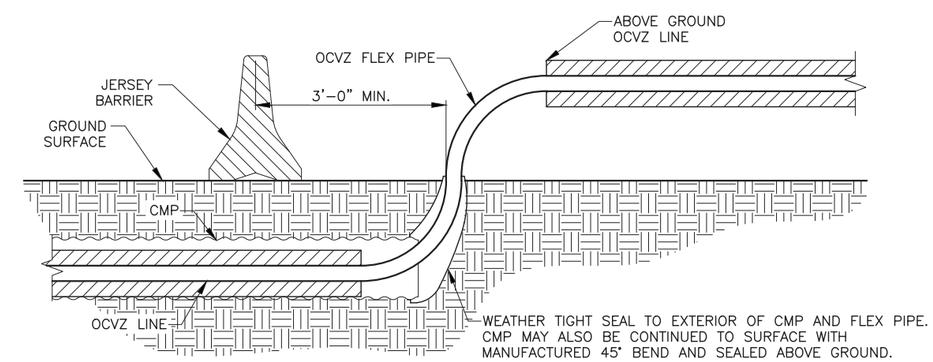
DETAIL (3 / 765048)
SCALE: NTS



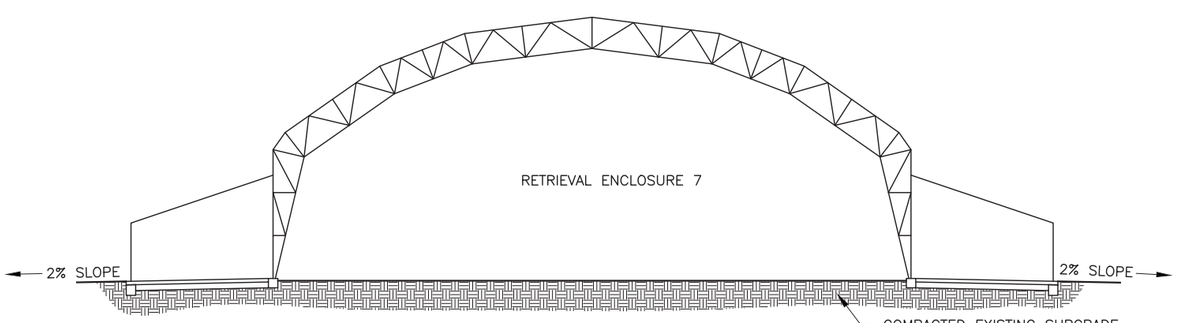
SECTION (K / 765045)
SCALE: NTS



SECTION (F / 765045)
SCALE: NTS



SECTION (J / 765045)
SCALE: NTS



SECTION (G / 765045)
SCALE: NTS

Paul D. Leonard
CWI
2015.11.12 15:26:31 -07'00'
PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD
2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J.L. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:21:28 -07'00'
TECHNICAL CHECK: EGS	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:41:00 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:26:31 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 328838	

Idaho Cleanup Project CH2M+WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 GRADING SECTIONS AND DETAILS

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	02	136	765049	2

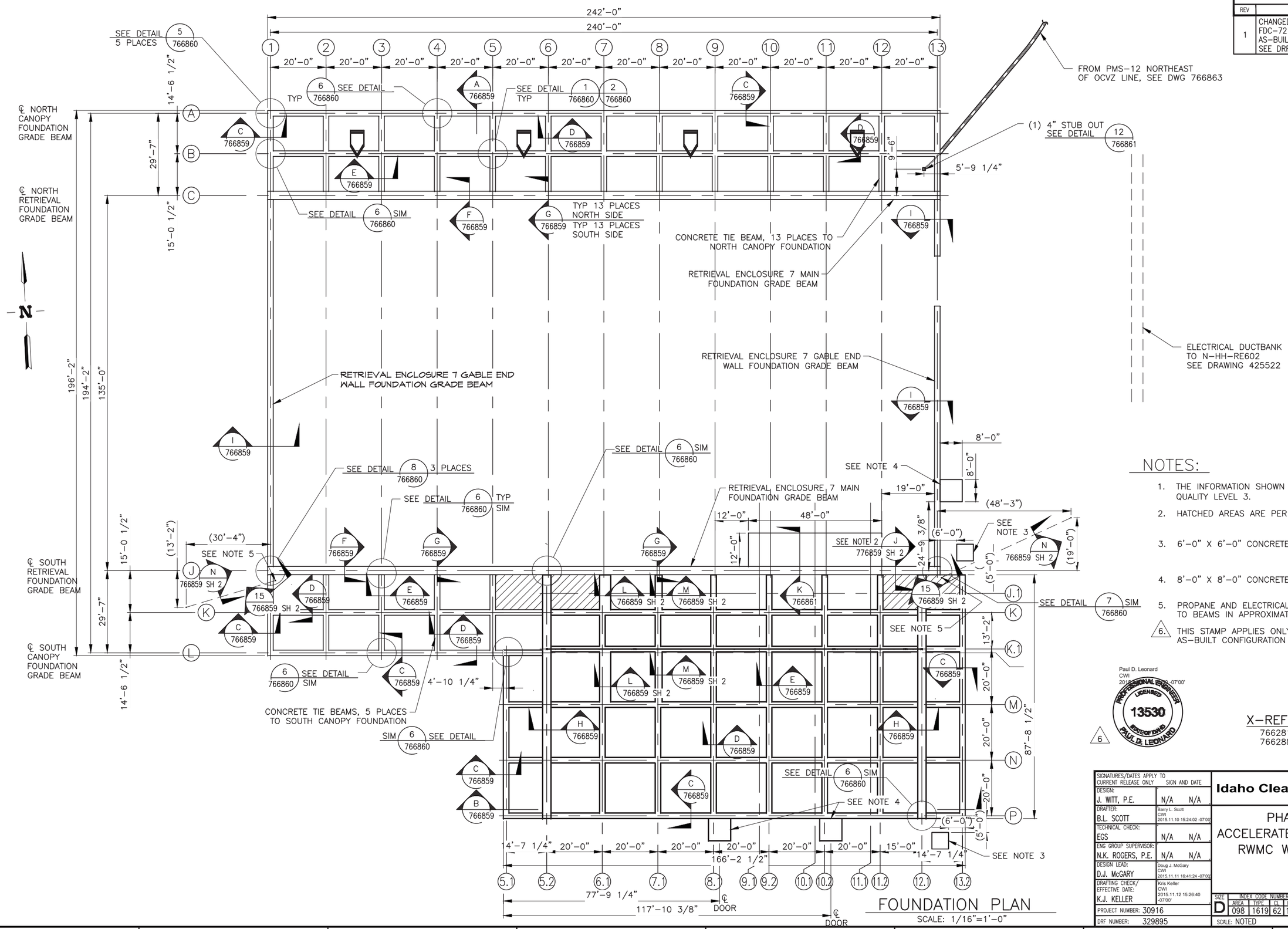
SCALE: NOTED — SHEET 1 OF 1

File: 765049-2.dwg
Path: Y:\RE-7\RCRA\RCRA Drawings
Date: 11/03/15 – 8:15 AM | Layout Name: C-7 | ID: BXS

RW-1271

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-7219 & -7331, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017



FOUNDATION PLAN

SCALE: 1/16"=1'-0"

NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3.
2. HATCHED AREAS ARE PER SECTION J 766859 SH 2
3. 6'-0" X 6'-0" CONCRETE PAD PER DETAIL 14 766859 SH 2
4. 8'-0" X 8'-0" CONCRETE PAD PER DETAIL 14 766859 SH 2
5. PROPANE AND ELECTRICAL CONDUIT PLACED NEXT TO BEAMS IN APPROXIMATE LOCATION SHOWN.
6. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

Paul D. Leonard
CWI
2015.11.12 15:26:40 -07'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

X-REF DRAWINGS

766281 – AL6
766288 – RE7

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:24:02 -07'00'
TECHNICAL CHECK: EGS	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:41:24 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:26:40 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329895	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 FOUNDATION PLAN

SIZE	INDEX CODE NUMBER (AREA / TYPE / GL / ORIG)	DWG-	REV
D	098 / 1619 / 62 / 136	766857	1

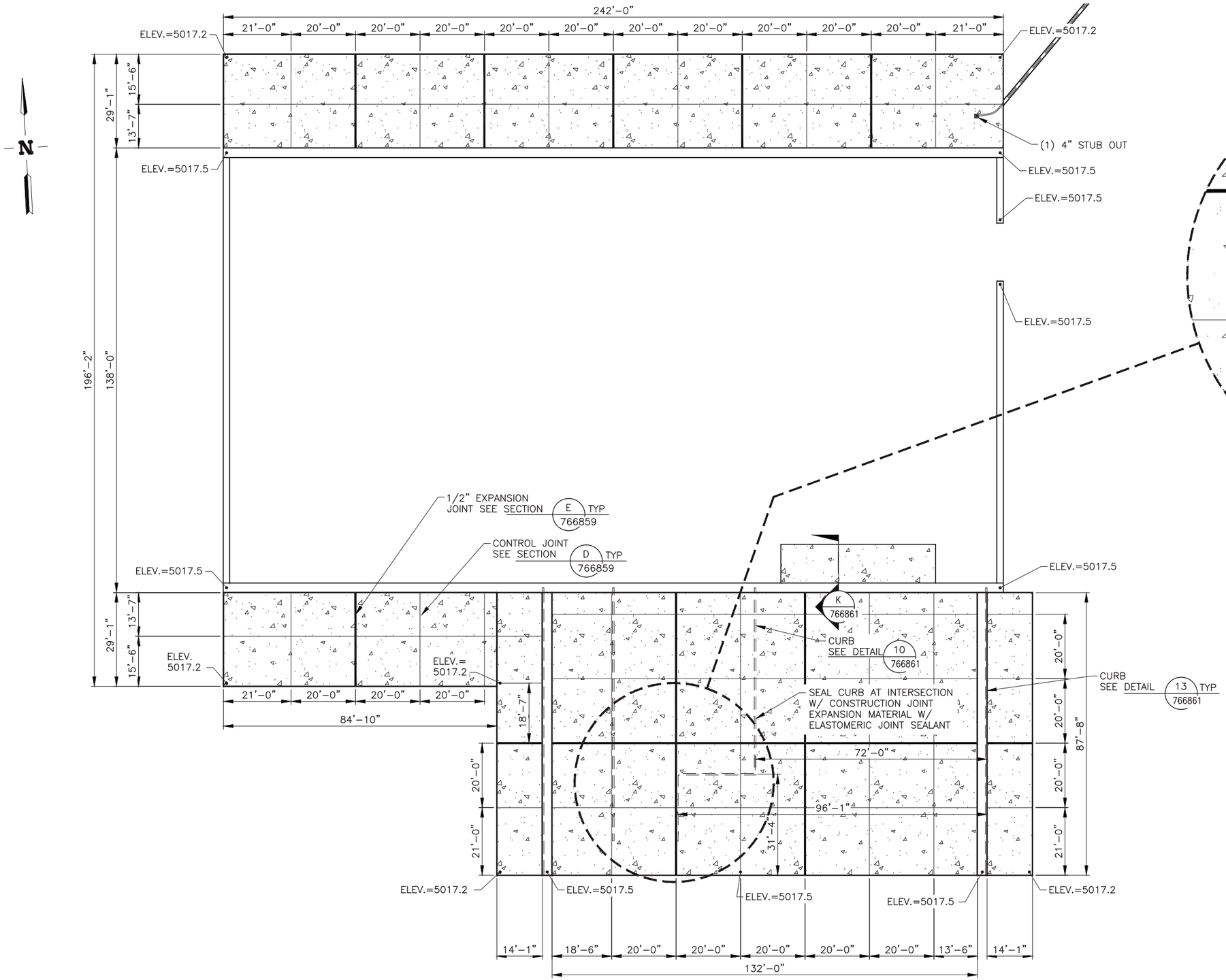
SCALE: NOTED — SHEET 1 OF 1

RW-1271

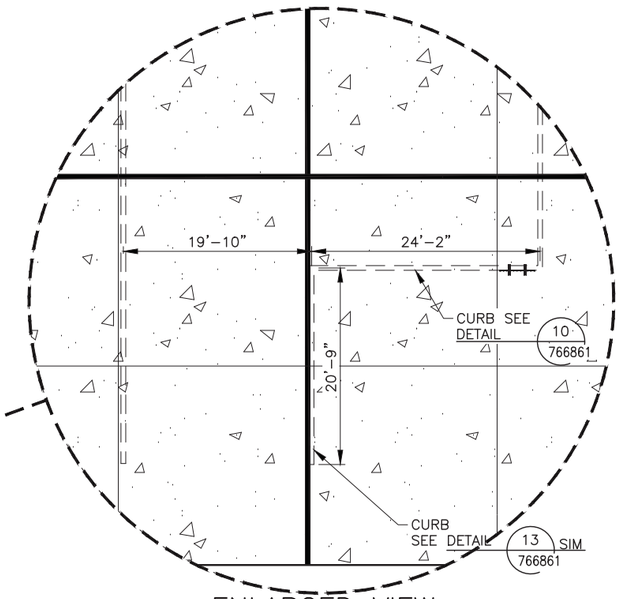
File: 766857-1.dwg
Path: Y:\RE-7\RCRA\RCRA Drawings
Date: 11/02/15 – 5:01 PM | Layout Name: S-1 | ID: BXS

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-7332, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017



SLAB PLAN
SCALE: 1/16"=1'-0"



ENLARGED VIEW
SCALE: 1/8"=1'-0"

NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3.
2. ALL ELEVATIONS ARE TOP OF CONCRETE/TOP OF SLAB.
3. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

Paul D. Leonard
CWI
2015.11.12 -07'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

3

X-REF DRAWINGS

766281 – AL6
766288 – RE7

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:24:30 -07'00'
TECHNICAL CHECK: EGS	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:41:43 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:28:15 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329895	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 FOUNDATION SLAB PLAN

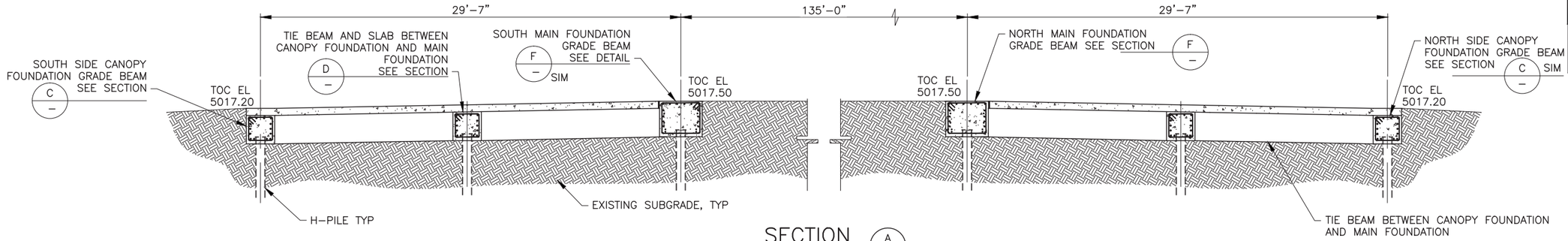
SIZE	INDEX CODE NUMBER				DWG-	REV
	AREA	TYPE	CL	ORIG		
D	098	1619	62	136	766858	1

SCALE: NOTED SHEET 1 OF 1

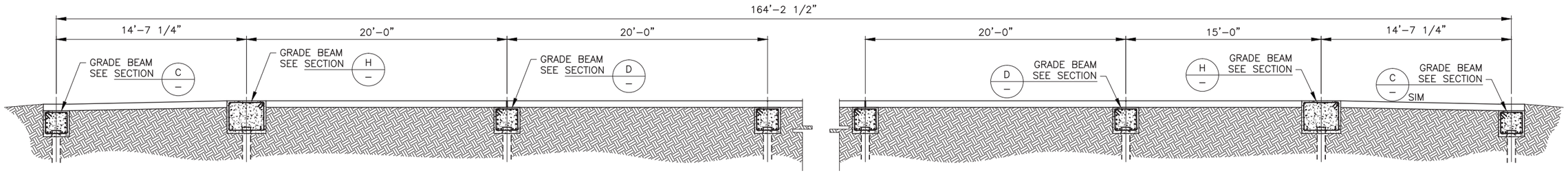
File: 766858-1.dwg
Path: Y:\RE-7\RCRA\RCRA Drawings
Date: 11/03/15 – 1:25 PM Layout Name: S-1
ID: BXS

FMT-D1-REV 2012-02-14

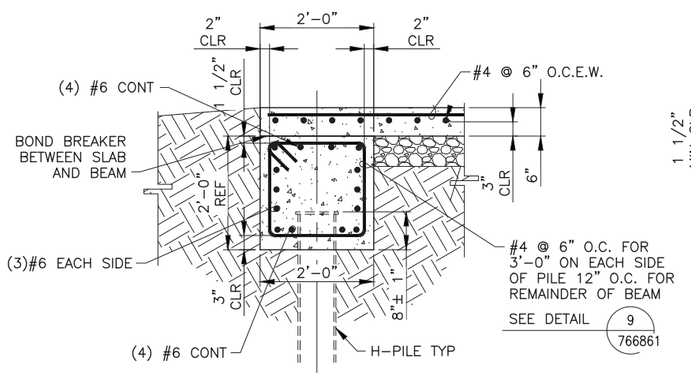
REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, ADDED SHEET 2, INCORPORATED FDC-7219 & -7251, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017



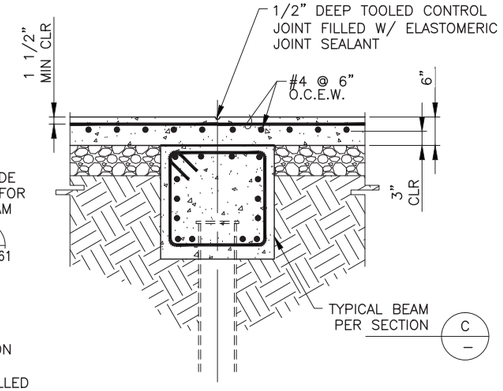
SECTION A 766857
SCALE: 1/4"=1'-0"



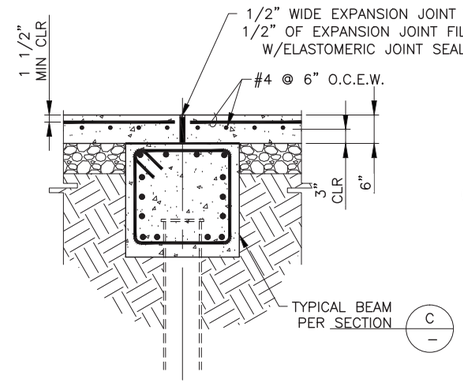
SECTION B 766857
SCALE: 1/4"=1'-0"



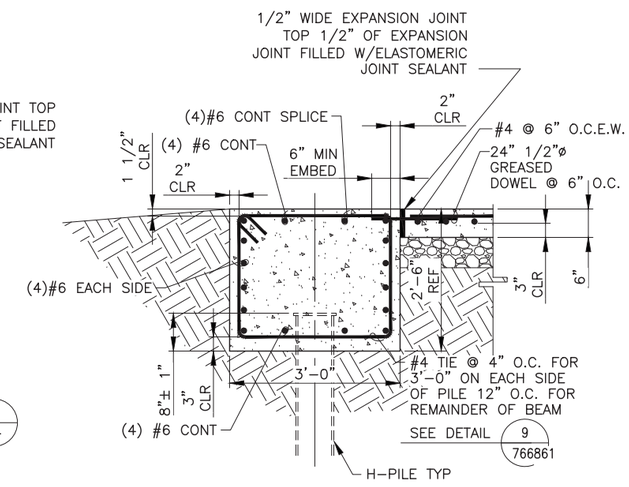
SECTION C C 766857
SCALE: 3/4"=1'-0"



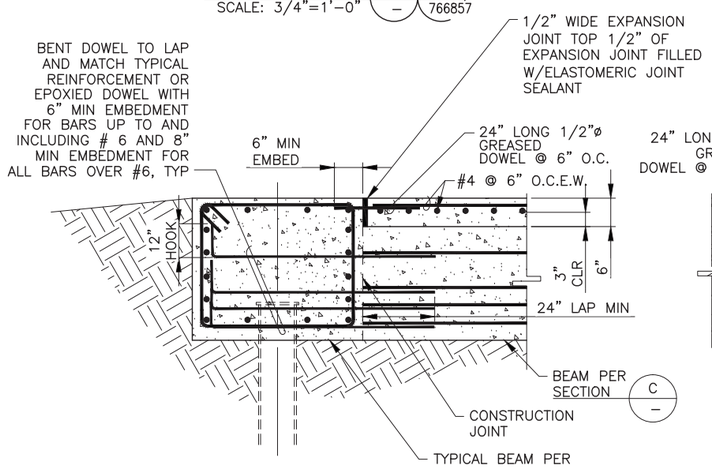
SECTION D D 766857 & 766858
SCALE: 3/4"=1'-0"



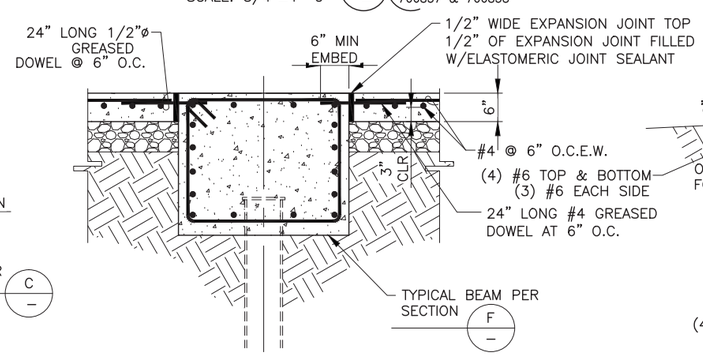
SECTION E E 766857 766858
SCALE: 3/4"=1'-0"



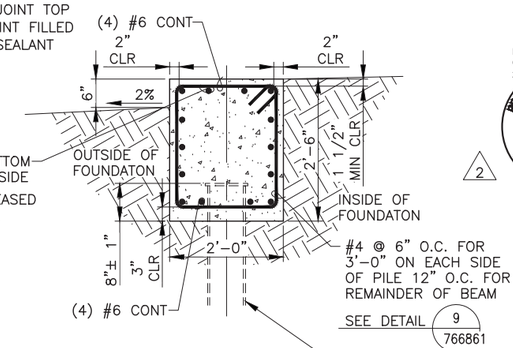
SECTION F F 766857
SCALE: 3/4"=1'-0"



SECTION G 766857
SCALE: 3/4"=1'-0"



SECTION H H 766857
SCALE: 3/4"=1'-0"



SECTION I 766857
SCALE: 3/4"=1'-0"

Paul D. Leonard
CWI
2015.11.12 15:28:04 -07'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

2

NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

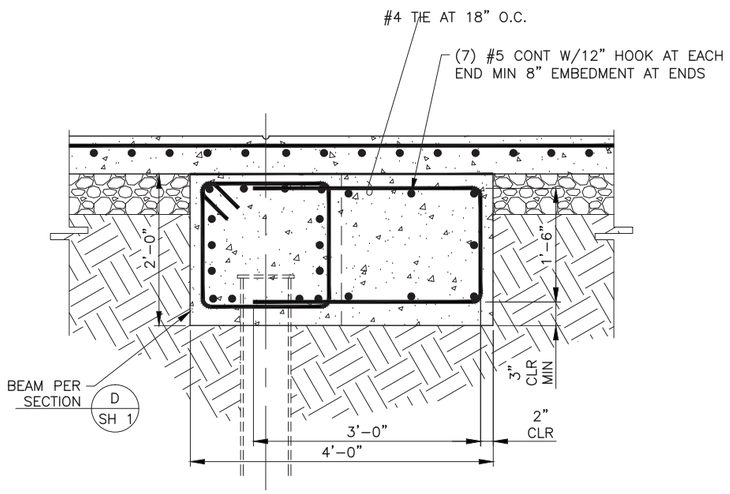
SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:33:37 -07'00'
TECHNICAL CHECK: EGS	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:42:05 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:28:04 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329895	

Idaho Cleanup Project CH2M+WG IDAHO, LLC

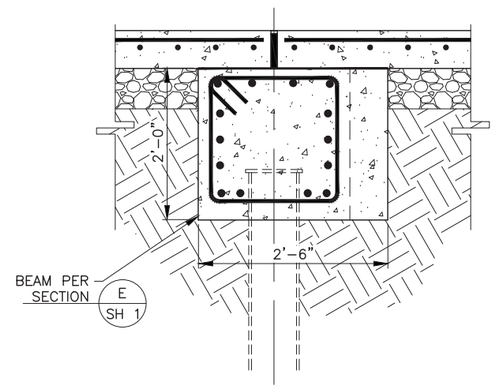
PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 FOUNDATION SECTIONS

SIZE	INDEX CODE NUMBER (AREA / TYPE / CL / ORIG)	DWG-	REV
D	098 / 1619 / 62 / 136	766859	1
SCALE: NOTED		SHEET 1 OF 2	

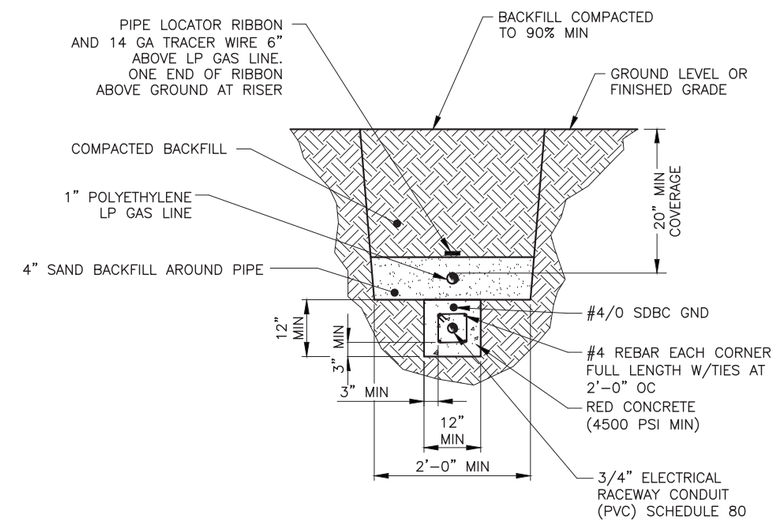
File: 766859-1.dwg
Path: H:\RE-7\RCRA\RCRA Drawings
Date: 11/02/15 – 4:37 PM
Layout Name: Sheet 1
ID: BXS



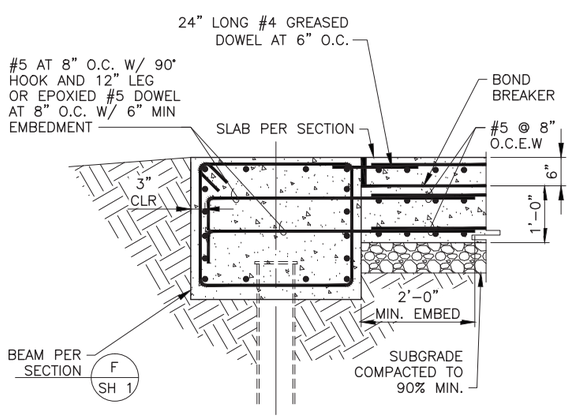
RE7 5-TON CRANE SUPPORT (L / 766857)
SCALE: 1"=1'-0



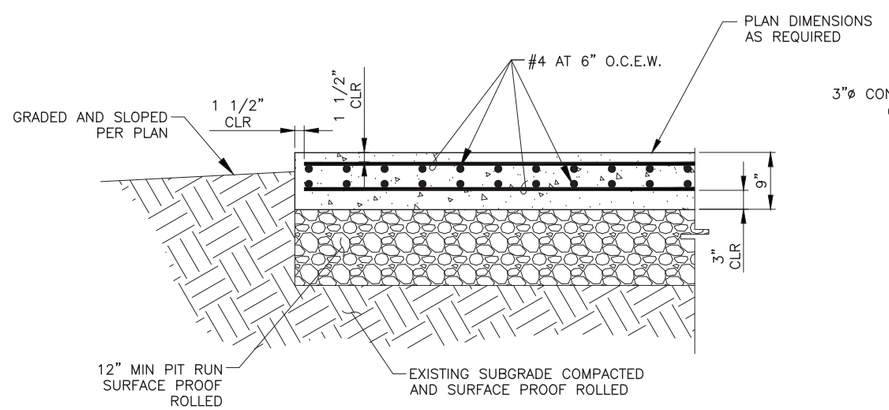
RE7 5-TON CRANE SUPPORT (M / 766857)
SCALE: 1"=1'-0



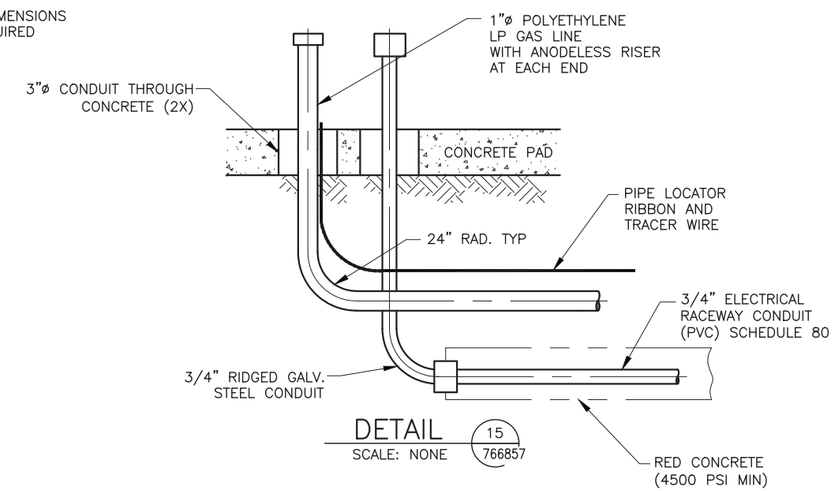
SECTION (N / 766857)
SCALE: NONE



SECTION (J / 766857)
SCALE: 3/4"=1'-0



CAST IN PLACE PAD (14 / 766857)
SCALE: 1"=1'-0



DETAIL (15 / 766857)
SCALE: NONE

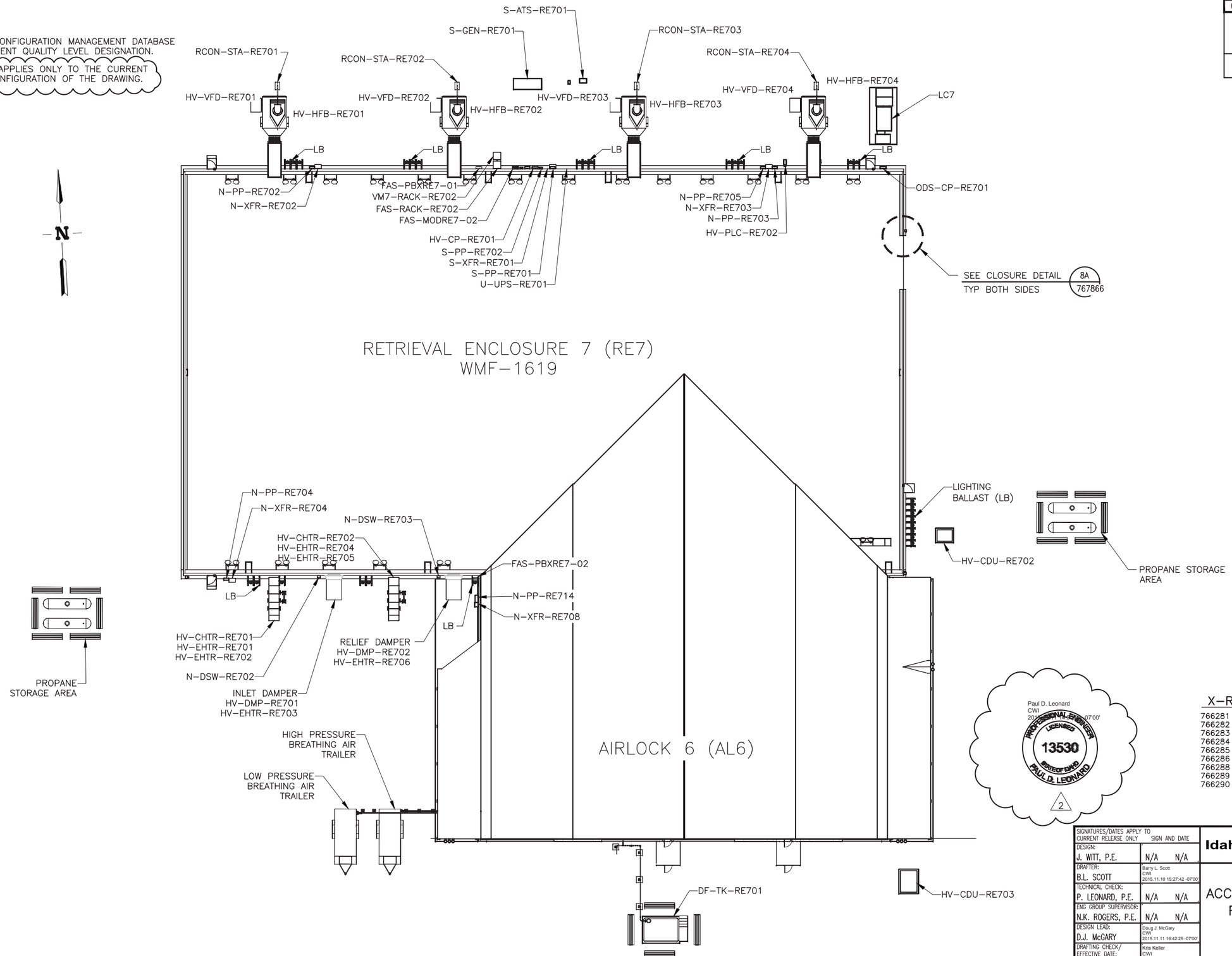
SIZE	INDEX CODE NUMBER				DWG-	REV
	AREA	TYPE	CL	ORIG		
D	098	1619	62	136	766859	1
SCALE: NOTED					SHEET 2	

FMT-D1-REV 2012-02-14

NOTES

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-7817, AS-BUILT AS OF 6-4-2012, SEE DRF-336586
2	ADDED P.E. STAMP AND NOTE 2, AS-BUILT AS OF 10-14-2015, SEE DRF-347017



EQUIPMENT LOCATION PLAN

SCALE: 1/16" = 1'-0"

Paul D. Leonard
CWI
2015.11.12 15:27:45 -07'00'
PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD
2

X-REF DRAWINGS

766281 – AL6
766282 – AL6 HVAC
766283 – AL6 ELECTRICAL
766284 – AL6 PIPING
766285 – AL6 DPS
766286 – AL6 EQUIPMENT
766288 – RE7
766289 – RE7 HVAC
766290 – RE7 ELECTRICAL

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:27:42 -07'00'
TECHNICAL CHECK: P. LEONARD, P.E.	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:42:25 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:27:45 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M HILL BOOZ ALLEN IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 EQUIPMENT LOCATION PLAN

SIZE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	02	136	767855	2

SCALE: NOTED

SHEET 1 OF 1

RW-1271

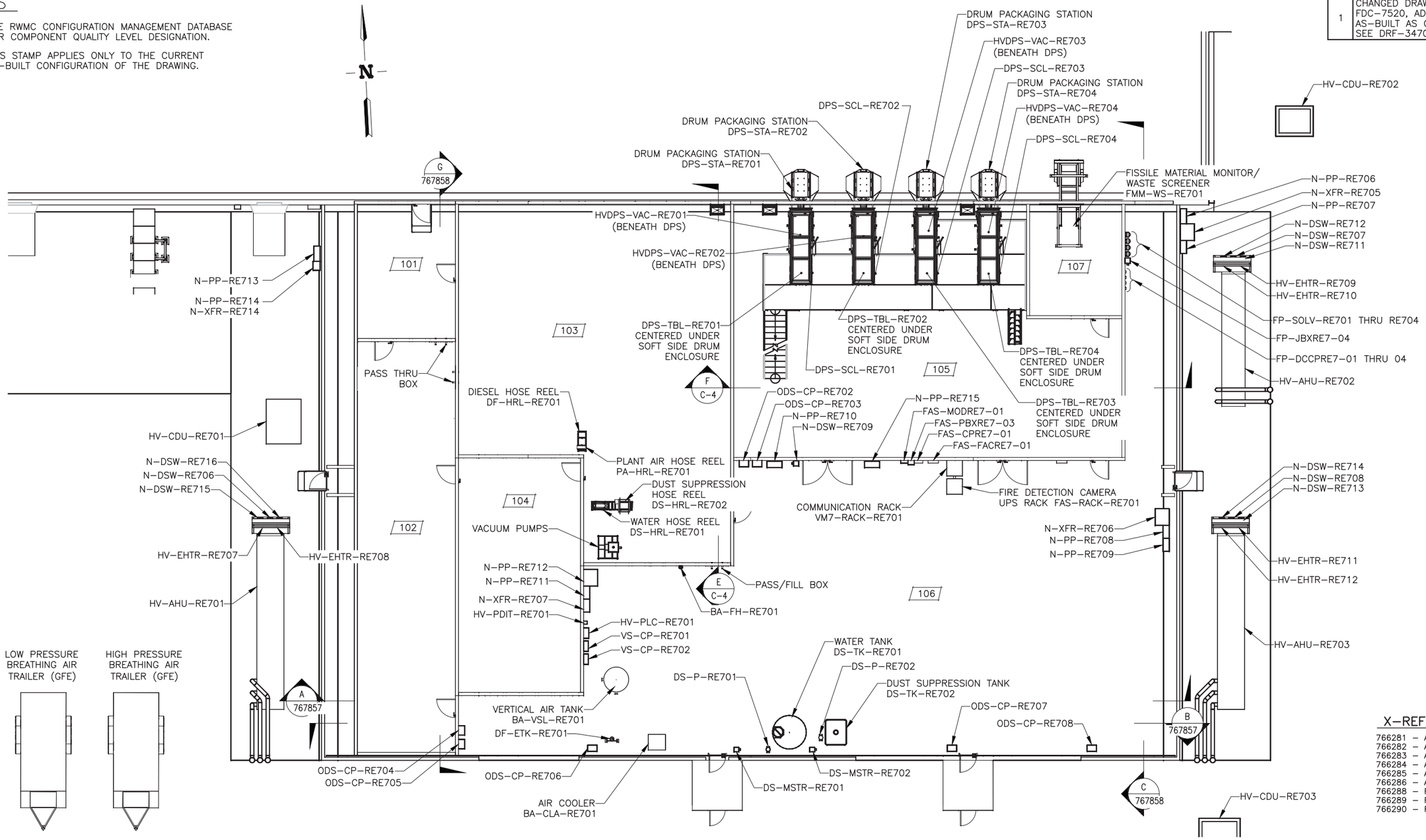
File: 767855-2.dwg
Path: Y:\RE-7\RCRA\RCRA Drawings
Date: 11/02/15 – 4:09 PM | Layout Name: C-1 | ID: BXS

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-7520, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017

NOTES

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.



X-REF DRAWINGS

766281 – AL6
766282 – AL6 HVAC
766283 – AL6 ELECTRICAL
766284 – AL6 PIPING
766285 – AL6 DPS
766286 – AL6 EQUIPMENT
766288 – RE7
766289 – RE7 HVAC
766290 – RE7 ELECTRICAL

AIRLOCK 6 (AL6) EQUIPMENT LOCATION PLAN

SCALE: 1/8" = 1'-0"

Paul D. Leonard
CWI
2015.11.24 -07'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE	
DESIGN: J. WITT, P.E.	N/A	N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:28:00 -07'00'	
TECHNICAL CHECK: P. LEONARD, P.E.	N/A	N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A	N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:42:44 -07'00'	
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:27:19 -07'00'	
PROJECT NUMBER: 30916		
DRF NUMBER: 329428		

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 (AL6) EQUIPMENT LOCATION PLAN

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	02	136	767856	1

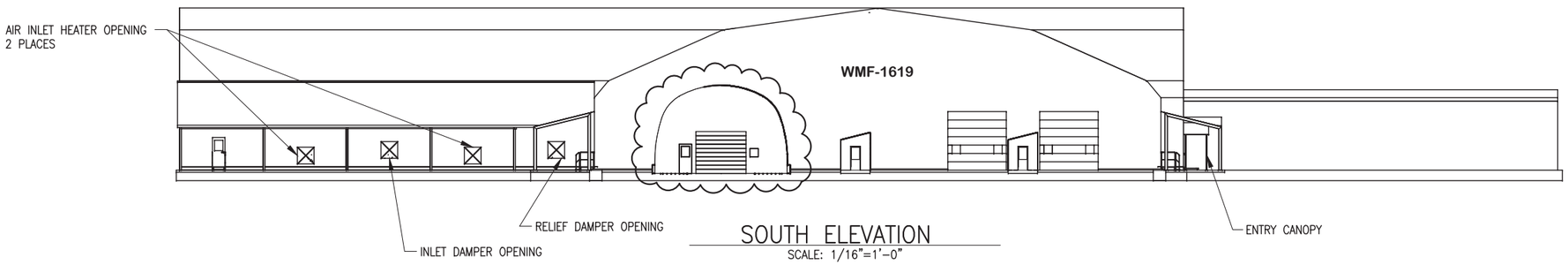
SCALE: NOTED SHEET 1 OF 1

RW-1271

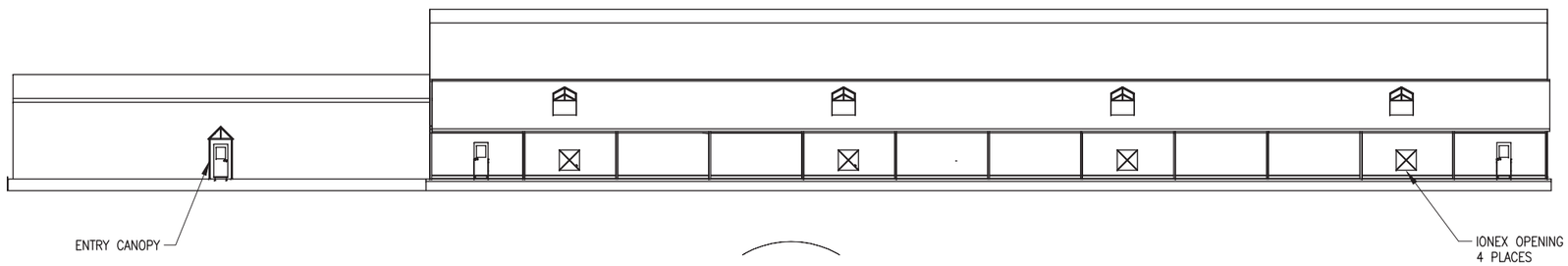
File: 767856-1.dwg
Path: Y:\RE-7\RCRA\RCRA Drawings
Date: 11/02/15 – 3:44 PM | Layout Name: C-2 | ID: BXS

FMT-D1-REV 2012-02-14

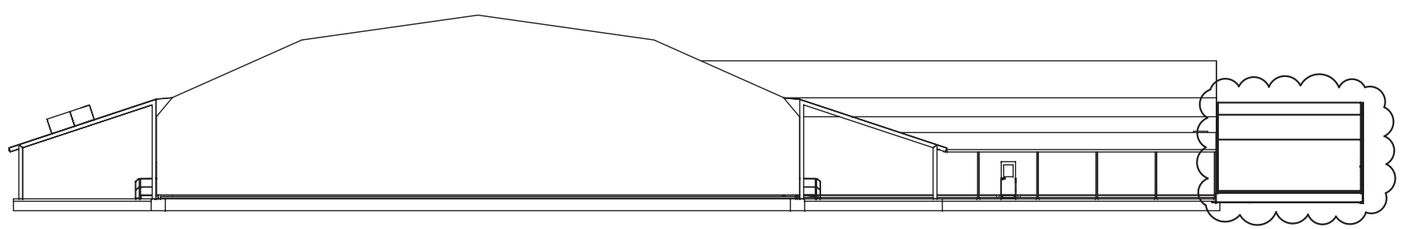
REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, ADDED P.E. STAMP, INCORPORATED FDC-9657, AS-BUILT AS OF 10-14-2015, SEE DRF-347017
2	INCORPORATED FDC-10701, AS-BUILT AS OF 5-12-2016, SEE DRF-348740



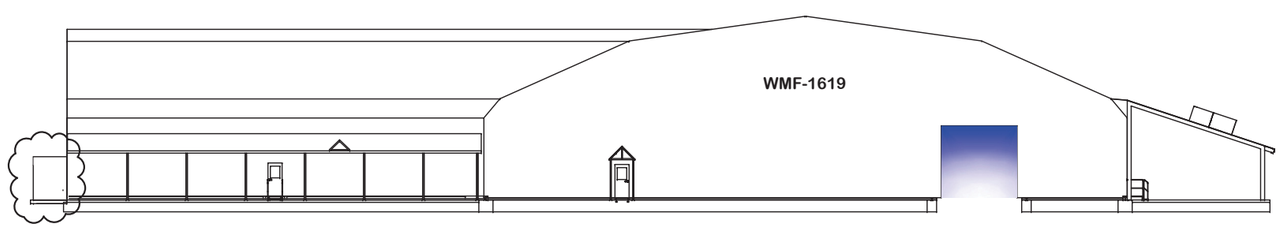
SOUTH ELEVATION
SCALE: 1/16"=1'-0"



NORTH ELEVATION
SCALE: 1/16"=1'-0"



WEST ELEVATION
SCALE: 1/16"=1'-0"



EAST ELEVATION
SCALE: 1/16"=1'-0"

NOTES

1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

Paul D. Leonard
Fluor Idaho
2016.06.16 13:52:37 -06'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott Fluor Idaho 2016.06.16 11:12:17 -06'00'
TECHNICAL CHECK: P. LEONARD, P.E.	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary Fluor Idaho 2016.06.16 12:52:56 -06'00'
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson Fluor Idaho 2016.06.16 13:03:30 -06'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6

BUILDING ELEVATIONS

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	00	136	767863	2

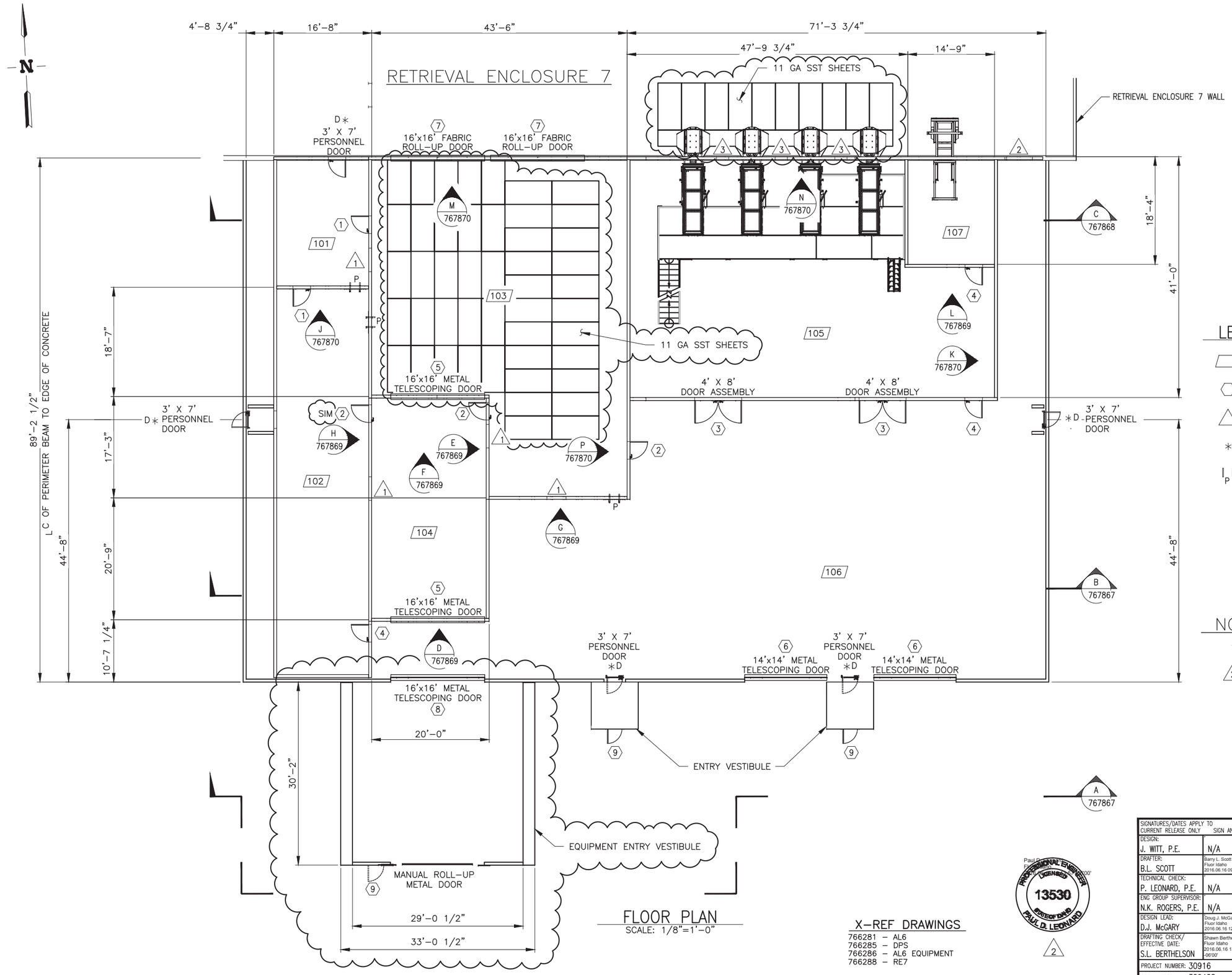
SCALE: NOTED SHEET 1 OF 1

RW-1273

File: 767863-2.dwg
Path: C:\Users\bxs\Documents\BXS\RW-1273 (ARPs Start 1-12-2016)
Date: 06/15/16 - 5:06 PM | Layout Name: A-3 | ID: BXS

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-7520 & -9657, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017
2	INCORPORATED FDC-10701, -10773 & -10820, AS-BUILT AS OF 5-12-2016, SEE DRF-348740



FLOOR PLAN
SCALE: 1/8"=1'-0"

LEGEND

- ROOM NUMBER. SEE ROOM FINISH SCHEDULE ON SHEET A-5
- DOOR NUMBER. SEE DOOR SCHEDULE ON SHEET A-5
- WINDOW NUMBER. SEE WINDOW SCHEDULE ON SHEET A-5
- *D DOOR, FRAME AND HARDWARE FURNISHED BY BUILDING MANUFACTURER
- P PASS THRU BOX OR PASS/FILL BOX

NOTES

1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

X-REF DRAWINGS

766281 – AL6
766285 – DPS
766286 – AL6 EQUIPMENT
766288 – RE7

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott Fluor Idaho 2016.06.16 09:36:21 -06'00'
TECHNICAL CHECK: P. LEONARD, P.E.	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary Fluor Idaho 2016.06.16 12:51:14 -06'00'
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson Fluor Idaho 2016.06.16 13:03:00 -06'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M+WG IDAHO, LLC

PHASE VII OF THE
ACCELERATED RETRIEVAL PROJECT
RWMC WMF-1619 RE7/AL6
AIRLOCK 6
FLOOR PLAN

SIZE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	00	136	767864	2

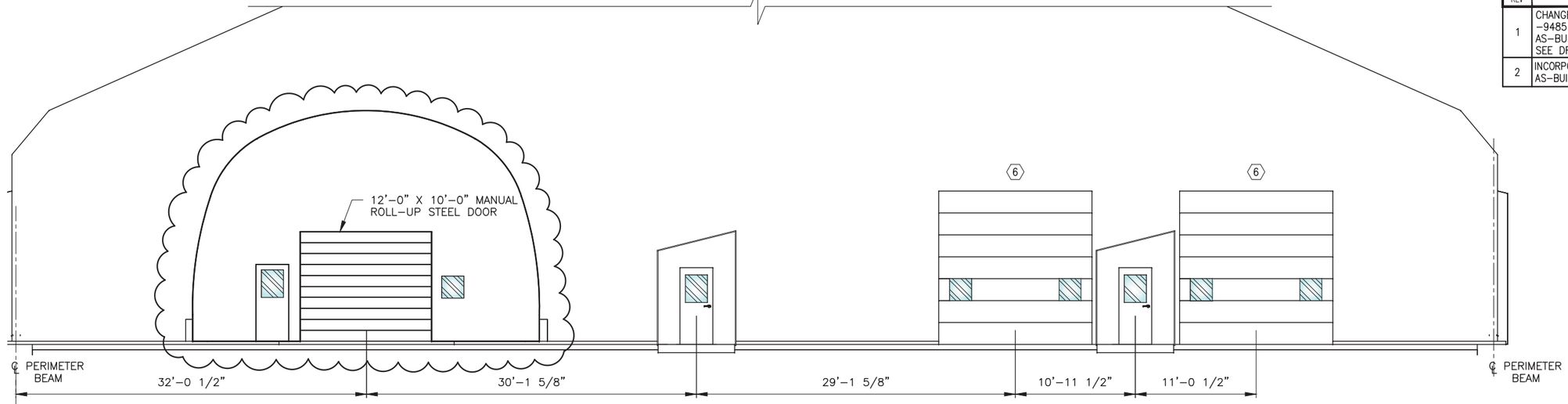
SCALE: NOTED SHEET 1 OF 1

RW-1273

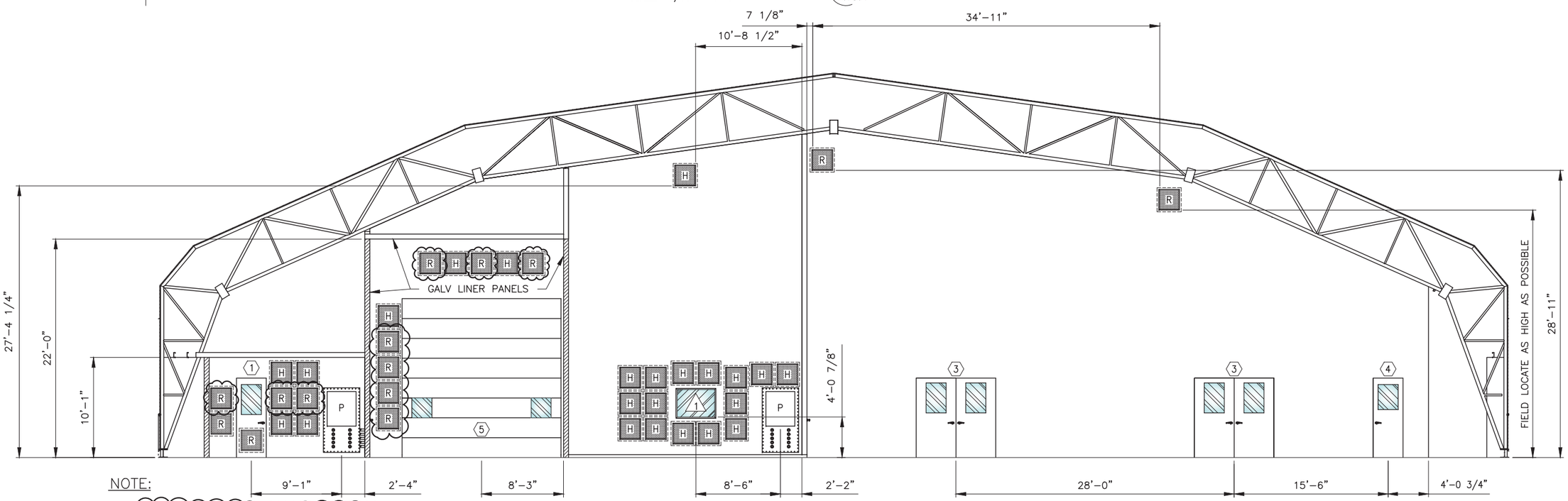
File: 767864-2.dwg
Path: C:\Users\bxs\Documents\BXS\RW-1273 (ARPs Start 1-12-2016)
Date: 06/15/16 – 5:09 PM Layout Name: A-4
ID: BXS

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDC-8242, -9485 & -9657, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017
2	INCORPORATED FDC-10693 & -10701, AS-BUILT AS OF 5-12-2016, SEE DRF-348740



BUILDING ELEVATION (A 767864)
SCALE: 3/16" = 1'-0"



NOTE:

1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3 AND APPLIES ONLY TO THE HEPA FILTERS.
2. THE FILTER BLANK LOCATIONS SHOWN AND THE NUMBER OF FILTERS WITH BLANKS INSTALLED ARE FOR THE ORIGINAL DESIGN CONFIGURATION ONLY. THE BLANKS MAY BE REMOVED, INSTALLED OR FILTERS REMOVED AND REINSTALLED AS NEEDED TO PROVIDE PROPER AIR FLOW AND ACCEPTABLE CONTAMINATION CONTROL FOR AIRLOCK 6.
3. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.
4. SEE DRAWING 767948 FOR ADDITIONAL NOTES.

BUILDING SECTION (B 767864)
SCALE: 3/16" = 1'-0"

LEGEND

H	HEPA FILTER
R	ROUGHING FILTER

Paul D. Leonard
Fluor Idaho
2016.06.16 12:51:57 -06'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

3

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott Fluor Idaho 2016.06.16 09:37:09 -06'00'
TECHNICAL CHECK: P. LEONARD, P.E.	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary Fluor Idaho 2016.06.16 12:51:57 -06'00'
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson Fluor Idaho 2016.06.16 13:01:23 -06'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 BUILDING SECTIONS

SIZE	INDEX CODE NUMBER (AREA / TYPE / CL / ORIG)	DWG-	REV
D	098 / 1619 / 00 / 136	767867	2
SCALE: NOTED		SHEET 1 OF 1	

RW-1273

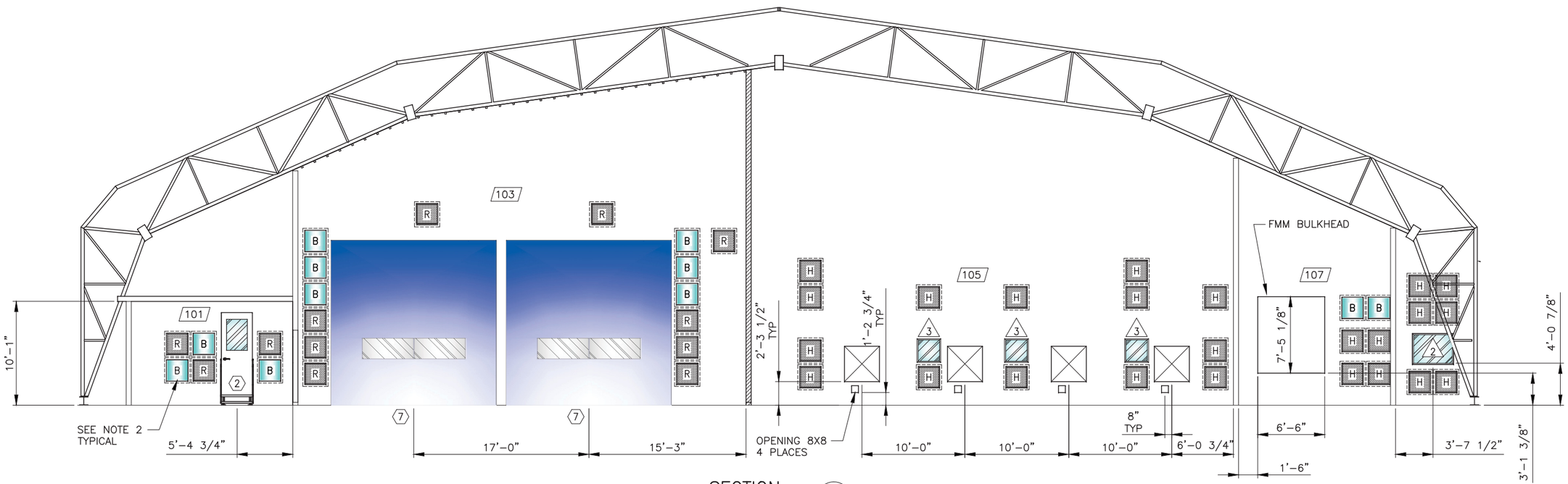
File: 767867-2.dwg
Path: C:\Users\bxs\Documents\BXS\RW-1273 (AREs Start 1-12-2016)
Date: 06/16/16 - 7:20 AM Layout Name: A-7 ID: BXS

FMT-D1-REV 2012-02-14

REVISIONS	
REV	DESCRIPTION
1	CHANGED DRAWING TITLE, INCORPORATED FDC-7486, -7520, -7586 & 8242, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017

NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3.
2. THE FILTER BLANK LOCATIONS SHOWN AND THE NUMBER OF FILTERS WITH BLANKS INSTALLED ARE FOR THE ORIGINAL DESIGN CONFIGURATION ONLY. THE BLANKS MAY BE REMOVED, INSTALLED OR FILTERS REMOVED AND REINSTALLED AS NEEDED TO PROVIDE PROPER AIR FLOW AND ACCEPTABLE CONTAMINATION CONTROL FOR AIRLOCK 6.
3. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.



SECTION C 767864
SCALE: 3/16"=1'-0"

X-REF DRAWINGS
766281 – AL6

LEGEND

- H — HEPA FILTER
- R — ROUGHING FILTER
- B — BLANK

Paul D. Leonard
CWI
2015.11.12 15:28:22 -07'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

3

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:35:18 -07'00'
TECHNICAL CHECK: P. LEONARD, P.E.	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:44:03 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:28:27 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE
ACCELERATED RETRIEVAL PROJECT
RWMC WMF-1619 RE7/AL6
AIRLOCK 6
BUILDING SECTION

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	00	136	767868	1

SCALE: NOTED
SHEET 1 OF 1

RW-1271

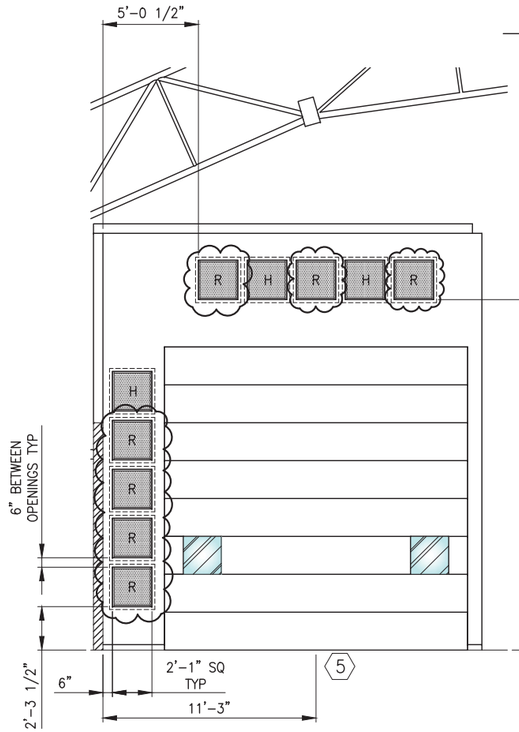
File: 767868-1.dwg
Path: Y:\RE-TRCRA\RCRA Drawings
Date: 11/02/15 - 1:50 PM
Layout Name: A-8
ID: BXS

FMT-D1-REV 2012-02-14

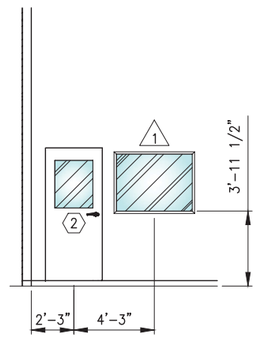
REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDC-8242, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017
2	INCORPORATED FDC-10693 & -10773, AS-BUILT AS OF 5-12-2016, SEE DRF-348740

NOTES

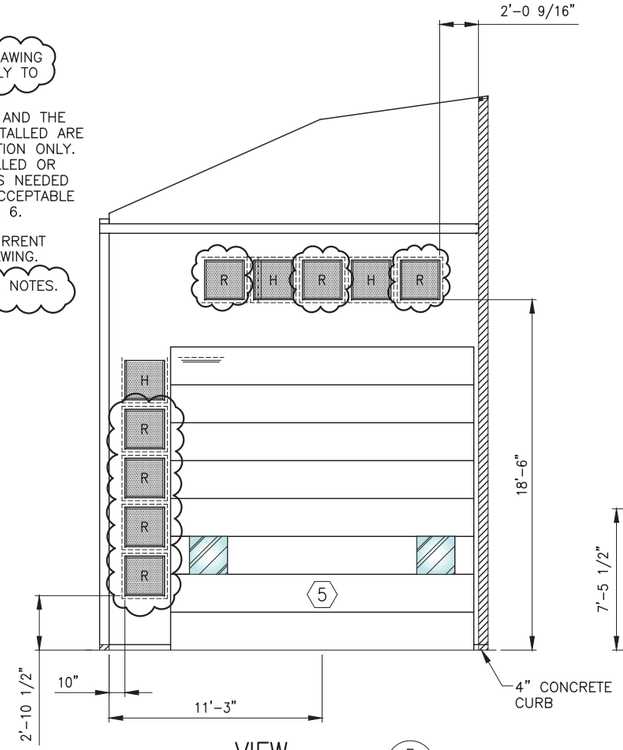
1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3 AND APPLIES ONLY TO THE HEPA FILTERS.
2. THE FILTER BLANK LOCATIONS SHOWN AND THE NUMBER OF FILTERS WITH BLANKS INSTALLED ARE FOR THE ORIGINAL DESIGN CONFIGURATION ONLY. THE BLANKS MAY BE REMOVED, INSTALLED OR FILTERS REMOVED AND REINSTALLED AS NEEDED TO PROVIDE PROPER AIR FLOW AND ACCEPTABLE CONTAMINATION CONTROL FOR AIRLOCK 6.
3. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.
4. SEE DRAWING 767948 FOR ADDITIONAL NOTES.



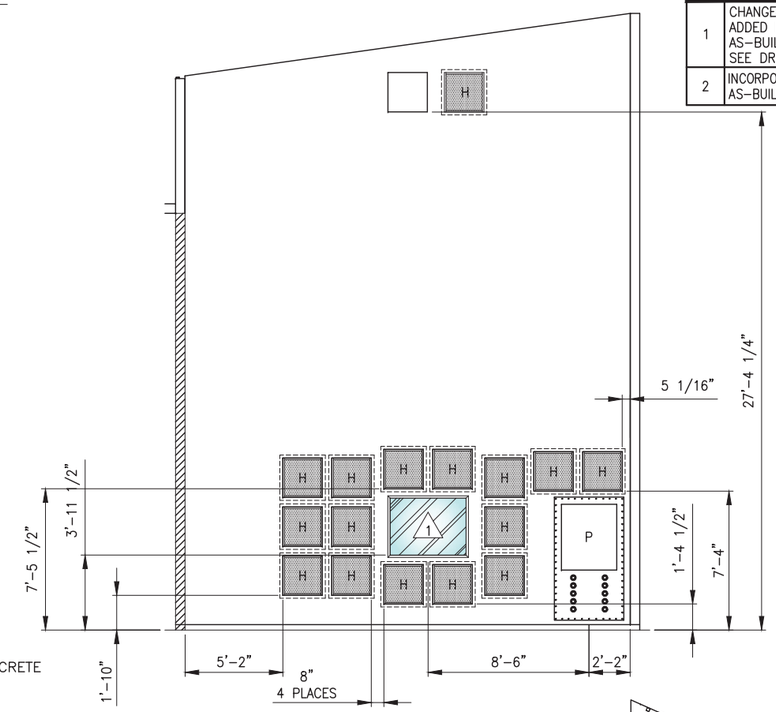
VIEW D 767864
SCALE: 1/4" = 1'-0"



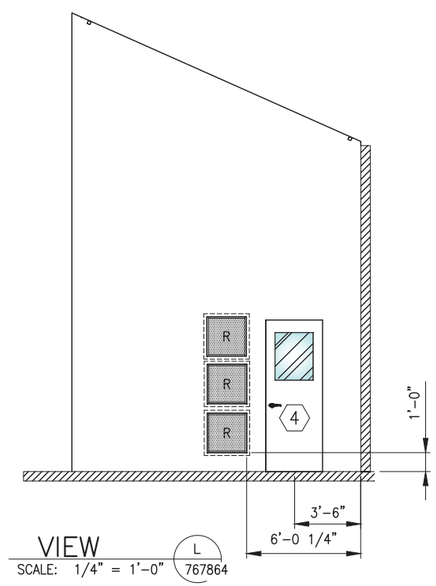
VIEW E 767864
SCALE: 1/4" = 1'-0"



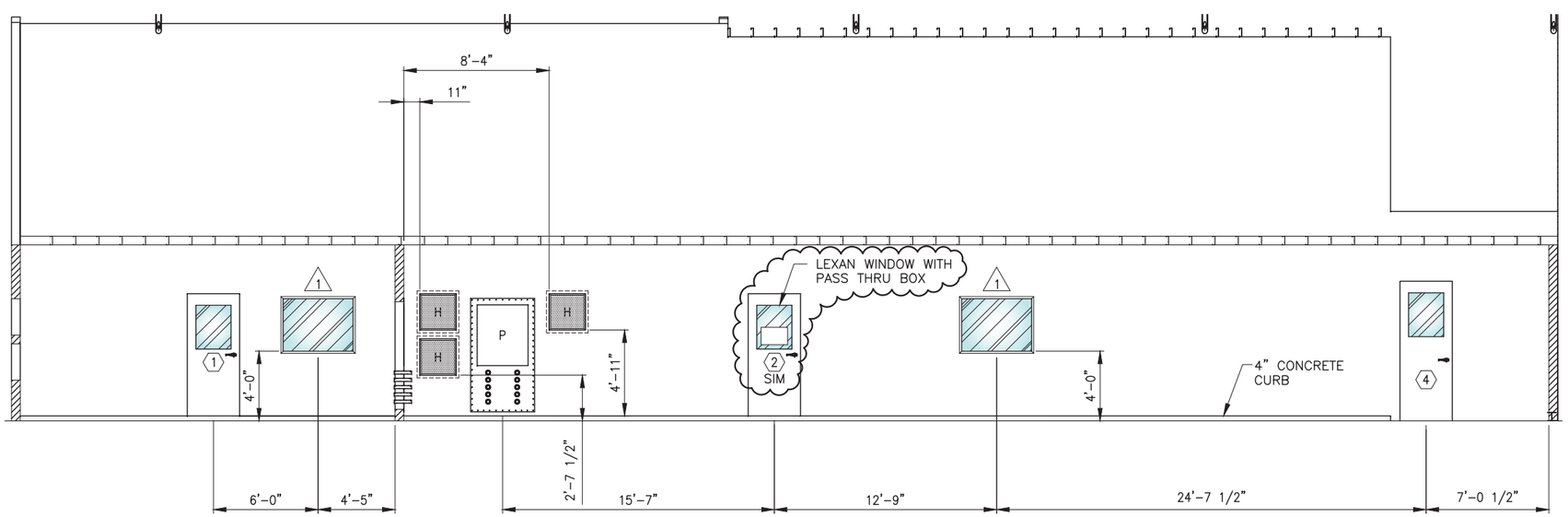
VIEW F 767864
SCALE: 1/4" = 1'-0"



VIEW G 767864
SCALE: 1/4" = 1'-0"



VIEW L 767864
SCALE: 1/4" = 1'-0"



ELEVATION H 767864
SCALE: 1/4" = 1'-0"

LEGEND

H	HEPA FILTER
R	ROUGHING FILTER

X-REF DRAWINGS

766281 – AL6

Paul D. Leonard
Fluor Idaho
2016.06.16 09:37:50 -06'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

3

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott Fluor Idaho 2016.06.16 09:37:50 -06'00'
TECHNICAL CHECK: P. LEONARD, P.E.	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary Fluor Idaho 2016.06.16 12:52:15 -06'00'
DRAFTING CHECK/ EFFECTIVE DATE: S.L. BERTHELSON	Shawn Berthelson Fluor Idaho 2016.06.16 13:02:18 -06'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 INTERIOR ELEVATIONS

SIZE	INDEX CODE NUMBER: AREA	TYPE	CL	ORIG	DWG-	REV
D	098	1619	00	136	767869	2

SCALE: NOTED — SHEET 1 OF 1

RW-1273

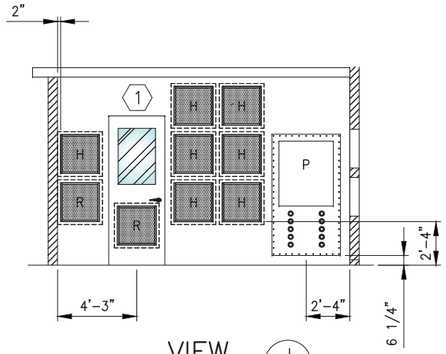
File: 767869-2.dwg
Path: C:\Users\bxs\Documents\BXS\RW-1273 (ARPs Start 1-12-2016)
Date: 06/16/16 – 7:24 AM | Layout Name: A-9 | ID: BXS

FMT-D1-REV 2012-02-14

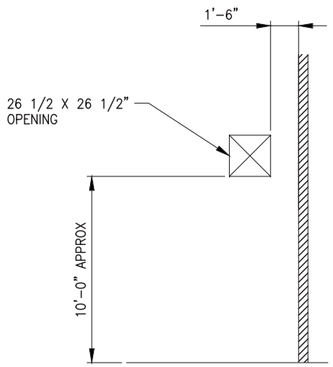
REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, INCORPORATED FDC-7501, -7586, -8242 & -9485, ADDED P.E. STAMP, AS-BUILT AS OF 10-14-2015, SEE DRF-347017

NOTES:

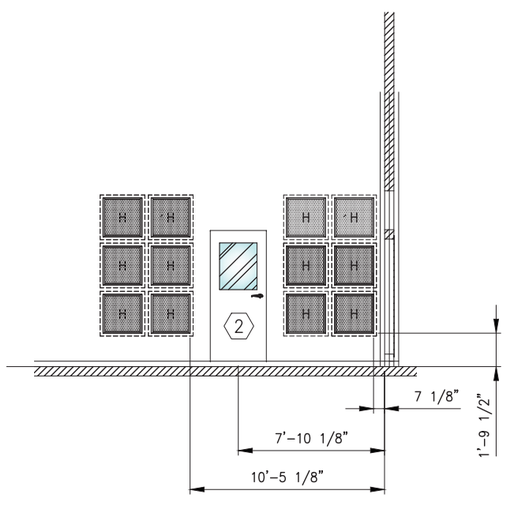
1. THE INFORMATION SHOWN ON THIS DRAWING IS QUALITY LEVEL 3.
2. THE FILTER BLANK LOCATIONS SHOWN AND THE NUMBER OF FILTERS WITH BLANKS INSTALLED ARE FOR THE ORIGINAL DESIGN CONFIGURATION ONLY. THE BLANKS MAY BE REMOVED, INSTALLED OR FILTERS REMOVED AND REINSTALLED AS NEEDED TO PROVIDE PROPER AIR FLOW AND ACCEPTABLE CONTAMINATION CONTROL FOR AIRLOCK 6.
3. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.



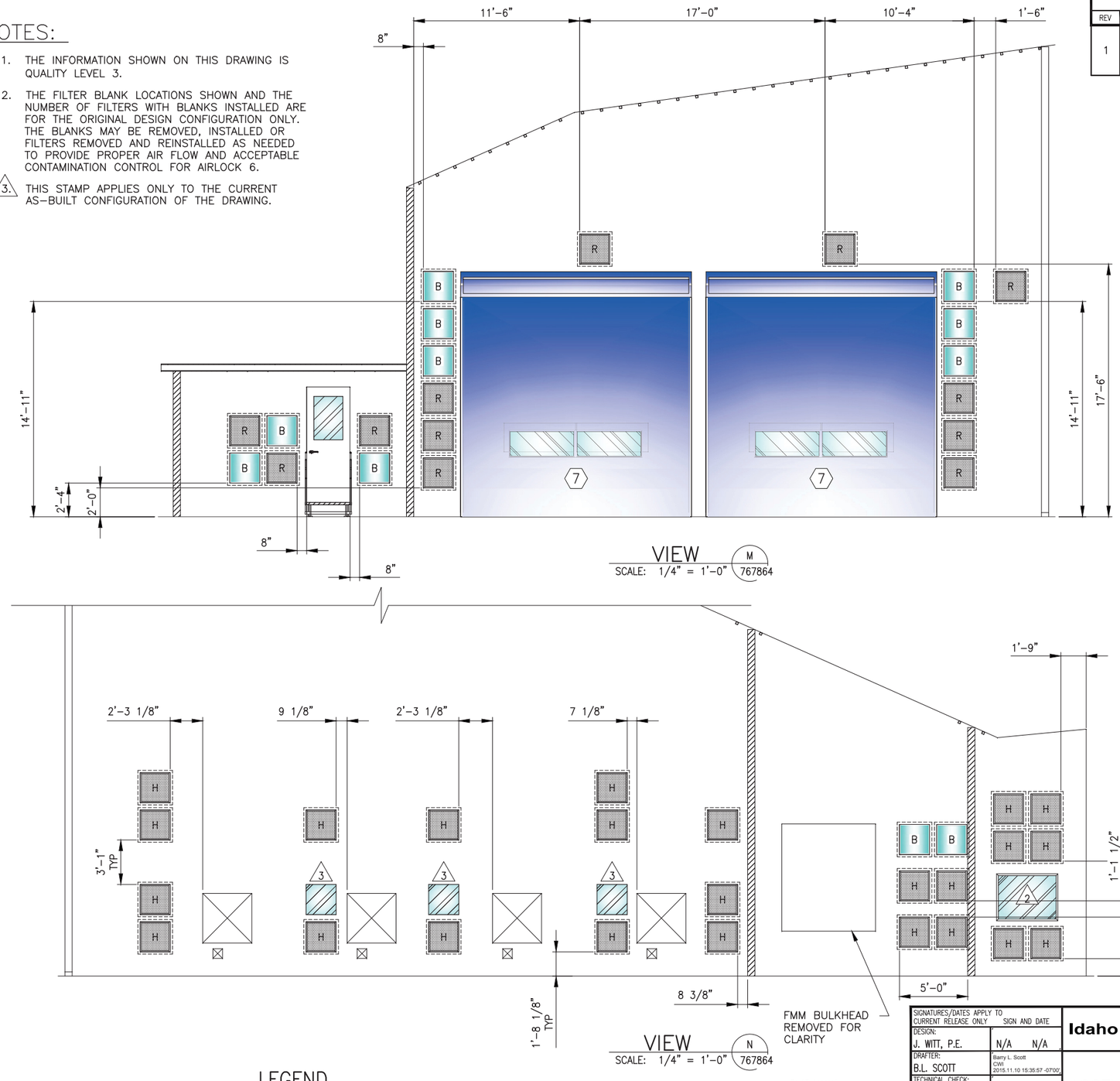
VIEW J 767864
SCALE: 1/4" = 1'-0"



VIEW K 767864
SCALE: 1/4" = 1'-0"



VIEW P 767864
SCALE: 1/4" = 1'-0"



VIEW M 767864
SCALE: 1/4" = 1'-0"

VIEW N 767864
SCALE: 1/4" = 1'-0"

LEGEND

H	HEPA FILTER
R	ROUGHING FILTER
B	BLANK

X-REF DRAWINGS

766281 – AL6

Paul D. Leonard
CWI
2015.11.12 15:29:42 -07'00'

PROFESSIONAL ENGINEER LICENSED 13530 STATE OF IDAHO PAUL D. LEONARD

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: J. WITT, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:35:57 -07'00'
TECHNICAL CHECK: P. LEONARD, P.E.	N/A N/A
ENG GROUP SUPERVISOR: N.K. ROGERS, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:44:45 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:29:42 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE
ACCELERATED RETRIEVAL PROJECT
RWMC WMF-1619 RE7/AL6
AIRLOCK 6
INTERIOR ELEVATIONS

SIZE	INDEX CODE NUMBER: AREA	TYPE	CI	DBG	DWG-	REV
D	098	1619	00	136	767870	1

SCALE: NOTED SHEET 1 OF 1

RW-1271

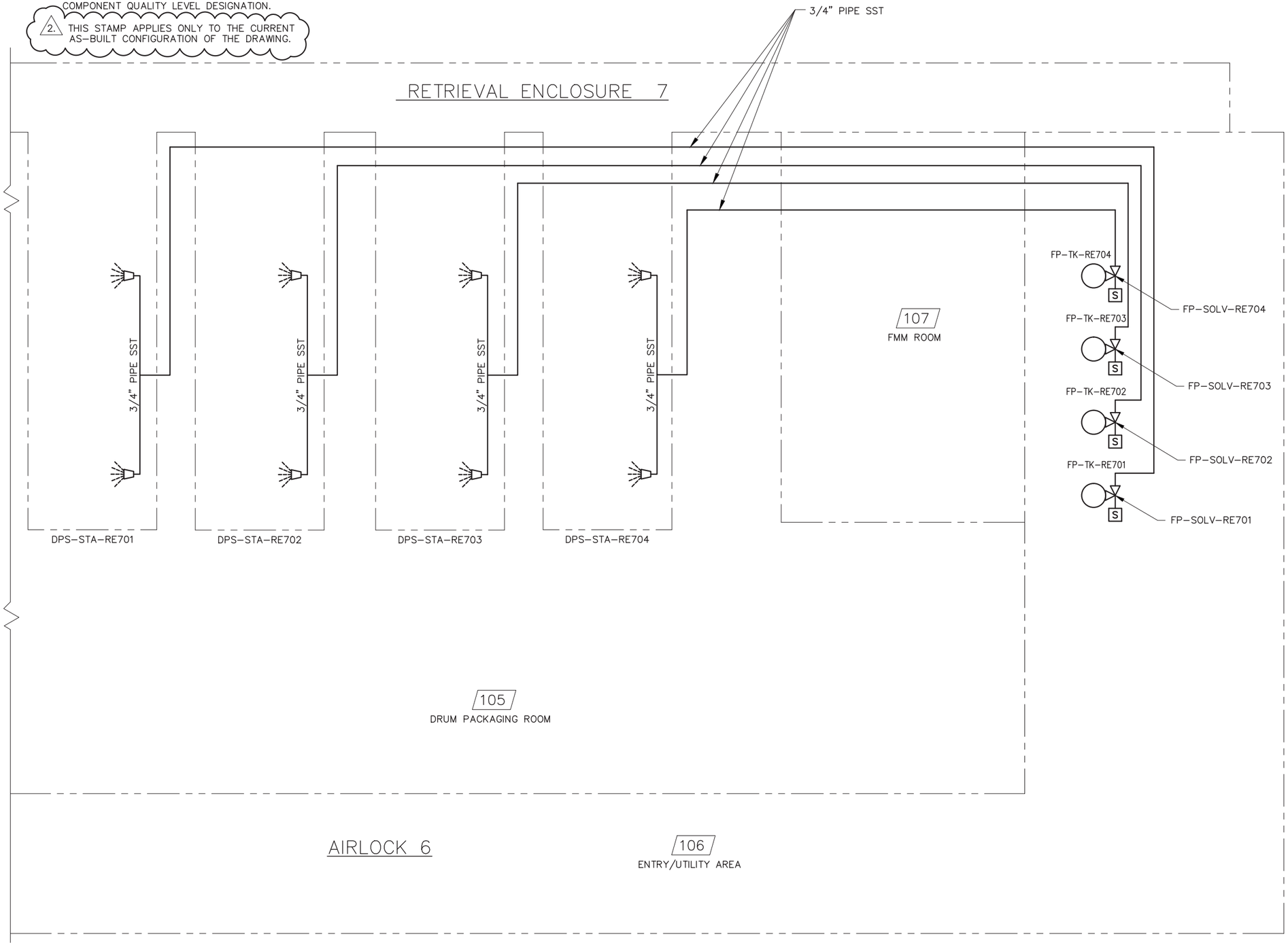
File: 767870-1.dwg
Path: Y:\RE-IT\RCRA\RCRA Drawings
Date: 11/02/15 - 12:03 PM
Layout Name: A-10
ID: BXS

FMT-D1-REV 5.2

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, CHANGED INDEX CODE CLASS, AS-BUILT AS OF 10/5/2011 SEE DRF 334556
2	ADDED P.E. STAMP & NOTE 2, AS-BUILT AS OF 10-14-2015, SEE DRF-347017

NOTE:

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.



DRY CHEMICAL SYSTEM P & ID

LEGEND

FP	FIRE PROTECTION
TK	TANK
S	CHEMICAL STORAGE CYLINDER WITH INTEGRAL SOLENOID VALVE
	DISCHARGE NOZZLE

Stephen Thorne
Hukari-Ascendent
2015.11.12 -07'00'
PROFESSIONAL ENGINEER REGISTERED 9302 STATE OF IDAHO STEPHEN D. THORNE
2

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: C. SUTTON, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:36:25 -07'00'
TECHNICAL CHECK: D. CLARK, P.E.	N/A N/A
ENG GROUP SUPERVISOR: R. EASTMAN, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:45:08 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:30:20 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M•WG IDAHO, LLC

PHASE VII OF THE
ACCELERATED RETRIEVAL PROJECT
RWMC WMF-1619 RE7/AL6
DRUM PACKAGING STATION
DRY CHEMICAL P & ID

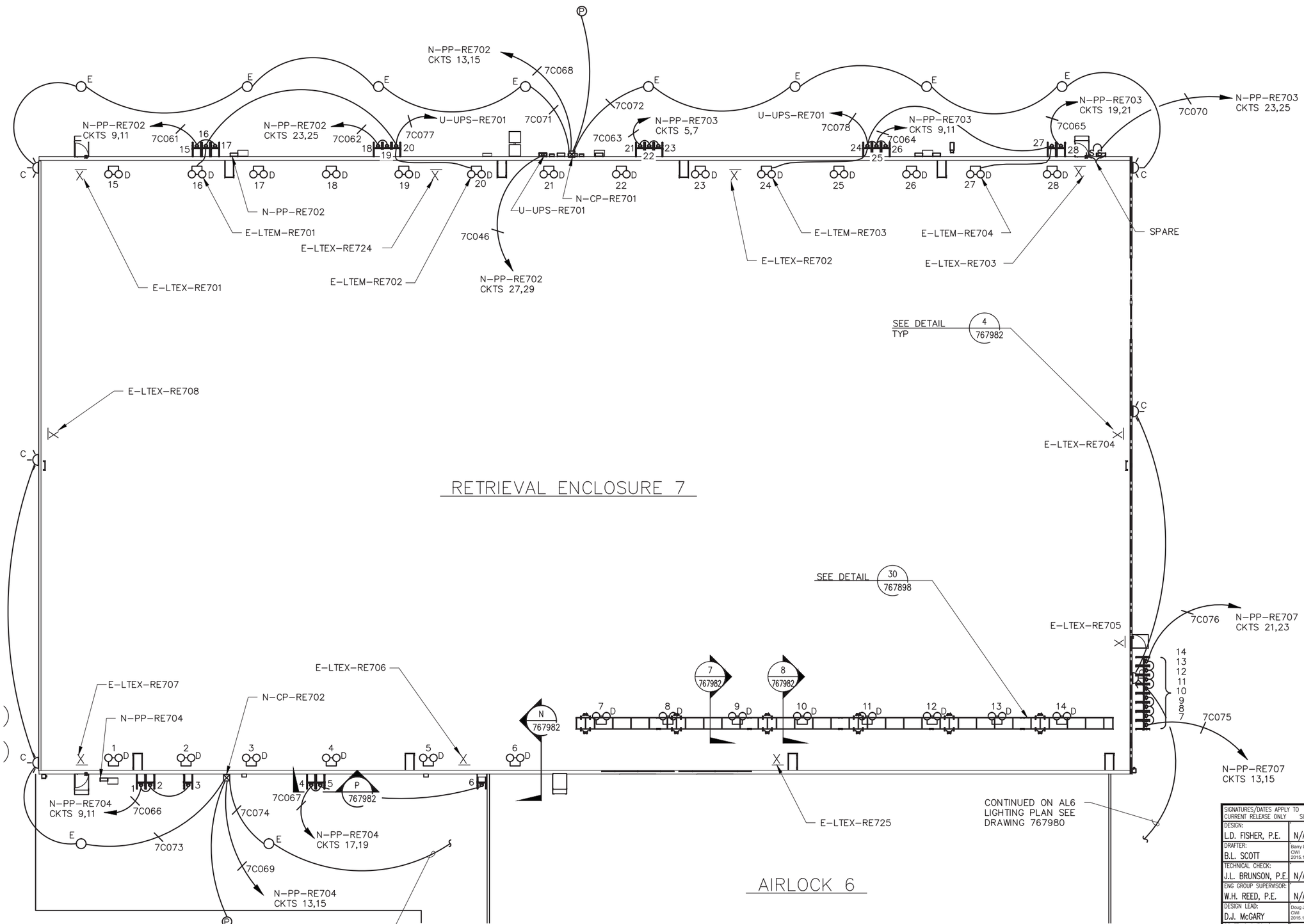
SIZE	INDEX CODE NUMBER				DWG-	REV
	AREA	TYPE	CL	ORIG		
D	098	1619	24	136	767935	2

SCALE: NONE SHEET 1 OF 1

File: 767935-2.dwg
Path: Y:\RE-7\RCRA\RCRA Drawings
Date: 11/10/15 - 2:44 PM Layout Name: FP-1 ID: BXS

FMT-D1-REV 5.2

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, AS-BUILT AS OF 11/23/2011 SEE DRF-335037
2	INCORPORATED FDC-8314 AS-BUILT AS OF 10/25/2012 SEE DRF-337757
3	ADDED P.E. STAMP & NOTE 5, AS-BUILT AS OF 10-14-2015, SEE DRF-347017



RE7 LIGHTING PLAN

SCALE 3/32" = 1'-0"

NOTES:

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. SEE DRAWING 767982 FOR LIGHTING DETAILS.
3. SEE DRAWINGS 767986, 767987 & 767988 FOR CABLE & CONDUIT SCHEDULE.
4. SEE DRAWING 7677981 FOR LUMINAIRE SCHEDULE.
5. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

LEGEND:

- LIGHTING CONTROL PANEL
- UNINTERRUPTIBLE POWER SUPPLY
- LIGHTS/RACK
- BALLAST, LIGHTING, REMOTE
- PHOTO-EYE SENSOR (PES)
- EXIT SIGN PHOTO LUMINESCENT
- OVERHEAD FIXTURE
- EXTERIOR WALL FIXTURE
- OUTDOOR RATED LIGHT SWITCH (208V)

Larry Fisher
CWI
2015.11.12 15:29:55 -07'00'
PROFESSIONAL ENGINEER REGISTERED 6876 STATE OF IDAHO LARRY D. FISHER
5

X-REF DRAWINGS

766281 – AL6
766288 – RE7
766290 – RE7 ELECTRICAL

SIGNATURES/DATES APPLY TO CURRENT RELEASE ONLY	SIGN AND DATE
DESIGN: L.D. FISHER, P.E.	N/A N/A
DRAFTER: B.L. SCOTT	Barry L. Scott CWI 2015.11.10 15:36:51 -07'00'
TECHNICAL CHECK: J.L. BRUNSON, P.E.	N/A N/A
ENG GROUP SUPERVISOR: W.H. REED, P.E.	N/A N/A
DESIGN LEAD: D.J. McGARY	Doug J. McGary CWI 2015.11.11 16:46:08 -07'00'
DRAFTING CHECK/ EFFECTIVE DATE: K.J. KELLER	Kris Keller CWI 2015.11.12 15:29:55 -07'00'
PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M+WG IDAHO, LLC

PHASE VII OF THE
ACCELERATED RETRIEVAL PROJECT
RWMC WMF-1619 RE7/AL6
RETRIEVAL ENCLOSURE 7
LIGHTING PLAN

SIZE	INDEX CODE NUMBER (AREA / TYPE / CL / ORIG)	DWG-	REV
D	098 / 1619 / 10 / 136	767979	3

SCALE: NOTED — SHEET 1 OF 1

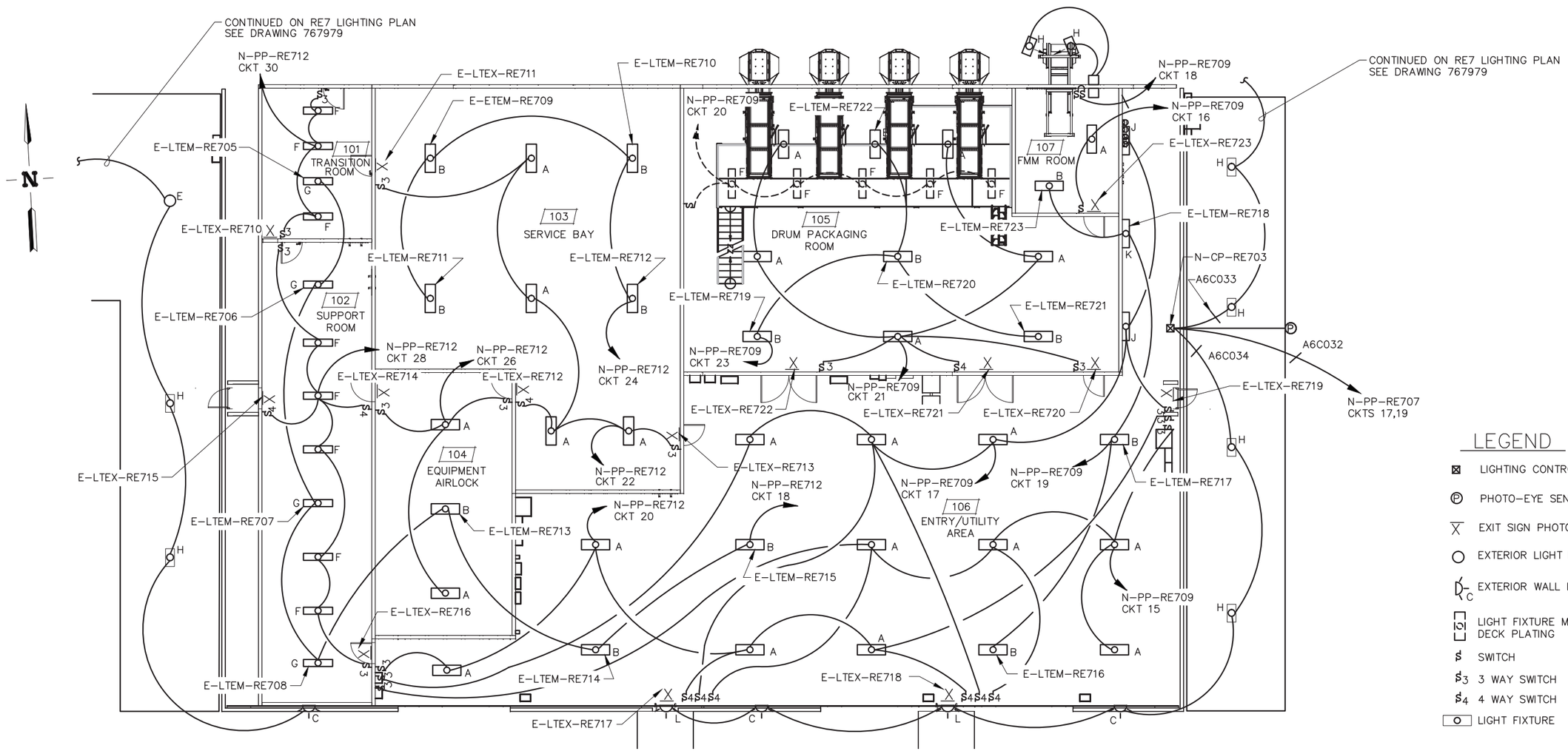
File: 767979-3.dwg
Path: I:\RE-7\RCRA\RCRA Drawings
Date: 11/03/15 – 11:33 AM | Layout Name: A-2
ID: BXS

FMT-D1-REV 5.2

REVISIONS	
REV	DESCRIPTION
1	CHANGED DWG TITLE, AS-BUILT AS OF 11/23/2011 SEE DRF-335037
2	AS-BUILT AS OF 12-13-2011, SEE DRF-335182
3	ADDED P.E. STAMP & NOTE 4, AS-BUILT AS OF 10-14-2015 SEE DRF-347017

NOTES:

1. SEE RWMC CONFIGURATION MANAGEMENT DATABASE FOR COMPONENT QUALITY LEVEL DESIGNATION.
2. SEE DRAWING 767988 FOR CABLE SCHEDULE.
3. SEE DRAWING 767981 FOR LUMINAIRE SCHEDULE.
4. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.



LEGEND

- LIGHTING CONTROL PANEL
- PHOTO-EYE SENSOR (PES)
- EXIT SIGN PHOTO LUMINESCENT
- EXTERIOR LIGHT FIXTURE
- EXTERIOR WALL LIGHT FIXTURE
- LIGHT FIXTURE MOUNTED UNDER DPS DECK PLATING
- SWITCH
- 3 WAY SWITCH
- 4 WAY SWITCH
- LIGHT FIXTURE

AL6 LIGHTING PLAN

SCALE: 1/8" = 1'-0"

X-REF DRAWINGS

766281 – AL6
766283 – AL6 ELECTRICAL
766285 – AL6 DPS

Larry Fisher
CWI
2015.11.12 15:37:57 -07'00'
PROFESSIONAL ENGINEER REGISTERED 6878 STATE OF IDAHO LARRY D. FISHER
4

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ENG GROUP SUPERVISOR: W.H. REED, P.E.	N/A N/A
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PROJECT NUMBER: 30916	
DRF NUMBER: 329428	

Idaho Cleanup Project CH2M HILL BOOZ ALLEN HAMILTON

PHASE VII OF THE
ACCELERATED RETRIEVAL PROJECT
RWMC WMF-1619 RE7/AL6
AIRLOCK 6
LIGHTING PLAN

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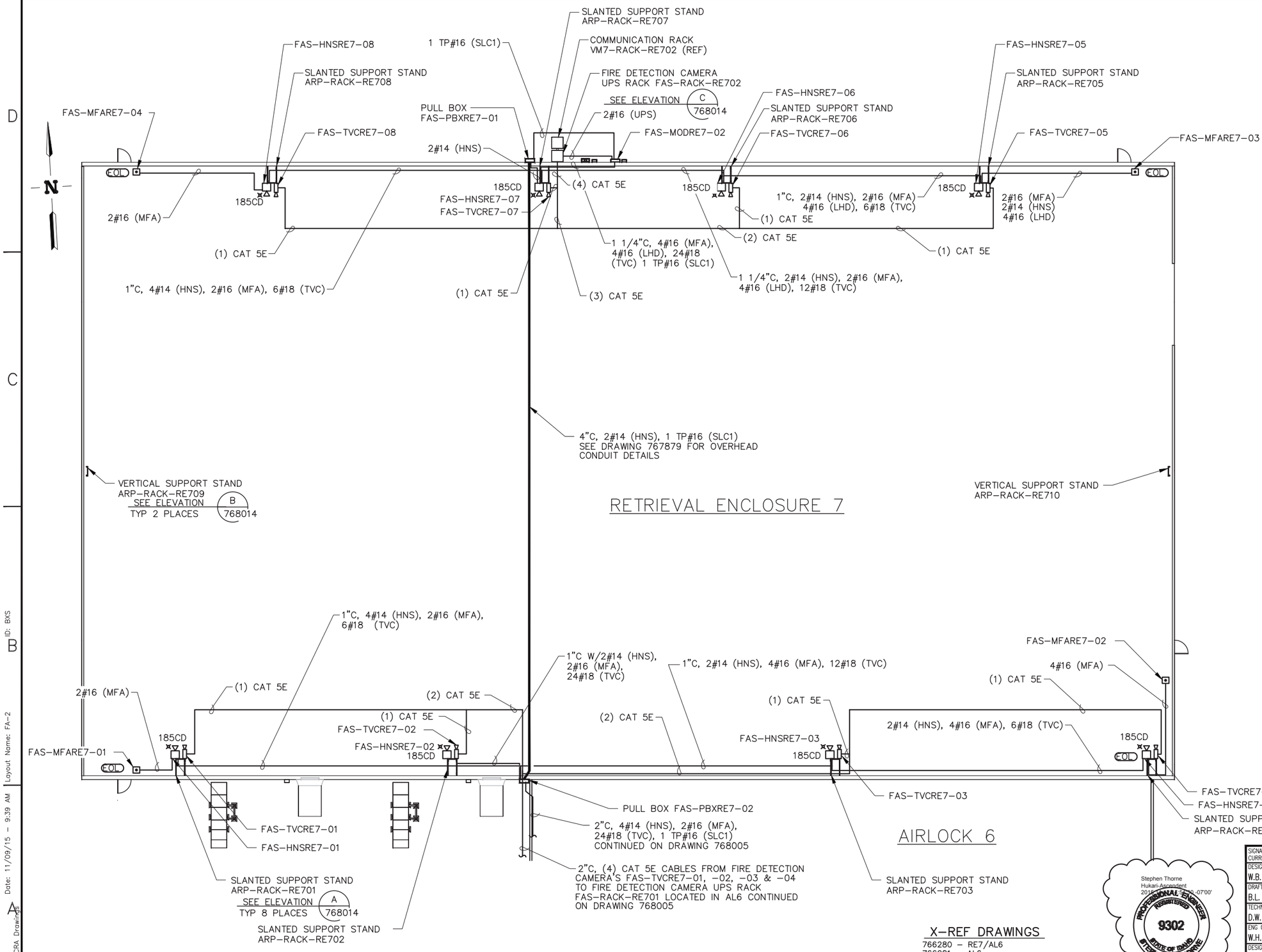

RE7 FIRE ALARM PLAN

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2. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

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- HORN/STROBE
- EOL END OF LINE RESISTOR
- SMOKE/FIRE DETECTION CAMERA WITH HOUSING

X-REF DRAWINGS

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766284 – AL6 PIPING
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766289 – RE7 HVAC
766290 – RE7 ELECTRICAL

Stephen Thorne
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DRF NUMBER: 329428	

Idaho Cleanup Project CH2M+WG IDAHO, LLC

PHASE VII OF THE
ACCELERATED RETRIEVAL PROJECT
RWMC WMF-1619 RE7/AL6
RE7
FIRE ALARM PLAN

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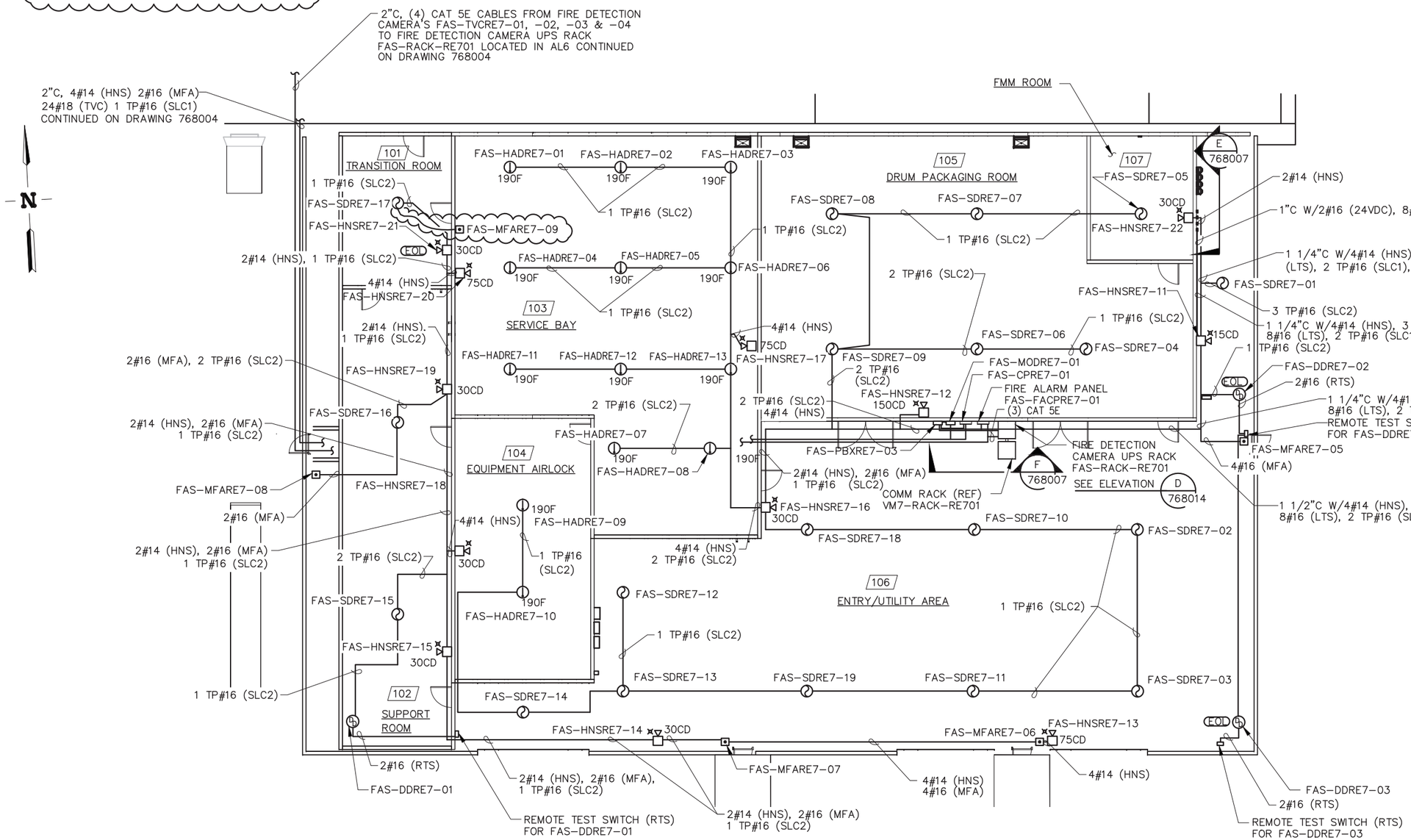

AIRLOCK 6 FIRE ALARM PLAN

SCALE: 1/8" = 1'-0"

LEGEND

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- SMOKE DETECTOR
- 190F — HEAT DETECTOR
- DUCT SMOKE DETECTOR
- FACP — FIRE ALARM PANEL

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X-REF DRAWINGS

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DRF NUMBER: 329428	

Idaho Cleanup Project CH2M HILL WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 FIRE ALARM PLAN

SIZE	INDEX CODE NUMBER				DWG-	REV
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NOTES:

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2. SEE DRAWING 768014 FOR SLANTED SUPPORT STAND AND VERTICAL SUPPORT STAND DETAILS.

3. THIS STAMP APPLIES ONLY TO THE CURRENT AS-BUILT CONFIGURATION OF THE DRAWING.

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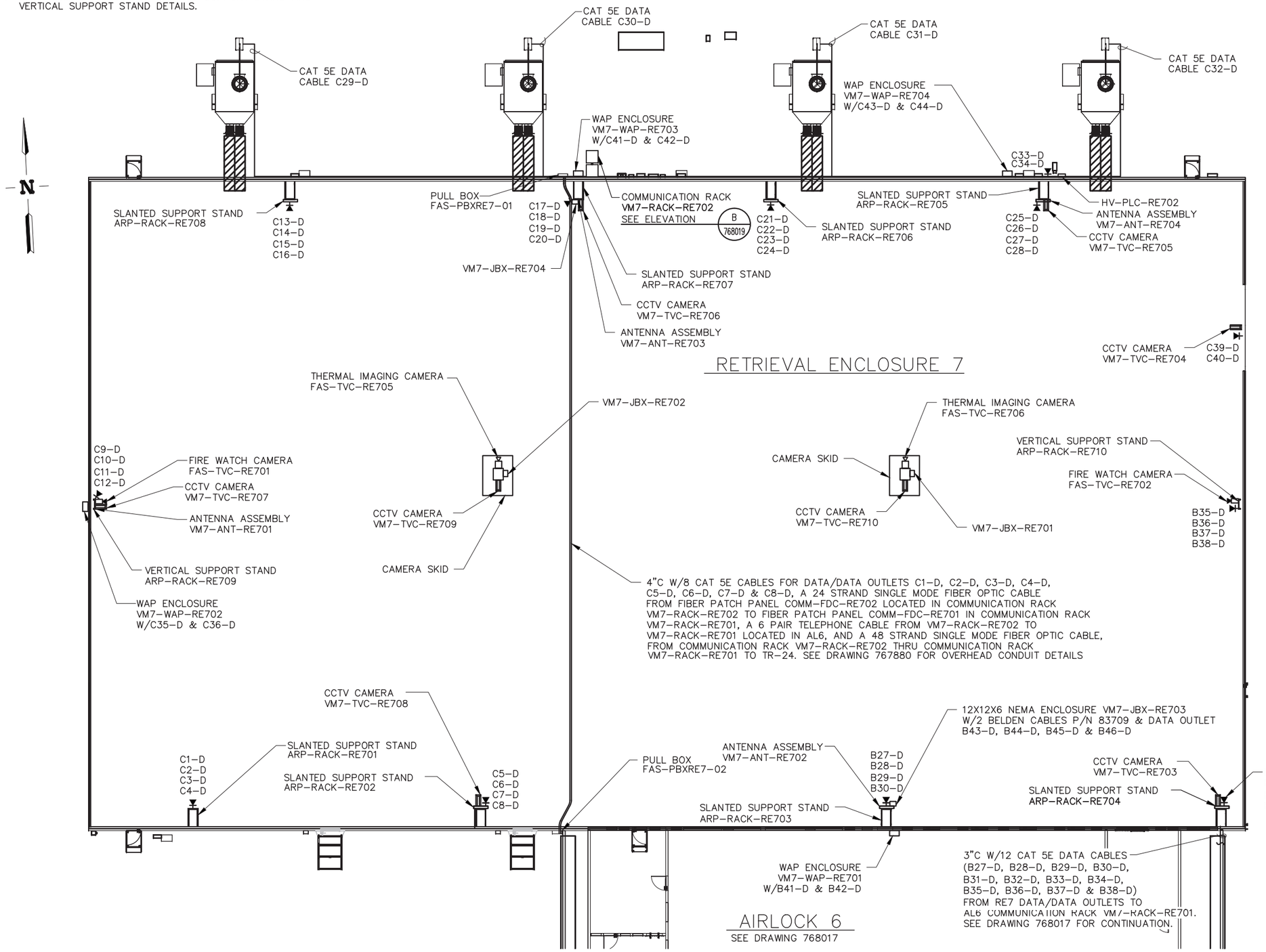

RE7 DATA/DATA PLAN

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DATA/DATA	C44-D

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766290 – RE7 ELECTRICAL

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PHASE VII OF THE
ACCELERATED RETRIEVAL PROJECT
RWMC WMF-1619 RE7/AL6
RETRIEVAL ENCLOSURE 7
DATA/DATA CCTV PLAN

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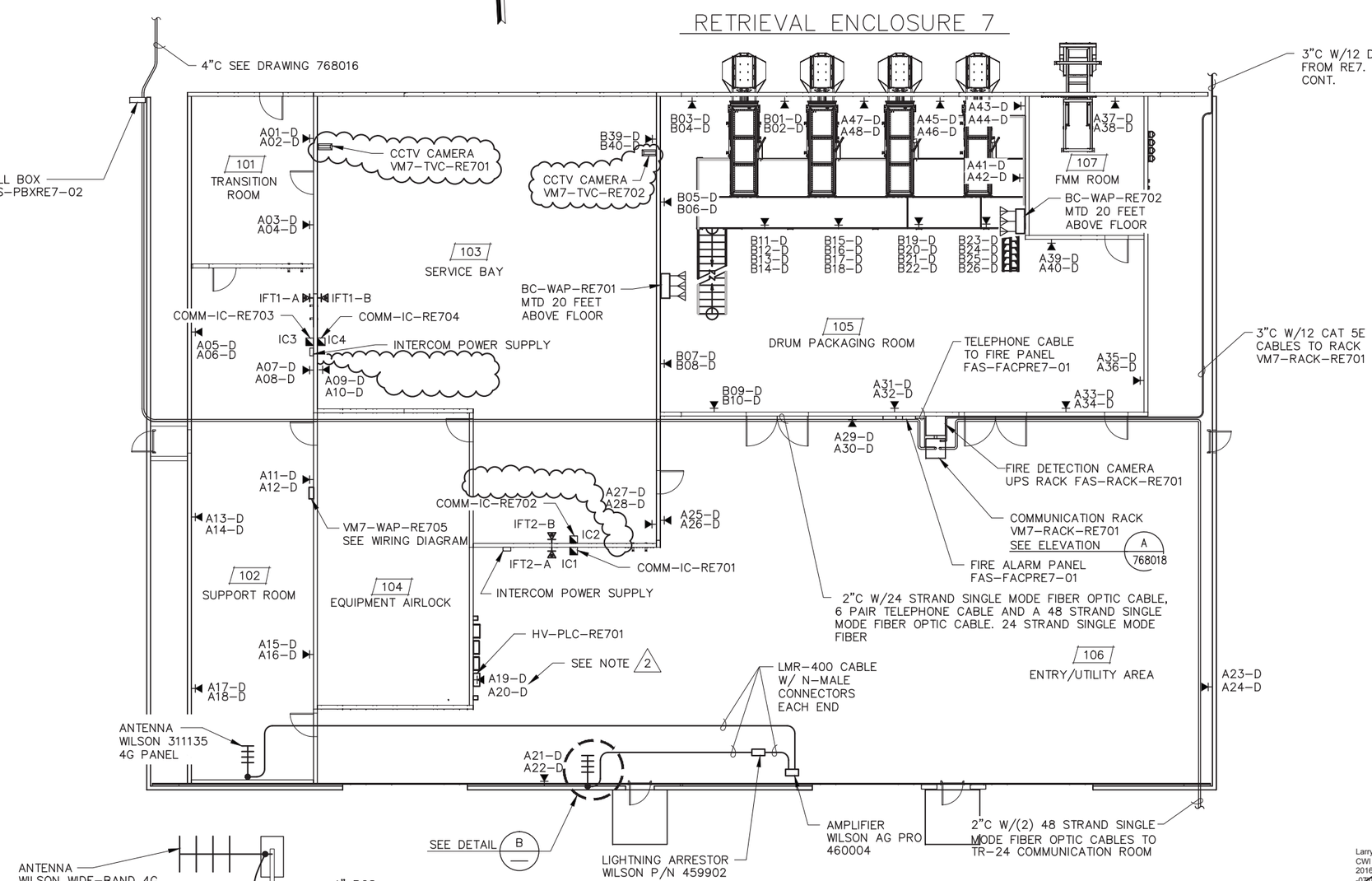

AIRLOCK 6 DATA/DATA PLAN

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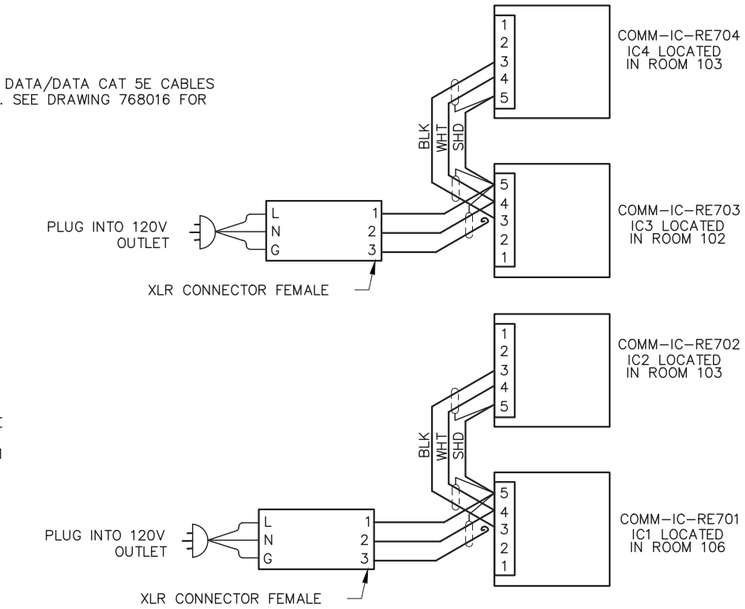

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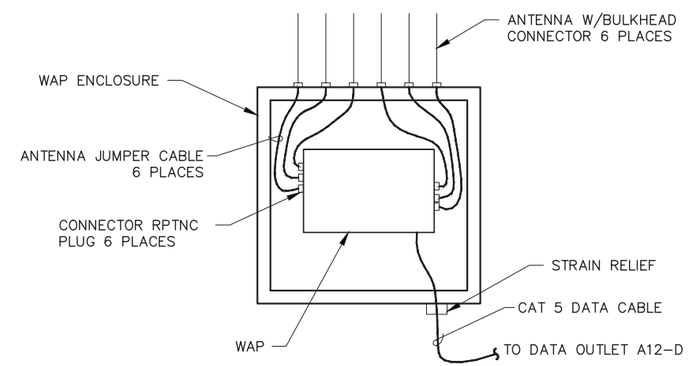
NTS



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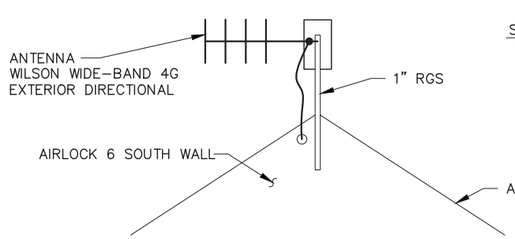

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LAST NO. USED

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X-REF DRAWINGS

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Idaho Cleanup Project CH2M+WG IDAHO, LLC

PHASE VII OF THE ACCELERATED RETRIEVAL PROJECT RWMC WMF-1619 RE7/AL6 AIRLOCK 6 DATA/DATA CCTV PLAN AND INTERCOM WIRING DIAGRAM

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APPENDIX 2

100-YEAR FLOODPLAIN AND 25-YEAR RUNOFF ANALYSES FOR THE RADIOACTIVE WASTE MANAGEMENT COMPLEX AREA AT THE IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY (INEEL/EXT-02-00093)

INEEL/EXT-02-00093

Revision 0
December 2001

100-Year Floodplain and 25-Year Runoff Analyses for the Radioactive Waste Management Complex Area at the Idaho National Engineering and Environmental Laboratory

T. Mitchell, P.E.
S. Mitchell
J. Humphrey, PhD
D. Kennedy
T. Funderburg

INEEL/EXT-02-00093
Revision 0

100-Year Floodplain and 25-Year Runoff Analyses for the Radioactive Waste Management Complex Area at the Idaho National Engineering and Environmental Laboratory

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J. Humphrey, PhD[1]
D. Kennedy[2]
T. Funderburg[2]

Published December 2001

1. Clear Creek Hydrology
2. North Wind Environmental, Inc.

Idaho National Engineering and Environmental Laboratory
Environmental Affairs
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Affairs
Under DOE Idaho Operations Office

ABSTRACT

This hydrologic study of the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering and Environmental Laboratory (INEEL) was conducted to identify the 100-year overland floodplain boundary for the major surface water channels at the site. The RWMC comprises the Subsurface Disposal Area (SDA), the Transuranic Storage Area (TSA) and the Administrative facilities supporting the RWMC. The Main Channel Flow System (MCFS) was constructed through the RWMC area to control storm water run-on to and runoff from the SDA, TSA and administrative areas. The MCFS has undergone several modifications throughout the history of this facility in order to meet changes in the building layouts, subsurface drainage systems, and the overall hydrologic conditions of the RWMC area. Previous studies identified areas where some buildings in the TSA perimeter may be within the limits of the 25- and 100- and year floodplains. Construction of new buildings, topography modifications, and replacement of one bridge on Adams Boulevard over the past several years have prompted the need to revise the floodplain mapping for the RWMC.

The study was conducted to evaluate the largest 25-year and 100-year flood flows through this facility. Summer, winter rain on snow, and winter rain on snow with frozen ground conditions were evaluated as a part of this study to identify the maximum flows anticipated for storms with these return intervals. Flood flows were generated using hydrologic models of the facility and incorporated into hydraulic models of the MCFS. Peak water surface profiles were used to develop a map with 100-year floodplain boundaries to represent conditions at the RWMC as of August 2001.

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ACRONYMS

AMC	antecedent moisture condition
amsl	above mean sea level
CFS	cubic feet per second
DDF	depth duration frequency
HEC-HMS	Hydrologic Engineering Center Hydrologic Management System
HEC-RAS	Hydrologic Engineering Center River Analysis System
INEEL	Idaho National Engineering and Environmental Laboratory
MCFS	Main Channel Flow Systems
NOAA	National Oceanographic and Atmospheric Administration
NRCS	National Resource Conservation Service
NWS	National Weather Service
RCRA	Resource Conservation and Recovery Act
RWMC	Radioactive Waste Management Complex
SCS	Soil Conservation Service
SDA	Subsurface Disposal Area
SWMM	Storm Water Management Model
TRU	transuranic
TSA	Temporary Storage Area
USCOE	United States Corps of Engineers
USGS	United States Geological Survey

100-Year Floodplain and 25-Year Runoff Analyses for the Radioactive Waste Management Complex Area at the Idaho National Engineering and Environmental Laboratory

1. INTRODUCTION

1.1 General

The Radioactive Waste Management Complex (RWMC), located in the southwestern quadrant of the Idaho National Engineering and Environmental Laboratory (INEEL), encompasses a total of 174 acres and is divided into three separate areas by function: the Subsurface Disposal Area (SDA), the Transuranic Storage Area (TSA), and the Administrative Area (see Figure 1 RWMC area map and Figure 2 RWMC plan view). The original facility covered 13 acres and was used for shallow burial of solid radioactive waste. In 1958, the burial ground was expanded to 88 acres. Relocation of the security fence in 1988 to the outside of the dike surrounding the burial ground established the current 95.9-acre size of the SDA. The TSA was added to the RWMC in 1970. Located adjacent to the east side of the SDA, TSA encompasses 56.1 acres and is used for retrievable storage of transuranic (TRU) waste pending characterization, certification, and shipment out of the state to a permanent disposal repository. The 22-acre Administrative area maintains administrative offices, maintenance buildings, equipment storage, and miscellaneous support facilities.

Though the RWMC is located within a natural topographic depression, no permanent surface water features are located near the site. However, the local depression tends to hold precipitation and to collect additional runoff from the surrounding slopes. Surface water within the surrounding area eventually infiltrates the soils or evaporates before reaching the Big Lost River (Keck 1998).

Historically, the SDA has been flooded by local runoff at least three times because of a combination of snowmelt, rain and warm winds. The Main Channel Flow System (MCFS), consisting of dikes and drainage channels, was constructed around the perimeter of the SDA in response to the first flooding event, which occurred in 1962. Following a second flood in 1969, the height of the dike was increased and the drainage channel around the perimeter was enlarged. The dike was breached by accumulated snowmelt in 1982, resulting in a third inundation of open pits within the SDA. Significant flood-control improvements included increasing the height and breadth of the dike, deepening and widening the drainage channel, and contouring to eliminate the formation of surface ponds and route runoff to the drainage channel. Localized runoff from surrounding slopes is now prevented from entering the SDA by the perimeter drainage channel and dike surrounding the facility. Runoff from within the SDA is directed to the perimeter drainage channel, thus exiting the disposal area.

The Big Lost River, 2-mi north of the RWMC, is at an elevation 30-ft to 40-ft higher than the SDA (DOE-ID, 1998). However, the Big Lost River poses no flood threat to the RWMC (DOE-ID, 1998). The Big Lost River flows northeast, away from the RWMC, to its termination in the playas. A detailed flood-routing analysis of a hypothetical failure of Mackay Dam resulting from hydrologic and seismic failure shows that the RWMC would not be inundated by the severe flooding caused by the failure of the dam (Koslow and Van Haaften 1986). Big Lost River flows have not entered the RWMC since operations began in 1952. However, evidence indicates alluvial deposits in the RWMC area were possibly deposited during the Pleistocene period. A mineralogical correlation of surficial sediment from

area drainages with sedimentary interbeds at the RWMC suggests that the present day drainage patterns of the streams may be similar to historical patterns (Bartholomay 1990).

1.2 Objective

The primary objective of this project is to determine the magnitude and extent of the hypothetical 100-year flood event within the RWMC drainage area and develop a floodplain map from the hypothetical storm event as required by state and federal regulations to determine whether RWMC facilities are constructed in the 100-year floodplain. The secondary objective is to ensure that the facilities storm drain system will pass, at a minimum, the 25-year 24-hour peak storm flow for the TSA.

1.3 Previous Investigations

The potential for flooding in the Big Lost River and in the RWMC watershed has been evaluated through several studies performed at the INEEL. Specific aspects of these studies that are relevant to the current study are discussed below and in subsequent sections of this report.

Tullis and Koslow (1983) characterized Big Lost River floods with recurrence intervals greater than 25 years by a statistical analysis of short-term historical records and through the study of slack-water deposits. The United States Geological Survey (USGS) (Berenbrock and Kjelstrom, 1998) evaluated flood potential on the Big Lost River by applying a one-dimensional hydraulic model to calculate water-surface elevations and estimating the areas of inundation for the 100-year peak flow. Ostenaa, et al. (1999) performed a paleoflood study of the Big Lost River that included estimates of paleohydrologic bounds, hydraulic modeling, and development of Bayesian flood-frequency statistics.

Koslow and Van Haaften (1986) utilized the National Weather Service (NWS) DAMBRK model to simulate four different hypothetical Mackay Dam failure scenarios. One of these scenarios consisted of a hydraulic (piping) failure of the dam combined with Big Lost River runoff from the 100-year recurrence interval flood and subsequent hypothetical failure of Mackay Dam. In this modeled flood scenario, the INEEL Diversion Dam was overtopped by one foot of water at an elevation of 5066 ft msl. The magnitude of the combined probability of the 100-year recurrence interval flood with Mackay Dam failure was not specified in this report, but by definition is less than the probability of the 100-year runoff event alone. Likewise, the probability of the hydrologic events discussed in the current report with the simultaneous occurrence of a hypothetical Mackay Dam failure is much less than 0.01. Analyses of hydrologic events with probabilities less than 0.01 (recurrence intervals greater than 100-years) were considered beyond the scope of this report. Appendix A of the Koslow and Van Haaften (1986) report included a local basin snowmelt study that indicated a low potential for flooding from heavy rains and snowmelt at the facilities.

Dames and Moore (1993 and 1996) performed hydrologic studies of the RWMC watershed area utilizing the available topographic mapping data that represented current surface conditions at the time. The hydrologic analyses performed for the 1993 report included development of 100-, 500- 1000-year, ½ PMF, and PMF hydrographs for sub-basins contributing surface runoff to the main channel flow system (MCFS) of the RWMC. The scope of the 1996 study was specific to evaluating runoff produced by the rain-only 500-year precipitation event.

Zukauskas, et al. (1992) evaluated the adequacy of the storm water drainage control systems at the RWMC in preventing flooding of the TSA resulting from 25- and 100-yr return interval, 24-hr duration, storm events. Taylor, et al. (1994) performed hydrologic analyses as part of their siting activities for new waste handling facilities at the INEEL.

Large-scale aquifer pumping and infiltration tests in the RWMC area by Wood and Norrell (1996) were performed in a constructed basin in which the top 4 ft of topsoil was removed for construction. This study resulted in infiltration flux values that ranged from 1.42×10^{-3} gpm/ft^2 to 2.35×10^{-3} gpm/ft^2 (0.14 in/hr to 0.23 in/hr, respectively). The time weighted average infiltration flux for this experiment was 1.99×10^{-3} gpm/ft^2 (0.19 in/hr).

The current study was performed to include recent precipitation and temperature data, and to address changes that have occurred in topography and facility structures since the previous studies were performed. Topographic data were collected in an aerial photogrammetry flight by Aero-Graphics of Salt Lake City, Utah on October 17, 2000. These data were used to develop the topographic maps that were used in this hydrologic analysis. This hydrologic study was performed pursuant to the surface water requirements relative to the RCRA Part B permit application requirements of 40 Code of Federal Regulations (CFR) Parts 260-281.

1.4 Acknowledgements

Appreciation is extended to Ken Beard, BBWI at the INEEL who provided horizontal and vertical control for this project by use of a Global Positioning System (GPS). Mr. Beard developed survey control targets in support of the aerial photogrammetric flight, surveyed channel cross-sections and provided survey data for hydrologic control structures.

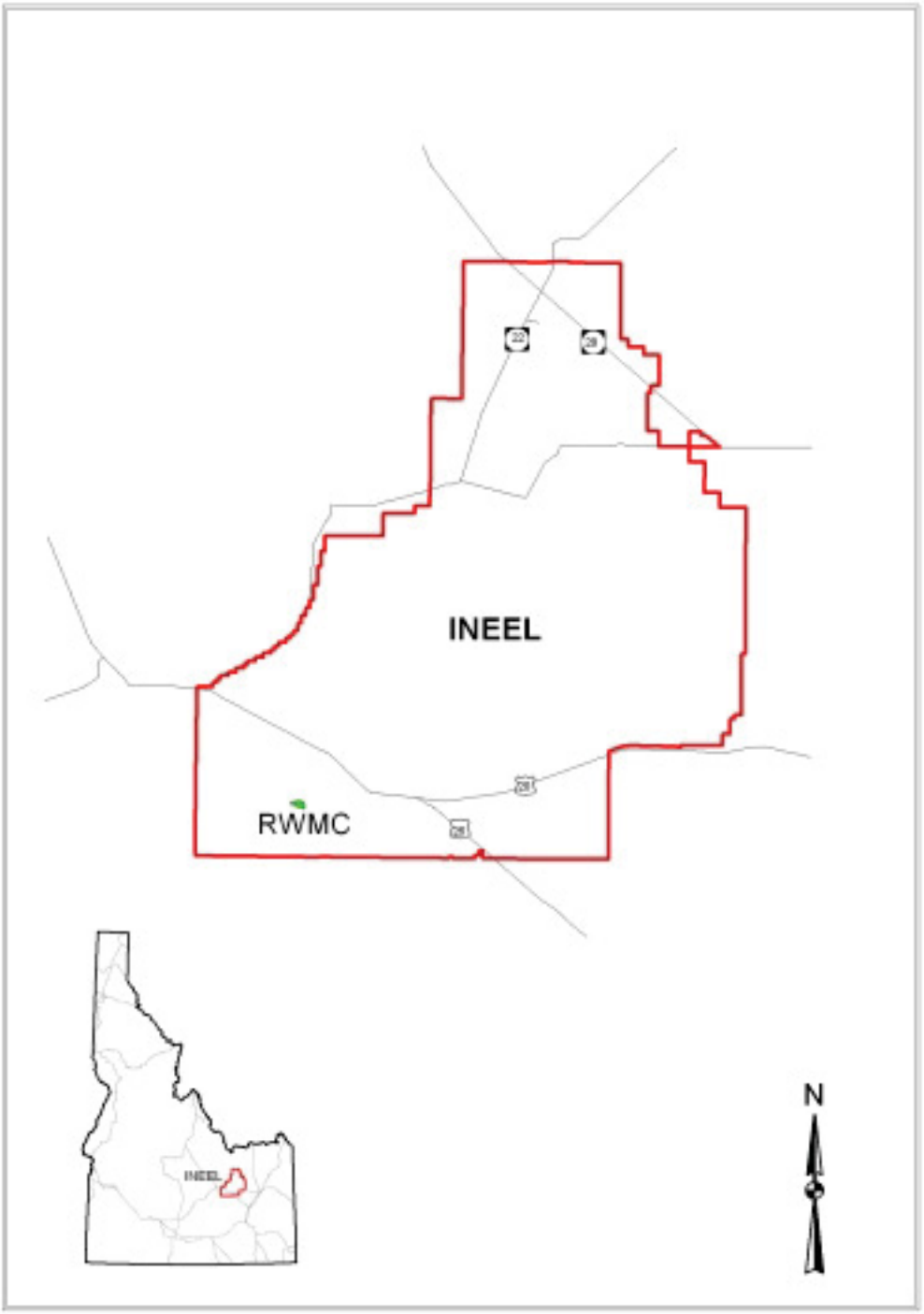
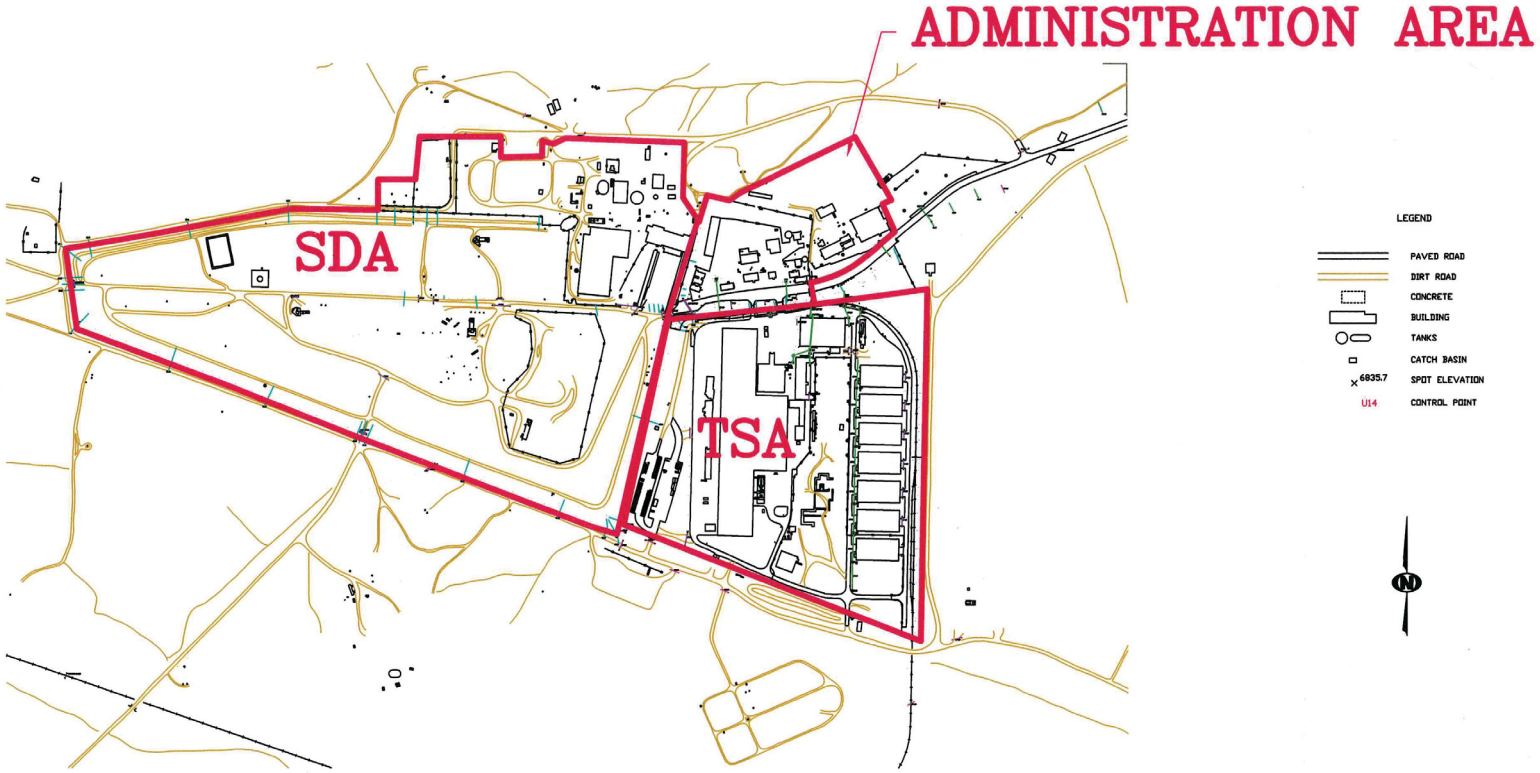


Figure 1. RWMC area map.

Figure 2. RWMC plan view.



SUBCONTRACT NO. 00000098, Rel. #3	INEEL
REQUESTER: Neil Hutten	Figure 2: RWMC Plan View
Report Eng: INEEL/EXT-02-00093	
DRAWN: Tim Funderburg	
PROJECT NO. NA	
SPEC CODE NA	SIZE / CAGE CODE / INDEX CODE NUMBER (AREA, TYPE, CL, ORIG) / Figure 2.dwg / REV 0
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	
EFFECTIVE DATE: 12-13-2001	SCALE: / Figure 2

2. REGIONAL HYDROLOGY

A detailed hydrologic analysis was developed specifically for the watershed area contributing to the MCFS to identify the peak 25- and 100-year flood flows and associated floodplains for the RWMC area. An investigation and review of available regional hydrology documentation was conducted in order to determine the appropriate design storm conditions and watershed parameters for use in hydrologic and hydraulic modeling of the site. Several sources of information were utilized to determine existing conditions during previous flooding events throughout southeastern Idaho and the surrounding area, which provides a measure of flood and regional hydrologic conditions for the RWMC facility at INEEL. This section of the report discusses the sources of information reviewed as a part of the evaluation of regional hydrologic conditions, which in turn was used to develop design storm parameters and precipitation statistics for the hydrologic modeling.

2.1 Climatology and Historic Flooding Data Sources

Several sources of information relating to climatology and historic flooding were utilized in determining regional hydrologic conditions for the INEEL and the RWMC facility. Regional hydrologic information is available for southeastern and central Idaho. A report prepared by Taylor (1994), references seven gauge sites and design storms. This report, however, is limited to information relating specifically to stream flows and storm water runoff for the INEEL and the RWMC. Data sources used in this hydrologic study were obtained from the National Weather Service for the area within and surrounding the INEEL. Data utilized for areas outside of the INEEL property were selected for hydrologic regimes with similar characteristics including southern Idaho, northern Utah, northern Nevada and southwestern Montana. Data sources utilized in this hydrologic investigation include the following:

- United States Geological Survey, Methods for Estimating Magnitude and Frequency of Floods in the Southwestern United States, Open File Report 93-419, 1994.
- National Weather Service, INEEL Winter Flood Events, Idaho Falls 46W Data (1952 – 2000).
- National Weather Service, Idaho Falls FAA, Idaho Falls Airport Gage data (1948 – 1952).
- National Weather Service, Idaho Falls 2ESE Gage Data (1952 – 1960)
- National Weather Service, Idaho Falls 16SE Gage Data (1960 – 1997)
- National Weather Service, Dubois Gage Data (1948 – 1997)
- National Weather Service, Twin Falls Gage Data (1978 – 1997)
- Eugene L. Peck and E. Arlo Richardson, An Analysis of the Causative Factors of the February 1962 Floods in Utah and Eastern Nevada, National Weather Service, Salt Lake City, Utah, 1962.
- United States Army Corps of Engineers, Humbolt River and Tributaries, Nevada, Design Memorandum No. 1, Sacramento District, 1975.
- Soil Conservation Service, National Engineering Handbook, 1972

- Dr. John H. Humphrey, Meteorological Analysis, Flood Control Master Plan, Washoe County, Nevada, 1994.

- CH2MHill, Inc., Silver Bow Creek Flood Modeling Study, 1989.

- United States Army Corps of Engineers (USCOE), Northwest Division, Snow Hydrology, 1972.

In addition to the data sources identified above, several reports and technical memoranda regarding the RWMC facility were reviewed to evaluate previous flooding events and hydrologic studies including:

- Dames and Moore, Flood Evaluation Study, Radioactive Waste Management Complex, Idaho National Engineering Laboratory, Idaho Falls, Idaho, 1993.

- K.N. Keck, 25-Year, 24-hour Storm Evaluation for the Transuranic Storage Area, Document No. INEEL/EXT-98-00472, 1998.

- Clinton O. Kingsford, PE and Karen N Keck, As-Built Condition of the Surface Water Drainage System at the SDA, Document No. INEL/EXT-97-00603, June 1997.

- J. Sagendorf, Meteorological Information for RWMC Flood Potential Studies, National Oceanic Atmospheric Administration, Environmental Research Laboratories, Air Resources Laboratory Field Research Division, Idaho Falls, Idaho, 1991.

- J. Sagendorf, Precipitation Frequency and Intensity at the Idaho National Engineering Laboratory, National Oceanic and Atmospheric Administration, Technical Memorandum ERL ARL-215, Air Resources Laboratory, Silver Spring, Maryland, 1996.

2.2 Historical Flood Events

There have been several significant flood events within southern Idaho, northern Utah and northern Nevada with documented information dating from the early 1900's through the present. Four events in particular have enough recorded information to estimate conditions experienced during winter rain and snowmelt storms with return periods ranging from 25 to 100 years. The four events occurred in February 1962, January 1969, February 1980 and February 1982. Of these events, the 1962 rain-on–snow conditions were estimated to represent a storm with a return period of 50 to 100 years (DOE-ID 1998). Climatological and general flooding information was obtained for all of these events and used to evaluate conditions anticipated during a 100-year return period storm. The data provides an approximate measure of the peak flow anticipated for the RWMC complex.

All of the observed flood events required an unusual set of climatological conditions including a wet fall season, very cold temperatures through December, January, and February with little or no snow cover, no thawing of the ground, and some accumulation of snow just prior to the flooding period. This set of conditions would result in a shallow snow cover underlain by concrete impermeable frost.

Based on the historic flooding information and according to limited United States Geological Survey (USGS) stream gage data in the area surrounding INEEL, regional hydrologic conditions indicate that peak flows of 30 to 60 cubic feet per second per square mile (cfs/mi^2) can be expected during a 100-year rain-on-snow event in watersheds similar in size to that of the RWMC watershed. Seven gauge sites identified at the INEEL indicated peak flows of 10 cfs per square mile to 76 cfs per square mile

(Taylor et. al, 1994). The regional flood flow information was used as an approximation of the 100-year flood model developed for the RWMC.

In addition to the peak flow estimations provided by the USGS documentation, limited information relating to runoff volumes was obtained from previous hydrologic studies. Sagendorf (1991) indicates that the 1962 flood event produced approximately 30 acre-ft of runoff in the SDA boundary. It should be noted that there was no perimeter ditch constructed around the SDA at the time, and the 30 acre-ft of runoff was generated in the watershed area contributing to the SDA (3.435 mi^2). Previous reports also indicate that 20 acre-ft of runoff flooded the SDA boundary in 1969, however, it is not known which portions of the watershed contributed to the flooding (a drainage ditch and dike had been constructed around the SDA subsequent to the 1962 event).

2.3 Summer and Winter Design Storm Conditions

In order to evaluate the largest 100-year flood event for the RWMC facility, three separate conditions were considered. Design storms were developed separately for summer cloudburst storms and for winter rain-on-snow and frozen ground events. Separating the different conditions provides more accurate determination of precipitation depths for various return period storms and better representation of hydrologic conditions during the summer and winter seasons. Design storm parameters for the summer and winter conditions are discussed in the following paragraphs.

2.3.1 Design Storm Precipitation

Precipitation depths for summer and winter storms were determined primarily from gage data collected from the City of Idaho Falls and INEEL. Specific gage sites included the following:

- Idaho Falls 46W, National Weather Service (NWS) data (located at the CFA, INEEL).
- Idaho Falls, FAA, National Weather Service data (located at the airport in Idaho Falls).

Gage data from these sources is available for approximately 50 years, providing sufficient data to conduct a statistical analysis for precipitation depths. Depth-duration-frequency (DDF) curves were developed for this study from the gage data obtained from the NWS using standard procedures of ranking maximum observed precipitation depths and plotting data on a log normal probability distribution. Power curve functions were developed for evaluating precipitation depth-duration-frequency statistics for the RWMC facility. The power curve function equation is shown below.

$$Depth = a * t^b$$

where:

Depth	=	design storm precipitation depth (in.)
a	=	statistical parameter based on ranked gage data
b	=	statistical parameter based on ranked gage data
t	=	time (minutes).

Using the above equation, precipitation depths were determined for 5-, 15-minute and 1-, 2-, 3-, 6-, 12- and 24-hour storm events with return periods ranging from 2 to 100 years. It should be noted that the

precipitation depths developed for design storms used in this hydrologic analysis were prepared independently from previous studies and analyses, including those prepared by J. Sagendorf (1991 and 1996), Keck (1998) and Dames and Moore (1993). Most significantly, the DDF statistics developed for this hydrologic analysis compare closely with those prepared by J. Sagendorf in 1996. Slight differences can be identified in precipitation depths for each design storm and return frequency from specific data periods used in developing the statistics, differences in interpretation of best-fit curves and lines, and engineering judgment.

Summer DDF curves were developed from gage data between the months of May through September. Summer precipitation depths (in.) are shown in Table 2-1.

Table 2-1. Precipitation depths (in.) for summer design storms.

Summer Cloudburst Depth Duration Frequency D=a*t^b										
Recurrence	a	b	5-min	15-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
2-year	0.095	0.305	0.155	0.217	0.331	0.409	0.463	0.572	0.707	0.873
5-year	0.154	0.282	0.242	0.331	0.489	0.594	0.666	0.810	0.985	1.197
10-year	0.199	0.269	0.307	0.412	0.599	0.721	0.804	0.969	1.168	1.408
25-year	0.262	0.257	0.396	0.525	0.750	0.897	0.995	1.189	1.421	1.698
50-year	0.302	0.253	0.454	0.599	0.851	1.014	1.124	1.339	1.596	1.901
100-year	0.359	0.243	0.531	0.693	0.971	1.149	1.268	1.501	1.776	2.102

Winter DDF curves were developed using precipitation gage data over the period of record during the months from November through March, when wet soil conditions will occur. Winter precipitation depths (in.) are shown in Table 2-2.

Table 2-2. Precipitation depths (in.) for winter design storms.

Winter Rainfall Depth Duration Frequency D=a*t^b										
Recurrence	a	b	5-min	15-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
2-year	0.015	0.506	0.034	0.059	0.119	0.169	0.208	0.295	0.419	0.595
5-year	0.026	0.469	0.055	0.093	0.177	0.246	0.297	0.411	0.569	0.787
10-year	0.035	0.447	0.072	0.117	0.218	0.297	0.357	0.486	0.663	0.903
25-year	0.047	0.427	0.093	0.149	0.270	0.363	0.432	0.580	0.780	1.049
50-year	0.058	0.413	0.113	0.177	0.315	0.419	0.495	0.659	0.878	1.169
100-year	0.071	0.397	0.135	0.208	0.361	0.475	0.558	0.735	0.967	1.274

Winter rain on frozen ground DDF curves were developed using precipitation gage data over the period of record during the months of January and February, when frozen ground conditions will occur. Winter rain on frozen ground precipitation depths (in.) are shown in Table 2-3.

Table 2-3. Precipitation depths (in.) for winter rain on frozen ground design storms.

Winter Rain on Frozen Ground Depth Duration Frequency D=a*t^b										
Recurrence	a	b	5-min	15-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
2-year	0.011	0.506	0.024	0.042	0.084	0.119	0.147	0.208	0.296	0.420
5-year	0.018	0.469	0.039	0.065	0.125	0.172	0.209	0.289	0.400	0.553
10-year	0.025	0.447	0.051	0.083	0.154	0.210	0.252	0.343	0.467	0.637
25-year	0.031	0.433	0.066	0.106	0.191	0.257	0.305	0.411	0.552	0.742
50-year	0.033	0.427	0.079	0.124	0.221	0.294	0.347	0.462	0.615	0.819
100-year	0.041	0.413	0.094	0.145	0.252	0.332	0.390	0.513	0.675	0.889

It should be noted that the data and procedures used in developing the DDF curves for the various seasonal events are standard meteorological methods used by the NWS and National Oceanographic and Atmospheric Administration (NOAA). Differences in the DDF statistics prepared for this study can be identified in precipitation depths associated with the various storm durations and return periods when compared to other DDF curves prepared for INEEL. The differences are the result of the specific seasonal periods used to develop the curves and judgment in best-fit curves for statistical representation of precipitation data.

In preparing the three different sets of DDF curves for this study, data were separated according to seasonal variations when summer, winter and winter frozen ground conditions exist. This separation of the data often results in lower precipitation depths and intensities used for modeling during the winter season as compared to summer and to the year as a whole. Winter storms typically have lower depths and rainfall intensity than other times of the year and separation of this data from the entire period of record provides a more accurate determination of DDF statistics when evaluating specific seasonal storm events.

2.3.2 Snowmelt

Snowmelt was incorporated into hydrologic models for the RWMC flood study in order to evaluate winter storm events. Data for snow depths and water content was developed from the winter precipitation statistics, and previous rain-on-snow events observed throughout the region surrounding INEEL. Several assumptions were made regarding contributing factors to the snowmelt including the following:

- Maximum daily temperature is 46° F and average daily temperature is 42° F.
- Wind speed of 20 miles per hour
- Constant snowmelt during the 24-hour storm period
- Little delay for snowmelt contribution to runoff.

Using equations presented in the USCOE snow hydrology manual, with a mean temperature of 42° F and wind speed of 20 mph, snowmelt was calculated as 0.06 in/hr. This constant snowmelt was added to the design storm precipitation for use in hydrologic modeling of the winter rain-on-snow and frozen ground event. This constant snowmelt adds 1.44 in. of water to the rainfall event throughout the duration of the 25- and 100-year, 24-hour winter storms.

2.3.3 Frozen Ground and Concrete Impermeable Frost

Frozen ground and concrete impermeable frost increase the runoff volume and associated peak flows during winter storms by limiting the infiltration capacity of the soil, and in the case of concrete impermeable frost, effectively increasing the amount of impervious surface within a watershed. Several climatological factors contribute to developing frozen ground and concrete impermeable frost including, but not limited to, the following:

- Wet fall and early winter season, sufficient to allow accumulation of water in the surface soil layers
- Continuous cold weather
- Little or no snow accumulation to insulate the ground.

For the purposes of this study, it is necessary to distinguish between frozen ground and concrete impermeable frost in order to estimate the impervious surface area in the watershed. Frozen ground occurs annually during the winter season as cold temperatures freeze moisture in surface and vadose zone soils. However, this condition does not preclude infiltration as cracks develop, porosity in the soil-ice structure still exists, and root structures provide additional pathways for water to enter the soil profile. To become a completely impervious frost layer, sufficient moisture must be present to saturate the soil and sustained freezing temperatures must develop sufficient frost and ice to eliminate all infiltration capability in the soil profile. This condition is described as concrete impermeable frost.

Previous investigations have been conducted to evaluate the presence and severity of concrete impermeable frost during winter rain-on-snow and frozen ground events (Humphrey 1994). During this study, known gage data were used to calibrate hydrologic models of the watershed contributing to Silver Bow Creek during winter storm events. It was determined through this study that although concrete impermeable frost existed in the watershed, it did not cover the entire surface area, was found to exist only in very narrow elevation ranges throughout the watershed, and that water infiltration occurs in areas where frozen ground (not impermeable frost) exists.

Results of the Silver Bow Creek investigation were used to develop a rating index to assign probability to the recurrence of concrete impermeable frost. This index is used to evaluate rainfall, temperatures, snow and other climatological factors that allow concrete impermeable frost to develop. Climatological data from the INEEL area were used evaluate the probability of concrete impermeable frost development as a part of this study. It was determined that concrete impermeable frost has the potential to develop in the INEEL area approximately every 5 to 10 years.

Additionally, an estimate of the percentage of the ground surface representing concrete impermeable frost was developed from site-specific conditions at INEEL and results of the Silver Bow Creek investigation. Vegetation, exposed surface soils, soil porosity and other factors contribute to the development of concrete impermeable frost. For the watershed surrounding the RWMC, vegetative cover was estimated to be 50% and exposed soils have fairly good water transmission properties (B group).

Concrete impermeable frost was estimated to represent 33% of the watershed area during this study, based on the following assumptions:

1. Exposed surface soils represent 50% of the natural watershed area. 67% of exposed surface soils are subject to developing concrete impermeable frost. Total concrete impermeable frost in the natural watershed is then 33%.

2. Concrete impermeable frost will not develop in the remaining 50% of the watershed area due to the presence of vegetative cover and root structures; shallow sedimentary soils over basalt and exposed basalt areas allowing infiltration and lack of saturated soil.

Review of previous studies conducted at INEEL further indicate that although concrete impermeable frost will exist in portions of the watershed, it is overly conservative to assume that the presence of frozen ground eliminates all infiltration. A report prepared in 1994 (Taylor et. al, 1994) states "..the assumption of frozen ground presumes zero infiltration of the surface...zero infiltration appears overly conservative...assumption of zero infiltration was used in order to obtain demonstrably conservative results." This previous study further supports the assumption that impermeable concrete frost does not exist over the entire watershed area. Natural watershed areas can have concrete impermeable frost, which occupies less than 100% of the natural watershed during winter.

There are no universally accepted methods for establishing recurrence interval or areal extent of concrete impermeable frost during winter seasons. Generally accepted methods include estimations of impervious surfaces using hydrologic models of watersheds with available stream gage data. In the absence of site-specific data, it is necessary to estimate concrete impermeable frost and resulting impervious surface area from climatological data, known watershed properties, experience with similar sites, and comparison to other studies. Representing 33% of the natural watershed area as concrete impermeable frost provides a reasonable estimate of expected impervious ground conditions during winter storm events for INEEL based on the hydrologic conditions of the watershed, available surface area for impermeable frost to develop, and experience with similar studies.

2.4 Summer and Winter Design Storm Parameters

Summer and winter design storm parameters were developed for subsequent hydrologic modeling of the contributing watershed to the RWMC and MCFS. The storm parameters were developed from the statistical analyses of the data collected primarily from the INEEL gage with additional supporting information as described in the previous sections. The following design storm parameters were used in hydrologic modeling of the various return period and seasonal conditions.

- 25- and 100-year Summer Thunderstorms (Cloudburst)
  - 25-and 100-year, 24-hour storm events
  - 1.70 and 2.10 in. of precipitation, respectively, from statistical analyses and data presented in Table 2-1.
  - Embedded peak 5- and 15-minute, 1-, 2-, 3-, 6-, 12- and 24-hour rainfall depths and intensities.
- 25-year, 24-hour Winter Precipitation (Rain or Rain-on-Snow) with frozen ground
  - 5-year, 24-hour storm event

- 5-year frozen ground conditions
- 0.553 in. of precipitation
- 0.06 in./hour constant snowmelt (1.44 in. total depth for 24 hours)
- Embedded peak 5- and 15- minute, 1-, 2-, 3-, 6-, 12- and 24-hour rainfall depths and intensities.

- 100-year Winter Precipitation (Rain on Snow) with Frozen Ground
  - 20-year, 24-hour storm event
  - 5-year frozen ground conditions
  - 0.72 in. of precipitation
  - 0.06 in./hour constant snowmelt (1.44 in. total depth for 24 hours)
  - Embedded peak 5- and 15-minute, 1-, 2-, 3-, 6-, 12- and 24-hour rainfall depths and intensities.

The design storm parameters for the various storms used in this hydrologic study are statistically equivalent or greater than the return frequencies for the 25- and 100-year events. The return interval for a particular storm event has a probability equal to the inverse of the return interval as shown in the following equation:

$$P = \frac{1}{return\ period}$$

Therefore, the probability of the 25- and 100-year events are 0.04 and 0.01, respectively. Additionally, the probability of different events can be multiplied to determine combined probabilities representing statistically equivalent, greater return period events. As described above, the 100-year rain on snow with frozen ground event has a combination of the 20-year precipitation and 5-year frozen ground conditions, therefore this combined probability of events is statistically equivalent to the 100-year event:

$$P_{100} = P_{20} * P_5 = \frac{1}{20} * \frac{1}{5} = \frac{1}{100} = 0.01$$

Review of available literature suggests that concrete impermeable ground conditions happen every 5 to 10 years. Therefore, the 20-year rainfall was combined with the 5-year frozen ground condition to determine the 100-year event.

The probabilities for the 20-year rainfall and 5-year frozen ground conditions are sufficiently independent to allow their combination in a joint probability distribution because the design storm precipitation is developed from rainfall gage data for the period of record for several different gages around the INEEL region, including the CFA and Idaho Falls gages. In some cases, the period of record is more than 50 years and provides sufficient data for separation of winter and summer thunderstorm precipitation depths and a thorough statistical analysis of the precipitation depths associated with various

storm durations, intensities and return periods for seasonal events. This statistical analysis is based on precipitation depths alone, and does not consider other environmental factors that may contribute to precipitation including temperature and other regional climatological conditions.

The frozen ground probability is developed from a variety of climatological factors including temperatures, wind speeds, freezing temperature duration, precipitation during winter months, and is based on an index developed by Dr. John H. Humphrey, PhD, PE (personal communication, 2001). The index was developed for frozen ground during the months of November through March, and is based on climatological data from the CFA and Idaho Falls gages.

The combined probability of the 20-year rainfall and 5-year frozen ground represents a 100-year return period probability. For the purposes of this hydrologic study, snowmelt has been added to the winter design storm events in order to provide additional runoff. Adding the snowmelt to the design storms increases the return period of the storms, as the presence of snow during the event has additional statistical probability which should be multiplied in the combined probabilities. However, the probability of snow during the design storms has been neglected to account for possible variations in truly frozen ground, design storm precipitation depths and other hydrologic parameters used to represent the watershed and sub areas. Neglecting the probability of snowmelt in the combined probabilities of the design storm events provides a conservative approach to estimating the peak flood flow by adding additional water without considering the probability of the presence of snow anticipated for the RWMC facility and the MCFS.

3. HYDROLOGIC MODELING

The HEC-1 computer program was selected for this hydrologic analysis because it provides the most flexibility in modeling methods and allows detailed input of watershed parameters, stage-storage-routing information, design storm precipitation, snowmelt and other hydrologic modeling parameters impacting storm water runoff. A comparison of commonly available computer modeling programs was conducted as a part of this study and included HEC-1, SCS TR-20 and SCS TR-55, resulting in the following conclusions:

1. The SCS TR-20 and TR-55 models have several limitations in defining watershed characteristics and storm water runoff flow paths, which may affect peak flow estimations for the contributing watershed area at INEEL. HEC-1/HMS allows input of several different parameters regarding land use, soil types, vegetative conditions, hydrologic connectivity and others affecting storm water runoff, which provides more reasonable runoff modeling results.

2. The SCS TR-55 model relies on standard design storm parameters (i.e., Types I, II, III etc.,) to develop rainfall hydrographs based on a given rainfall depth. Design storms were developed from site-specific data and produce more accurate results in flood modeling programs by eliminating geographic effects on rainfall (i.e., mountains, rain-shadow effects, etc.). Using the HEC-1/HMS modeling program allows entry of site-specific design storm data developed for the RWMC.

3. The TR-55 model was developed for Urban Hydrology. The RWMC is more representative of natural conditions, with a relatively limited developed area within the regional watershed boundary.

4. The HEC-1/HMS computer program provides flexibility in runoff evaluation methods used in sub areas within the watershed boundary. HEC-1/HMS provides the ability to use different runoff evaluation methods within the same model, which may be more applicable to varying conditions within the regional boundary (i.e., Kinematic wave, Muskingum, Muskingum-Cunge, SCS methods).

The hydrologic modeling for this study was conducted using ProHEC1 Plus, an enhanced version of the Hydrologic Engineering Center's HEC-1 program (Dodson and Associates, ProHEC1 Plus, 1995). This program generates rainfall/runoff hydrographs for watershed and sub basins based on several hydrologic parameters including, but not limited to, the following:

- Watershed and sub basin area
- Soil type and vegetative cover
- Impervious surfaces
- Surface features such as exposed bedrock and fractures
- Stream channel flow patterns
- Natural and constructed reservoirs or storm water retention areas
- Storm water runoff controls

- Unique hydrologic features.

Details of the hydrologic modeling parameters and processes are included in the following sections.

3.1 Hydrologic Characteristics and Modeling Parameters

Hydrologic characteristics of the watershed are discussed in the following sections and, where applicable, modeling parameters are discussed.

3.1.1 Watershed and Sub Area Delineation

Topographic mapping and field inspection of hydrologic and hydraulic features were used to delineate the contributing watershed and sub basins of the RWMC. Topographic mapping provided by INEEL and portions of a USGS quadrangle map were used to identify the outer boundary of the watershed. Sub basins were delineated within the outer watershed boundary based on several factors including the following:

- Major and minor surface water runoff drainage patterns and flow lengths
- Location of culverts, storm water runoff controls, local reservoir areas (storage)
- Key features and junctions in the MCFS
- General hydrologic regime and field conditions

The total contributing area to the RWMC facility and the MCFS up to the Adams Boulevard Bridge is 4.33 mi^2 (2771 acres). The total contributing area of the watershed investigated as a part of this study is 6.39 mi^2 (4090 acres). The total watershed area considered in this study includes the total area contributing to the RWMC and one additional sub-basin that contributes to the MCFS downstream of the Adams Boulevard Bridge. This larger area was evaluated in order to identify the presence or absence of backwater effects with the potential to influence the floodplain near the SDA and TSA boundaries. The major watershed boundary was divided into 40 sub basins for subsequent hydrologic modeling. The sub basins are identified on the RWMC watershed boundary map (see Appendix A).

3.1.2 Soil Type and Vegetation

Native soils in the area of the RWMC facility are primarily sandy silt loam, with sand fractions ranging in size from very fine to coarse. Soil depths range from very shallow to very deep and are intermixed with basalt flows. Soil cover placed over disposal area pits and within the SDA boundary were constructed using borrow materials from areas around the complex and have similar textures to those found within the contributing watershed area. Regional soils data indicate that soils are primarily loess, designated as a B hydrologic soil group. This soil group allows moderate infiltration and consist of silts, sands and to a lesser extent, clays.

The vegetation in the RWMC facility watershed is a sage-grass community consisting of sagebrush and primarily wheat grasses. Cover was estimated at approximately 50 percent during the field investigation conducted at the site.

The Soil Conservation Service (SCS) National Engineering Handbook provides estimates for curve numbers for forest-range complexes in the Western United States (SCS, 1972). The curve number is used

in hydrologic modeling to represent the soil and vegetation conditions within a watershed and accounts for precipitation losses and excesses. According to the SCS reference, curve numbers may range from 28 to 96 for sage-grass complexes, depending on soil group and vegetative cover. Low numbers indicate Group B soils with high percentage of vegetative cover and high numbers indicate Group D soils with little or no vegetative cover.

Curve numbers are adjusted from standard conditions to represent the conditions in a watershed prior to the rainfall-runoff event being modeled. Antecedent Moisture Condition I (AMC I) represents dry soil conditions typical of soil conditions preceding summer thunderstorms, with no precipitation prior to the model storm. AMC III represents wet soil conditions during winter and spring seasons, where it is likely that some moisture has been retained in the soils from previous storms and snowmelt. Curve numbers taken from the SCS handbook are shown in Table 3-1.

The curve numbers were selected from tables shown in the SCS National Engineering Handbook, Section 4, Hydrology, 1972, page 9.11. Curve numbers were selected to represent natural conditions identified in the field, with further support from SCS documentation, the infiltration test report, and experience with similar sites. Curve numbers were also selected accordingly to represent antecedent moisture conditions (AMC) anticipated in each storm. Saturated soils during winter storms used AMC-III. Normal soils during summer events used AMC-II, although dry conditions are more likely in the summer.

Soils in the RWMC area are generally a silty loam with a small fraction of clay, based on soil texturing during the field investigation. The SCS Engineering Handbook and other supporting documentation designate these soils in the Hydrologic Soil Group B (moderate infiltration rates). Additionally, infiltration rates presented in the Integrated Large-Scale Aquifer Test Report (Wood and Norrell, 1996) range from 0.14 to 0.23 in/hr. The results of the infiltration rate testing further support the use of Hydrologic Soil Group B curve numbers.

Other information used in selecting the curve numbers included vegetative cover and condition. During the field investigation, vegetative cover was estimated to be 50%, consisting of sagebrush and a bunchgrass understory.

Curve numbers for sage-grass complexes, B Group; Soil under normal AMC (II) range from 28 to 74 for 100 to 0% cover, respectively. These values are presented in Table 3-1 of the report.

Based on the vegetative conditions with a Hydrologic Soil Group B, a curve number of 52 was selected to represent the natural watershed conditions and areas where soils from the watershed have been used for constructing portions of the RWMC facility. This CN was used for the summer thunderstorm events, although it should more likely be adjusted accordingly for AMC I conditions (which would result in a lower CN).

The CN of 52 was adjusted to AMC II conditions (saturated soil condition) for the winter storm events. A CN of 71 was selected to represent the unfrozen portion of soils in the natural watershed during the winter rain-on-snow and frozen ground events.

A curve number of 99 was used for all impervious surfaces including building rooftops, parking lots, roads, and other paved and impervious surfaces in all design storm events. This curve number was also used to represent concrete impermeable ground portions of the watershed during winter storm events.

Table 3-1. SCS Curve Numbers[1] for sage-grass complexes.

Antecedent Moisture Condition II (Standard)			
Vegetative Cover (%)	Hydrologic Soil Group B	Hydrologic Soil Group C	Hydrologic Soil Group D
0	74	87	96
20	65	78	88
40	56	68	79
60	47	59	70
80	37	49	61
100	28	40	52
Antecedent Moisture Condition I (Summer Condition)			
0	55	73	89
20	45	60	75
40	36	48	62
60	28	39	51
80	20	30	41
100	14	22	32
Antecedent Moisture Condition III (Winter Condition)			
0	88	95	99
20	82	90	95
40	75	84	91
60	67	77	85
80	57	69	78
100	48	60	71
Frozen Ground	99	99	99

[1]Section 4, Hydrology, SCS National Engineering Handbook, 1972.

A curve number of 52 was used for modeling summer thunderstorms for natural conditions within the watershed and sub areas. A curve number of 71 was used to model unfrozen ground for natural conditions within the watershed and sub areas during winter storm events. A curve number of 82 was used to model unfrozen portions of sub areas with buildings and constructed roads where compaction may increase runoff potential during winter storm events. A curve number of 99 was used to represent frozen portions of the watershed during winter rain-on-snow and frozen ground events.

3.1.3 Impervious Surfaces

There are limited areas of impervious surfaces within the natural watershed around the RWMC facility. Existing natural impervious surfaces include exposed bedrock outcrops. Bedrock outcrops, where present, were estimated to cover 5 percent of the surface in sub basins. Man-made impervious surfaces include buildings and parking lots in the immediate vicinity of the TSA and SDA areas. The impervious surface area created by man-made features was estimated from topographic mapping and aerial photography of the site. A curve number of 99 was used for all impervious surface portions of the watershed during all storm events.

3.1.4 Natural Surface Channels

The topography of the watershed at the RWMC is generally low rolling hills and flat open areas. There are very few natural channels in the sub basins within the regional watershed, with very limited areas of scour and erosion damage resulting from storm water runoff. In general, incised channels do not form until the lower portions of the watershed, near the MCFS, where sufficient storm water runoff has been concentrated and directed through culverts and storm water control structures. Representative channel sections in the lower portions of the watershed were evaluated in the field to provide information to be used in the subsequent hydrologic modeling.

3.1.5 Storm Water Retention Areas

Several storm water retention areas exist within the watershed contributing to the RWMC and MCFS. Culverts exist in the railroad grade south of the facility which will limit storm water runoff peak flows coming from the area south of the railroad grade. A total of 7 culverts were identified within the RWMC watershed along the railroad grade, ranging in size from 1×1 ft to 2×2.5 ft and constructed of natural rock materials (basalt) near the base of the railroad embankment. The culverts were surveyed as a part of the field investigation to evaluate stage-storage-discharge for the areas to the south of the railroad grade. Additional storm water retention areas were identified on topographic mapping of the site and incorporated into the hydrologic models for this study.

The storm water retention areas used for stage-storage-routing in this hydrologic study will be subject to flooding during the 25 and 100-year storm events. These stage-storage areas were not incorporated into the 25-and 100-year floodplain boundary mapping for the RWMC facility for several reasons. The floodplain in the stage-storage-routing areas located south of the railroad embankment are not located in the vicinity of any buildings or construction areas and have no impact on the RWMC facility area. For modeling purposes, it was assumed that all storage areas were empty prior to the model storm events. This is representative of actual conditions.

3.1.6 Main Channel Flow System

The MCFS is a constructed channel that begins at the north side of the SDA, flows west, south, then east along the SDA boundary, north between the SDA and TSA, east along the northern border of the TSA, under Adams Boulevard and ultimately to the Big Lost River. The channel has undergone several modifications to prevent storm water runon from entering the SDA and TSA areas and to convey storm water runoff from the contributing watershed around the RWMC to the Big Lost River, away from facility buildings. The MCFS was surveyed during this investigation and is further discussed in Section 4.1.

3.2 Hydrologic Modeling and Analysis

The rainfall-runoff modeling was conducted using HEC-1, with input parameters based on the design storm statistics and hydrologic conditions of the watershed area. The SCS method for storm water loss and excess was used within the hydrologic models to generate storm water runoff hydrographs for selected locations in the watershed area. Specific parameters incorporated into the models created as a part of this study are discussed in the following sections.

3.2.1 SCS Curve Numbers and Precipitation Losses

The SCS curve numbers were selected to represent the watershed condition based on soils information, vegetative cover, impervious surfaces and frozen ground considerations (see Table 3-2). In order to represent frozen ground conditions during the winter storm events, the sub areas were separated into two portions, designated as A and B in the model. Two-thirds (67%) of the basin was considered as unfrozen ground with AMC III soil conditions. One-third (33%) of the basin was represented as concrete impermeable ground with a curve number of 99 for impervious surface as discussed in Section 2.3.3. Hydrographs for the two separate portions of each sub area were combined to determine peak flow from the whole sub area, prior to combining flows with other sub areas.

The SCS method accounts for precipitation losses from infiltration and evaporation and precipitation excess contributing to runoff within the curve number. Other methods including Kinematic wave, Muskingum, Muskingum-Cunge account for the losses using initial and constant loss parameters and were tested with variations of the HEC-1 models generated for this study. These other methods also allow evaluation of snowmelt separate from rainfall using climatological data to determine snowmelt rates. After evaluation of different methods for determining peak runoff, the SCS method was determined to be the most reasonable for the watershed, rainfall, snowmelt and frozen ground conditions. The Kinematic Wave, Muskingum, and Muskingum-Cunge methods utilize overland flow parameters, shallow concentrated flow conditions and channel flow parameters to determine time of concentration and peak flow within a sub area of the watershed. Input of the sub area parameters into the HEC-1 program generated widely varied results within the different sub areas due to long overland flow lengths anticipated at this site, variations in frozen ground and natural soil conditions, and a variety of other factors affecting the model results. Due to the variances in results and long overland flow paths, kinematic wave, Muskingum and Muskingum-Cunge methods were used only for estimating time of concentration and channel routing in the HEC-1 models.

Table 3-2. SCS Curve numbers used in hydrologic modeling.

	Winter Rain on Snow/Frozen Ground				Summer Cloudburst			
	Sub Area Portion A[1]		Sub Area Portion B[2]		Sub Area Portion A		Sub Area Portion B	
Sub Area(s)	CN	%	CN	%	CN	%	CN	%
1-19, 21, 24-35, 36-39	71	67	99	33	52	99	99	1
20, 22	82	40	99	60	52	40	99	60

1. Each Sub area was separated into two portions, A and B. Portion A represents that portion of the subarea that is not frozen during the winter events, and natural soil conditions during summer events.

2. Portion B represents that portion of the sub area considered concrete impermeable ground and impervious surface area in winter events, and impervious surface area during summer events.

3.2.2 Time of Concentration

The time of concentration is used to assist in the definition of runoff characteristics within the individual watershed. The time of concentration for a watershed is defined as the travel time of water from the hydraulically most distant point of the watershed to the point of interest (generally the most downstream point). The time of concentration for each watershed was estimated by measuring three components of storm water runoff flow paths including overland flow, shallow concentrated flow, and channel flow, and determining appropriate roughness coefficients and other parameters that influence water flow. A summary of the travel time associated with the three flow conditions (i.e., overland, shallow, and channel flow) and time of concentration for each basin is presented in Table 3-3. The equations used in evaluating total time of concentration are standard equations for the three different flow components as shown below.

$$t_{overland} = \frac{0.007 * (nL)^{0.8}}{\sqrt{P_2} S^{0.4}}$$

$$t_{shallow} = \frac{L}{V}, \; where \; V = 16.1345\sqrt{S}$$

$$t_{channel} = \frac{L}{V}, \; where \; V = \frac{CR^{0.667} S^{0.5}}{\eta}$$

Where:

η= manning's roughness coefficient

L = length of flow (ft)

P_2 = 2-year, 24-hour precipitation depth (in.)

S = slope (ft/ft)

R = hydraulic radius (ft)

V = velocity (ft/s)

C = 1.49 (constant)

Existing topographic maps were used to determine flow distances and slopes, and roughness coefficients were estimated using the aerial photography and observed field conditions. A summary of the travel time associated with the three flow conditions (i.e., overland, shallow, and channel flow) and time of concentration for each basin is presented in Table 3-3.

Table 3-3. Time of concentration (t_c) for sub basins.

Hydrologic Modeling, Sub Area Time of Concentration (t_c)				
Sub Area	Overland Flow	Shallow Conc. Flow	Channel Flow	t_c (minutes)
1	0.47	2.58	54.14	57.19
2	0.51	7.30	57.30	65.11
3	0.49	18.14	38.40	57.02
4	0.70	9.19	16.14	26.03
5	0.84	30.92	72.70	104.46
6	0.89	7.75	34.17	42.80
7	1.10	4.71	92.23	98.05
8	0.80	6.13	27.50	34.43
9	0.72	12.40	55.66	68.77
10	0.85	50.03	42.17	93.05
11	0.67	13.07	48.62	62.36
12	0.57	14.16	25.99	40.71
13	0.73	4.68	19.67	25.08
14	0.73	24.08	34.75	59.56
15	1.04	3.13	22.57	26.07
16	0.97	8.49	16.67	26.20
17	0.56	34.32	6.73	42.02
18	0.75	34.43	10.25	45.24
19	0.75	3.89	17.60	22.24
20	Channel reach only, no t_c evaluated.			
21	0.67	3.58	27.83	32.08
22	0.51	6.20	15.53	22.24
24	Closed sub area - non contributing			
25	0.89	5.84	8.79	15.51
26	0.63	2.98	15.05	18.66
27	Closed sub area - non contributing			
28	0.67	18.46	62.35	81.49

Table 3-3. (continued).

Hydrologic Modeling, Sub Area Time of Concentration (t_c)				
Sub Area	Overland Flow	Shallow Conc. Flow	Channel Flow	t_c (minutes)
29	0.56	3.58	23.51	27.65
30	0.75	8.91	53.25	62.91
31	0.60	23.76	84.92	109.28
32	0.55	6.20	33.50	40.25
33	0.49	4.53	23.45	28.46
34	0.56	9.84	7.42	17.82
35	0.28	1.66	19.03	20.97
36	0.39	14.61	26.36	41.35
37	0.67	5.41	103.95	110.03
38	0.57	1.85	26.92	29.34
39	0.85	8.94	22.92	32.70
40	Closed sub area - non contributing			

The time of concentration for sub area 1 is shown in the following equations.

Sub Area 1: Overland Flow: L= 300 ft, (η)= 0.13, P_2=0.873 in. (summer), S = 0.05 ft/ft

$$t_{overland} = \frac{0.007 * (0.13 * 300)^{0.8}}{\sqrt{0.873} * 0.05^{0.4}} = 0.47 \text{ min}$$

Sub Area 1: Shallow Concentrated Flow: L=500, S=0.04

$$t_{shallow} = \frac{500}{16.1345\sqrt{0.04}} = 154.9 \text{ sec} = 2.58 \text{ min}$$

Sub Area 1: Channel Flow: L=5150 ft, C=1.49, R=0.339, S=0.0097, η=0.045

$$t_{channel} = \frac{5150}{\frac{1.49 * 0.339^{0.667} * 0.0097^{0.5}}{0.045}} = 3{,}249.4 \text{ sec} = 54.14 \text{ min}$$

The total time of concentration is the sum of the three component times for each basin (for some basins, with more defined channels contributing to the main channel, two channel flow sections may be used). For Sub Area 1 the total time of concentration is shown below.

$$t_c = t_{overland} + t_{shallow} + t_{channel} = 0.47 \text{ min} + 2.58 \text{ min} + 54.14 \text{ min} = 57.19 \text{ min}$$

3.2.3 HEC-1 Model Input and Output

The hydrologic modeling was completed using the HEC-1 computer program with watershed and sub area properties incorporated into the models based on the parameters discussed in the previous sections. The models were used to generate peak flows at key locations contributing to the MCFS in order to evaluate the 25-and 100-year flood profiles.

HEC-1 input is completed using "cards" to represent different sub area parameters, rainfall statistics, reservoir and channel routing parameters, sub area connectivity and hydrograph combinations, as well as a wide variety of model controls and output parameters. The card identifier is the first two characters on the lines contained in the input file, which the HEC-1 program uses to perform the hydrologic modeling process. Limited information is included in text in the HEC-1 input files, identifying sub basins, routing reaches, hydrograph combinations and other significant steps within the models and can, to some degree, be used to follow the general modeling process. Complete descriptions of the "cards" used in the HEC-1 input files can be reviewed in HEC-1 User's Manuals available from the USCOE website or other HEC-1 resources on the internet.

The peak flow associated with each sub area within the contributing watershed was evaluated in the HEC-1 modeling program. These included the following:

- 25-year, 24-hour summer thunderstorm
- 25-year, 24-hour winter rain-on-snow with frozen ground
- 100-year, 24-hour summer thunderstorm

- 100-year, 24-hour winter rain-on-snow with frozen ground.

Combined hydrographs defining flow conditions throughout the MCFS were also evaluated in the HEC-1 models.

3.3 Hydrologic Modeling Results

The HEC-1 analysis of the different return period storm events indicate that the 25- and 100-year rain-on-snow and frozen ground events contribute the largest peak flow to the MCFS when considering the watershed as a whole. The HEC-1 analysis also identifies that the 25-year and 100-year summer storm event will generate the highest peak flow from the TSA sub area (sub area 22). These results are indicative of the low permeability of the frozen ground in the watershed and the imperviousness of the TSA.

A summary of the peak flow within each subbasin area for the various model storm events is provided in Table 3-4. A summary of peak flows for several key combinations of sub area hydrographs contributing to the MCFS is shown in Table 3-5. Representative hydrographs for peak flows are shown in Figures 3 (25-year, 24-hour summer storm hydrographs) through Figure 6 (100-year, 24-hour winter storm hydrographs). Discussion of specific results of the hydrologic modeling for each individual storm event is provided in the following.

1. The 25-year, 24-hour winter rain-on-snow with frozen ground event generates the highest peak flow in the contributing watershed as a whole for the RWMC facility, for storms with this return period. The 25-year, 24-hour winter rain-on snow and frozen ground event was used to identify the 25-year floodplain for the MCFS and surrounding areas. This event generates 104 cubic feet per second (cfs) at the Adams Boulevard Bridge and 177 cfs at the junction downstream of Adams Boulevard.

2. The 100-year, 24-hour winter rain-on-snow with frozen ground event generates the highest peak flow in the contributing watershed as a whole for the RWMC facility, for storms with this return period. This storm event was used to identify the 100-year floodplain for the MCFS and surrounding areas. This event generates 133 cfs at the Adams Boulevard Bridge and 232 cfs at the junction downstream of Adams Boulevard.

3. The 25-year and 100-year summer events generate the highest peak flow for the TSA sub area due to the amount of impervious surface in this basin. Rainfall intensity drives the peak flow conditions and during summer storm events rainfall intensity is significantly greater than winter events. The amount of impervious surface within the TSA boundary was estimated to be 60 %, and when combined with the short time of concentration for this basin, generates approximately 47 cfs during the 25-year summer event, and 61 cfs during the 100-year summer event. The 25-year summer event was used to evaluate the capacity of all storm drain system and culverts located near the buildings in the TSA. The 100-year summer event was used to evaluate the 100-year flood profile conditions within the TSA boundary.

Table 3-4. Peak flow for individual sub basins.

HEC-1 Model Analysis, Peak Flow (cfs)				
Sub Area	25-year Summer	25-year Winter	100-year Summer	100-year Winter
1	1	10	1	14
2	<1	3	<1	4
3	1	7	1	10
4	1	5	1	7
5	1	11	1	15
6	2	13	2	18
7	1	11	1	14
8	<1	2	<1	3
9	2	17	2	23
10	2	20	2	27
11	1	10	1	14
12	1	9	1	12
13	1	9	2	13
14	1	7	1	10
15	1	4	1	6
16	1	7	1	10
17	1	7	1	10
18	1	10	2	14
19	1	4	1	6
20	1	1	1	2
21	1	6	1	9
22	47	10	61	14
24	Closed sub area – non contributing			
25	<1	3	1	4
26	1	5	1	8
27	Closed sub area – non contributing			
28	3	33	4	45

Table 3-4. (continued).

HEC-1 Model Analysis, Peak Flow (cfs)				
Sub Area	25-year Summer	25-year Winter	100-year Summer	100-year Winter
29	2	11	2	17
30	1	6	1	9
31	2	20	2	27
32	1	5	1	8
33	1	8	2	12
34	<1	1	<1	2
35	<1	1	1	2
36	<1	1	<1	2
37	1	17	2	23
38	1	8	1	11
39	2	19	3	27
40	Closed sub area – non contributing			

Hydrographs from individual sub areas were combined in the HEC-1 models according to storm water runoff flowpaths as water from one sub area flows into the upper reach of the next downstream sub area or as several sub areas combine at their most downstream point. Combining the sub areas provides a representative model analysis of the entire watershed, allowing evaluation of peak storm water runoff flows at any location within the watershed. Eleven locations where hydrographs were combined in the HEC-1 model were selected for subsequent hydraulic (HEC-RAS) modeling of the MCFS to evaluate peak flows where significant flow changes occur. Significant flow changes were identified at channel junctions where combined sub area flows enter the MCFS. Combined hydrographs and significant changes in peak flow incorporated into subsequent hydraulic models of the MCFS are shown in Table 3-5.

Combined hydrographs for 5 of the cross-section locations used in hydraulic modeling are shown in Figures 3 through 6. The hydrographs are presented to provide a representation of the channel flows associated with cross section 300, 900, 2000, 2900 and 4200 (See Table 3-5 for sub area hydrograph combinations used to generate the graphs) throughout the duration of the 24-hour storms. Only 5 locations are shown in the following figures in order to better view the hydrographs for each location. The hydrographs for summer storms show a significant spike in the channel flow near hour 12 due to the rainfall distribution associated with summer storms. Rainfall intensity increases during a summer storm near hour 12 causing the peak runoff to occur shortly thereafter. The hydrographs for winter storms show a smaller spike near hour 12, with a more drawn-out flow condition. Rainfall intensity during a winter storm is more consistent throughout the duration of the storm, with a smaller peak intensity near hour 12. The winter storm rainfall distribution generates the longer storm water runoff hydrograph, with the peak occurring near hour 12 and sustained flows for the remainder of the storm.

Table 3-5. Peak flows input into HEC-RAS Models for each return period.

Subarea Hydrograph Combination	Cross-section location	25-year summer peak flow (cfs)	25-year winter peak flow (cfs)	100-year summer peak flow (cfs)	100-year winter peak flow (cfs)
17	4300	1	7	1	10
16,17	4200	2	14	2	19
16, 17, 38	3500	2	19	2	27
14, 15, 16, 17, 38	3400	2	25	3	36
5-7, 9-12, 14-17, 31, 38	2900	2	59	2	71
5-7, 9-12, 14-17, 21, 31, 38	2800	2	63	2	76
5-7, 9-17, 21, 31, 38	2200	7	63	10	76
5-7, 9-17, 20, 21, 31, 38	2100	7	69	10	85
5-7, 9-18, 20-22, 25, 31, 38	2000	47	83	62	104
1, 3-18, 20-22, 25, 26, 31, 33, 35, 36, 38	900 (Adams)	51	104	70	133
All	300	56	177	77	232

3.4 Comparison of Results to Historic Rain/Snow/Frozen Ground Floods

A detailed model calibration was not performed for this hydrologic analysis due to limited availability of documented flood flow conditions throughout the Snake River Plain. There are no identified stream gage records throughout the region surrounding INEEL, which are representative of the hydrologic and hydraulic conditions at the RWMC facility. Typically, with known watershed area, hydrologic parameters, stream channel parameters and climatological, precipitation and stream flow gage data, a model calibration can be conducted, comparing model results to measured data in order to verify modeling results. However, there are no data sources that would allow a calibration of the hydrologic models prepared for the RWMC facility. As an alternative, regional hydrology was used to compare results of this study to historic data, including documented estimations of peak flow expected in upper watershed areas for rain on snow and frozen ground events.

The 100-year peak flow associated with the watershed area contributing to the Adams Boulevard Bridge (Cross-section 900) is estimated at 133 cfs, according to the HEC-1 analysis for this study. The contributing area to the Adams Boulevard Bridge is 4.33 square miles, resulting in an average peak flow of 31 cfs/mi^2. The peak flow associated with the entire watershed modeled in this study is 232 cfs, with a total contributing area of 6.39 square miles, resulting in an average peak flow of 36 cfs/mi^2. These

average peak flows are consistent with those flows identified in the historic rain-on-snow and frozen ground events (~ 30-60 cfs/mi^2) documented throughout the region surrounding INEEL and the RWMC facility.

The consistency of the modeling results with documented flood events provides a measure of the reasonableness of watershed parameters, snowmelt and frozen ground parameters, and the overall model setup for the RWMC facility.

3.5 Discussion of Previous Hydrologic Studies and Reports

Several hydrologic and hydraulic studies have been performed at INEEL, including the RWMC facility, to evaluate various return period storms. Watershed characteristics, historic flood events, and precipitation statistics have been used in hydrologic modeling to identify floodplains and flood conditions during storms with return periods of 25 to 10,000 years and probable maximum events. A brief discussion of similarities and differences between previous reports and this investigation is provided in the following paragraphs. This discussion is provided for informative purposes only and is not intended to validate or discount the methods, procedures, analyses and results of other studies.

A site investigation report prepared by Taylor, et al., in 1994 discusses precipitation and snowmelt depths associated with various return period storms, frozen ground (impermeable concrete frost), hydrologic modeling parameters and previous flooding events for the INEEL area. The information contained in the Taylor report generally agrees with and affirms the analyses and results of this study. Specifically, the Taylor report indicates that the winter rain-on-snow with frozen ground is the most extreme 100-year event for INEEL, with comparable precipitation and snowmelt. The report references concrete permeable frost and states that "*the assumption of frozen ground presumes zero infiltration…everywhere*", however, that "*zero infiltration appears overly conservative*", providing support for representing only a reasonable portion of the watershed as concrete impermeable frost during winter storms. Additionally, the Taylor report references seven sources of gage data around INEEL during the 1962 flood event, measuring peak flows in the range of 10 to 76 cfs/mi^2, which indicates that the peak numbers identified in this report are consistent with the findings of the previous site investigation and historic gage data.

Another investigation of the RWMC was conducted by Dames and Moore (Dames and Moore, 1993) to prepare floodplain maps and to evaluate storms with various return periods up to a probable maximum event. Changes in topography and additional site developments since the time of the 1993 study prompted the need for updating the 100-year floodplain. The methods, procedures, and results of the Dames and Moore study are very similar to those of this study, with slight differences in specific hydrologic parameters and resulting peak flows for the watershed and RWMC facility. Results of the Dames and Moore study indicate that the peak flow for the subject watershed are approximately 40 cfs/mi^2, similar to the 31 to 36 cfs/mi^2 identified in this study. The results of the Dames and Moore analysis as well as this study are well within the range of the gage data identified for the 1962 event at INEEL and documentation of historic flooding on the Humboldt River, validating these results as well as previous studies.

It should be noted that flow gage data referenced in this study serves as a general calibration of the results of the hydrologic modeling conducted to delineate the 100-year floodplain. A wide range of flows are presented in this study for regional hydrologic conditions, including the 10 to 76 cfs/mi^2 experienced in watersheds throughout INEEL during the 1962 flood event (Taylor et. al, 1994) and the 30-60 cfs/mi^2 referred to from a historical flooding literature search (USCOE, 1975). However, these ranges provide only a limited measure of expected flows for comparison purposes. Calibration to a known gage site (as those identified around INEEL) requires analysis of the watershed condition where the gage is located,

including natural and man-made features which may impact storm water runoff, and knowledge of the gage construction and flow rating methods.

Results of this and other studies present similar conditions and peak flows associated with a 100-year return period storm and are well within the limits presented in historic flood documentation, indicating that these studies provide a reasonable measure of the magnitude of the floods anticipated at the RWMC.

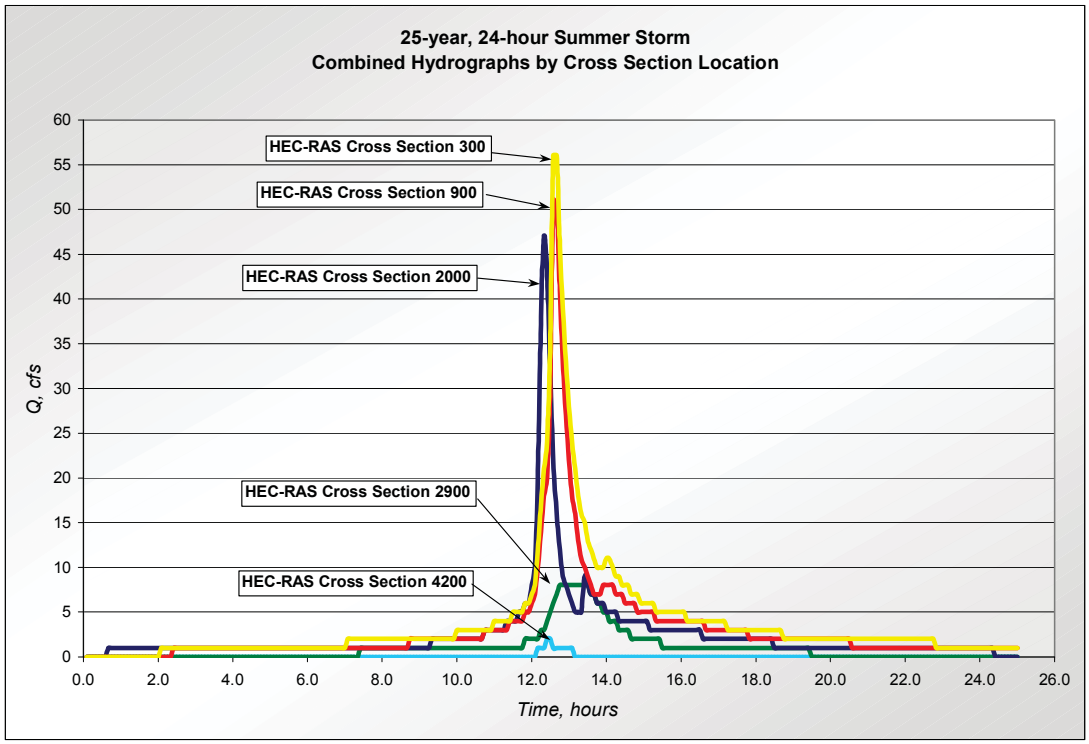


Figure 3. 25-year, 24-hour summer storm hydrographs.

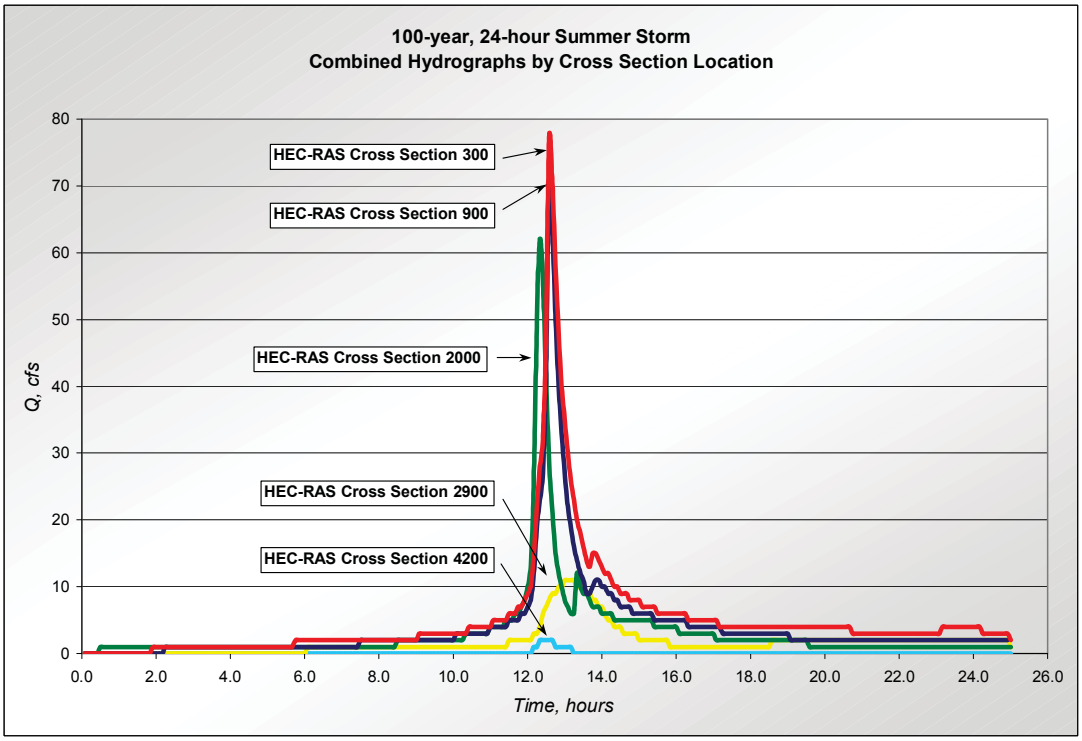


Figure 4. 100-year, 24-hour summer storm hydrographs.

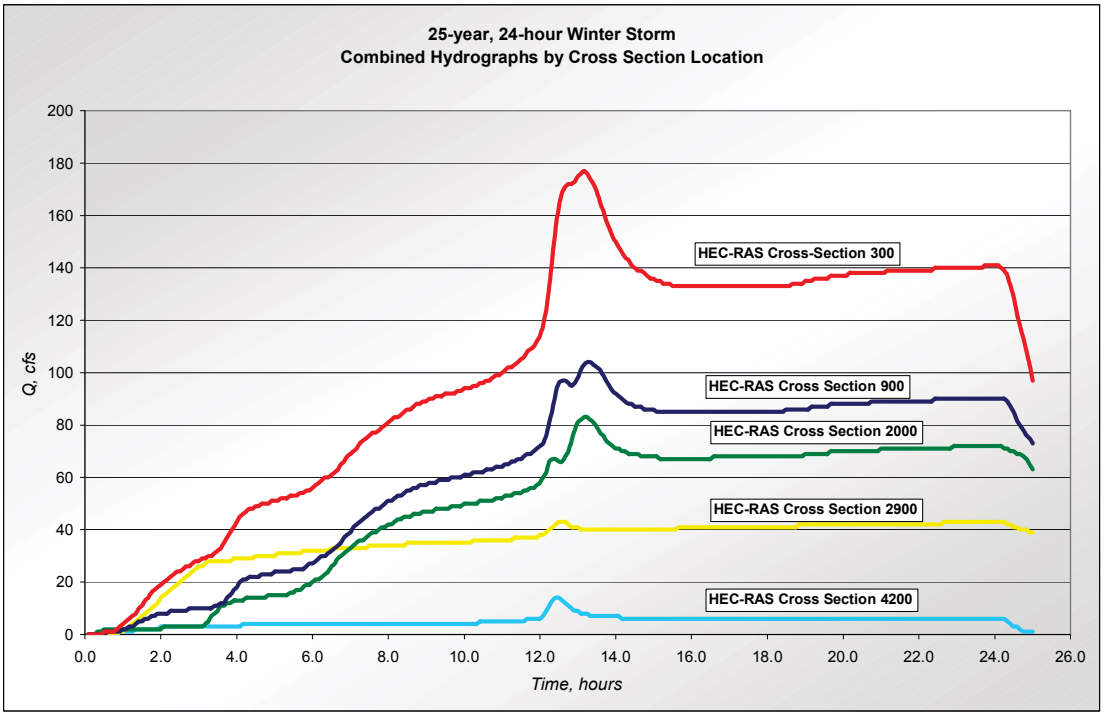


Figure 5. 25-year, 24-hour winter storm hydrographs.

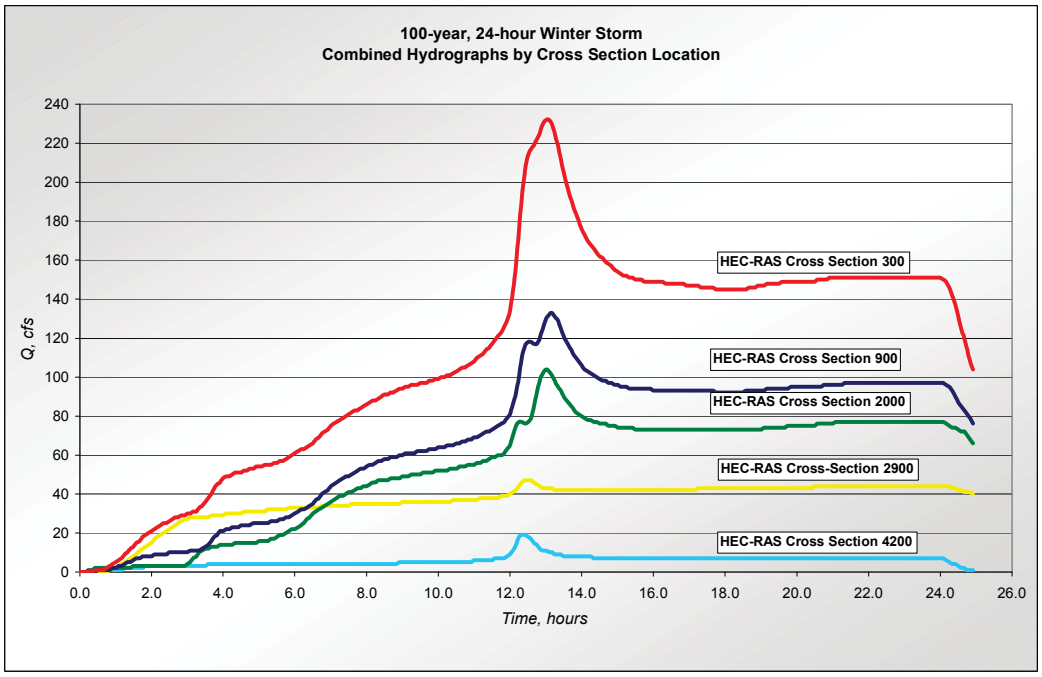


Figure 6. 100-year, 24-hour winter storm hydrographs.

4. HYDRAULIC ANALYSIS

The water surface profiles for the 25- and 100-year peak flood flow were developed using hydraulic models of the MCFS with all structures including bridges and culverts. The 100-year, 24-hour winter rain-on-snow event was used to identify the 100-year floodplain in this study. The methodology, assumptions and results of the hydraulic modeling of the MCFS are discussed in section 4.1. Water surface profiles and the storm water drainage system capacity in the TSA boundary were developed using hydraulic models of the inlets, pipes, culverts, and surface drainage channels for the 25-year event. The methodology, assumptions and results of the hydraulic modeling of the storm drain systems in the TSA are discussed in section 4.2

4.1 Main Channel Flow System

The MCFS was analyzed using the Hydrologic Engineering Center's River Analysis System (HEC-RAS, v. 3.0.1.). Field data collected during the course of this investigation was incorporated into a model of the channel and storm water runoff hydrographs resulting from HEC-1 simulations were input to determine the peak water surface profile during the storm event. Model parameters and assumptions used in generating the peak water surface profiles are described in the following paragraphs. Modeled cross section locations are identified in Figure 7 (Main channel flow system Modeled Cross Section Locations).

4.1.1 Channel Geometry

The MCFS was surveyed in the field during the course of this investigation using GPS and traditional instrumentation. Forty-two cross-sections were surveyed in the channel for the purposes of conducting the hydraulic analysis, beginning at the uppermost end of the channel and continuing west around the SDA. The MCFS has a subtle divide along the northern side of the SDA. One short portion of the channel flows east along the northern boundary and then south to its intersection with the main channel. To the west of the divide, the main channel begins and proceeds westward around the SDA, between the SDA and TSA, along the northern end of the TSA, under Adams Boulevard, and ultimately to the Big Lost River.

4.1.2 Bridges and Culverts

All hydraulic structures including bridges and culverts crossing the main channel were measured, surveyed and incorporated into hydraulic models of the channel. Additionally, all culverts and storm sewer system piping entering the main channel were measured to identify locations where significant flow changes in the main channel may occur. Measurements taken at each structure include opening widths, heights and/or diameters as applicable, channel geometry at the faces of the structure, number of culverts, entrance and exit geometry and other parameters that may influence hydraulic capacity. Several culverts entering the MCFS are equipped with valves. For the purpose of this study, all culverts were modeled with valves open in order to represent the maximum potential peak flow.

4.1.3 Roughness Coefficients

Roughness coefficients, or Manning's η, were estimated from field observations of conditions in the channel and overbank areas. The roughness coefficients vary greatly within the main channel ranging from 0.058 for rough, rocky segments, 0.042 for vegetated segments and 0.025 for constructed concrete segments. Areas outside of the channel, in the overbank segments were modeled using roughness coefficients ranging from 0.05 to 0.075, depending on surface and vegetation conditions observed in the field. These values were taken from the range of values identified in various engineering resource handbooks including the HEC-RAS User's Manual, with specific roughness values selected based on professional engineering judgment and experience with similar channel conditions. Values for the

channel and overbank reaches were varied accordingly to the conditions observed in the channel bottom, on side-slopes and areas outside of the constructed channel.

4.1.4 Hydraulic Modeling Process and Equations

The HEC-RAS computer program is used to model water surface profiles in a channel and incorporates channel and overbank geometry, channel length and slope (profile), roughness coefficients, and hydraulic structure data. Channel and flow properties modeled in HEC-RAS are used to evaluate a wide variety of flow conditions including flow depth, velocity, critical depths, and backwater effects from hydraulic structures. The program provides flow property solutions based on three equations; the energy equation, Manning's equation, and where necessary the momentum equation. The primary equation used to relate channel geometry, profile and roughness is Manning's equation:

$$Q = \frac{1.49}{\eta} A \left(\frac{A}{WP} \right)^{0.667} S^{0.5}$$

Where: Q = discharge, cfs

η = Manning's roughness coefficient

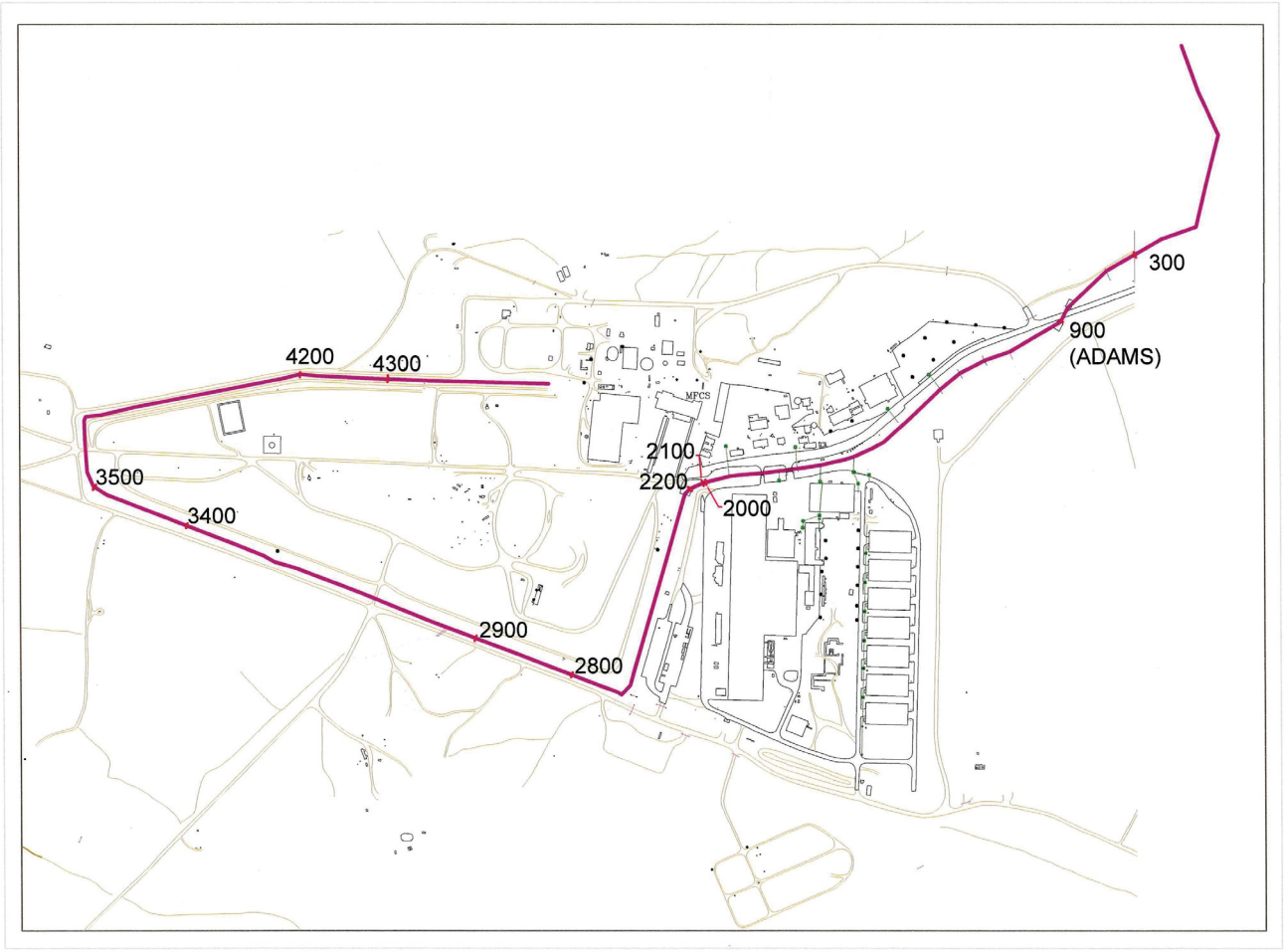
A = flow area, ft^2

WP = wetted perimeter,ft

S = channel slope, ft/ft

This equation relates the discharge and channel geometry to evaluate the flow area and wetted perimeter, which, in turn, determines the flow depth and water surface elevation at each cross-section within the model. Using an iterative process of solving the energy equation, Manning's equation and where necessary, the momentum equation, HEC-RAS provides a detailed analysis of the flow conditions in the modeled stream channel.

Figure 7. Main channel flow system modeled cross-section numbers.



LEGEND

- PAVED ROAD
- DIRT ROAD
- CONCRETE
- BUILDING
- TANKS
- CATCH BASIN
- 6835.7 SPOT ELEVATION
- U14 CONTROL POINT

N

SUBCONTRACT NO. 00000088, Rel. #3	INEEL
REQUESTER: Neil Hutten	Figure 7: Main Channel Flow System Modeled Cross Section Numbers
REPORT ID#: INEEL/EXT-02-00093	
DRAWN: Tim Funderburg	
PROJECT NO. NA	
SPEC CODE NA	
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	SIZE / CAGE CODE / INDEX CODE NUMBER (AREA, TYPE, CL, ORIG) / DWG- Figure-7 / REV 0
EFFECTIVE DATE: 12-13-2001	SCALE: / Figure-7

4.1.5 HEC-RAS Model Simulations

Peak flows from the 25- and 100-year hydrographs were taken from the HEC-1 hydrologic simulations and input into the HEC-RAS model of the main channel to identify the water surface profile during the simulated storm events. A total of 11 hydrographs, as identified in Table 3-5, were incorporated into the HEC-RAS model to accurately model channel junctions with major contributing sub area combinations.

The HEC-RAS model simulations indicate two general locations where the channel has insufficient capacity to convey both the 25-year and 100-year peak flows. Cross-sections in the uppermost reach of the MCFS on the north side of the SDA in sub basins 16, 17 and 18 identify water surface elevations above the channel banks. Additionally, water outside of the defined channel is shown in areas above and below the Adams Boulevard Bridge where the channel becomes shallow with a flat slope. The areas where 100-year peak flows exceed the capacity of the MCFS are shown on Sheet 1 (Main channel flow system 100-year floodplain). The remainder of the MCFS has sufficient capacity to convey the peak flood flow anticipated during the 25- and 100-year events.

The portions of the main channel with insufficient capacity during the peak 100-year flow have the potential to cause flooding in the area north of the SDA (an equipment laydown area) and in the area down gradient of the Adams Boulevard Bridge. Although this flooding potential exists, it is not expected to impact any buildings in the administrative area, buildings in the TSA perimeter, or buildings in the SDA boundary because the ground surface elevation is greater than the 100-year flood elevation predicted by the model. Further discussion of the areas subject to flooding during the 25- and 100-year events is presented in the following section.

4.2 TSA Surface/Subsurface Drainage Network Modeling

The surface drainage channels and subsurface drainage piping system in the Transuranic Storage Area were modeled using the Environmental Protection Agency's Storm Water Management Model (SWMM; USEPA 1994). This model provides a detailed analysis of storm drain system piping networks including pipe and inlet flow conditions, water surface elevations, flow velocities, and design capacities of pipe system components. The program generates detailed flow hydrographs resulting from storm water runoff input into the model, and simultaneously solves for flow conditions in all pipes and components using the energy equation, Manning's equation and the momentum equation to evaluate the storm drain system as a whole. The program can be used in conjunction with water surface profile data from HEC-RAS to evaluate backwater effects at storm drain system outfall locations, and to input additional storm water flow from storm drain systems into channels modeled in HEC-RAS.

It should be noted that the SWMM modeling for the TSA storm drain piping networks was conducted for the 25-year peak storm event in order to identify any flooding that may occur and to delineate the associated floodplain for the storm drain systems. The 25-year peak storm event is required to meet RCRA guidelines and requirements. RCRA guidelines do not require analysis of a 100-year peak flow for storm drain facilities such as the one serving the TSA area of the RWMC. Discussion of the SWMM program and modeling parameters used in this analysis are discussed in the following sections.

4.2.1 SWMM Program Input Parameters

The SWMM program combines storm water drainage system parameters including piping and inlet characteristics and configurations and storm water runoff hydrographs to generate a flow model of the drainage network during a design storm event. All connected components of the storm drainage system can be modeled together in order to identify backwater influences and pipes with insufficient capacity.

Input parameters for the SWMM program include the following:

- Pipe diameter, shape, length depths in the inlets or basins and roughness
- Surface channel shapes, lengths and roughness (where combinations of surface and subsurface drainage exist)
- Inlet type, surface and invert elevations
- Pipe and inlet connectivity data
- Storm water runoff hydrographs for the duration of the runoff event
- Outfall type and water surface elevation at the outfall during the runoff event (to identify backwater effects on the drainage system where outlet elevations are located near the bottom of surface channels).

The storm water drainage network inlets and culvert locations were surveyed during the field investigation at the RWMC. All necessary data to complete a storm water management model of this system was collected for the basins and culverts in the TSA area. Field data were incorporated into the SWMM input files and used to determine pipe capacities and peak flow during the runoff event.

4.2.2 Storm Water Runoff Hydrographs

A detailed storm water runoff hydrograph was developed from the HEC-1 model of the 25-year summer storm analysis and used to evaluate the drainage system. The runoff hydrograph for the TSA (sub area 22) was proportioned to various inlets throughout the drainage system according to their respective contributing areas and surface runoff flow paths. In each major segment of the drainage network, runoff is input into end of line inlets in order to evaluate all pipes and channels in the segment. A summary of the pipe capacities with the ratio of anticipated peak flow during the 25-year summer event is shown in Table 4-1.

4.2.3 SWMM Analysis

The SWMM program analysis provides detailed information regarding peak flows, pipe capacity, and pipe surcharge depths in and above the catch basins (inlets). During the modeling process, the SWMM program computes the flow and velocity in each pipe throughout the duration of the storm based on pipe size, roughness, slope, length and catch basin connections. The program also computes water surface elevations in the catch basins, including surcharge (water surface above pipe) due to insufficient pipe capacity. The surcharge elevation at the inlets indicates where insufficient pipe capacity may cause surface flooding. A detailed description of the information input to and output from the SWMM program and used in evaluating any surface flooding resulting from insufficient capacity is provided in the following:

Input information:

- Pipe segment describes upstream and downstream catch basin locations for each pipe segment modeled in the program. Inlet information in the model includes ground elevation and basin invert elevation.
- Pipe diameter and roughness (based on pipe material).

- Pipe slope, based on upstream and downstream basin invert elevations and pipe length.

Output information:

- Pipe capacity (design capacity) and peak flow.

- Ratio of design capacity to peak flow. This parameter, shown in the following table may indicate pipes where insufficient capacity can cause surface flooding. A ratio less than 1 shows sufficient capacity in the pipe segment for the storm water runoff input into the model. A ratio greater than 1 indicates pipe segments where the upstream junction is surcharged, providing additional head to drive storm water runoff through the pipe.

- Junction surcharge elevation above ground elevation indicates inlets where surcharge water in the basin has reached the surface and can cause flooding. Values of zero for this output parameter indicate that, although surcharge water may be present in the basin, the water surface elevation does not rise above the ground elevation and cause flooding.

A summary of the pipe capacities, ratio of design to peak flow, and junction surcharge above ground elevation for the anticipated peak flow during the 25-year summer event is shown in Table 4-1.

4.2.4 SWMM Modeling Results

In general, all pipes and surface channels within the TSA storm water drainage systems have sufficient capacity to convey the 25-year peak runoff event. The TSA storm drain system will safely pass the 25-year 24-hour peak flow. No surface flooding was identified in the SWMM program, however, some basins become surcharged during the peak flow, causing the ratio of design to peak flow to exceed a value of 1. Although some basins do have surcharge water providing additional head on the downstream pipe segments, this surcharge is not expected to cause any surface flooding beyond the ground elevation at the inlets.

4.3 25- and 100-year Floodplain Mapping

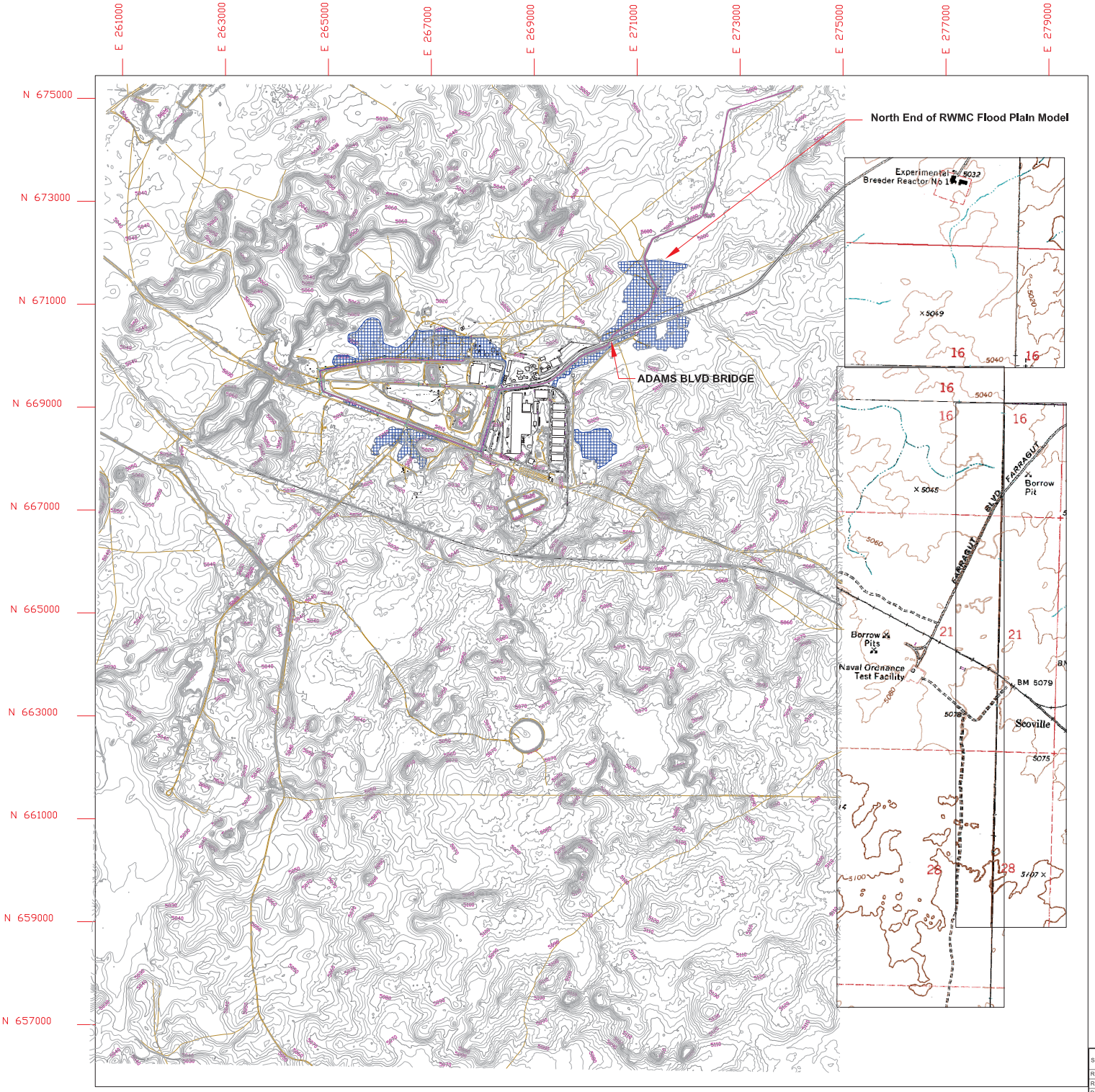
The 25- and 100-year floodplains were identified on topographic mapping of the RWMC facility using results of the HEC-RAS model simulations. The water surface elevations resulting from the 25-and 100-year flow were plotted at each cross-section used in the HEC-RAS model and a map of the associated floodplain area drawn in between the points and sections. In locations where the channel capacity was exceeded, the water surface was extended away from the channel to all points where the water surface elevation was contained. Surface water flow paths away from the main channel were also considered within the areas subject to flooding in order to identify all areas associated with the 25- and 100-year floodplains (i.e., culverts, surface channels, storm drains, etc.). The overall 100-year floodplain boundaries are identified in Sheet 1 (Main Channel Flow System 100-year floodplain) located at the end of this section.

Table 4-1. Basin 22 TSA Perimeter Storm Water Management Modeling, 25-Year Summer Cloudburst.

Pipe Segment (upstream and downstream junction)	Pipe Size (in.)	Pipe Type	n	Slope	Pipe Length (ft)	Design Capacity (DC) CFS	Ratio of DC to Computed Peak Flow	Junction Surcharge Elevation Above Ground Elevation
cb010→cb011	12	CMP	0.022	0.0230	161	3.19	1.17	0.0
cb011→cb007	12	CMP	0.022	0.0283	166	3.54	0.97	0.0
cb007→cb008	12	CMP	0.022	0.0102	166	2.13	1.49	0.0
cb008→cb009	15	CMP	0.022	0.0088	159	3.58	0.89	0.0
cb009→cb010	15	CMP	0.022	0.0090	166	3.63	0.94	0.0
cb010→cb011	18	CMP	0.022	0.0096	166	6.09	1.23	0.0
cb011→cb012	18	CMP	0.022	0.0102	166	6.28	1.18	0.0
cb012→out12	24	CMP	0.022	0.0068	163	11.0	0.67	0.0
cb016→cb16x	12	CMP	0.022	0.0180	39	2.82	1.25	0.0
cb16x→cb005	12	CMP	0.022	0.0180	100	2.82	1.25	0.0
in005→cb005	dual 12×18 elliptical	CMP	0.022	0.0094	85	12.1	0.39	0.0
cb005→cb004	dual 12×12	CPVC	0.015	0.0239	117	11.9	0.69	0.0
cb004→out04	dual 12×18 elliptical	CMP	0.022	0.0106	85	12.9	0.63	0.0
in013→cb013	24	CMP	0.022	0.0104	48	13.6	0.53	0.0
cb013→cb014	24	CMP	0.022	0.0226	71	20.1	0.36	0.0
in006→cb006	18	CMP	0.022	0.0046	43	4.23	1.11	0.0
cb006→cb014	18	CMP	0.022	0.0231	91	9.43	0.48	0.0
cb014→out14	dual 13×16 elliptical	CMP	0.022	0.0091	88	11.4	1.06	0.0

*cb110 included in model although not currently connected to system

**There is no threshold value that would indicate whether the DC to Computed Flow ratio is a concern. A DC to Computed Flow ratio greater than one is not a concern as long as the junction's ground elevation is not exceeded. For the conditions utilized in the analysis of the TSA storm drain system (25-year storm) no supplemental pumping should be needed in the TSA area.



LEGEND

- Main Channel Flow System
- Paved Road
- Dirt Road
- Concrete
- Building
- Tanks
- Fence
- Rail Road
- Guard Rail
- Catch Basin
- Index Contour
- Intermediate Contour
- 100-Year Flood
- 21 USGS Quad Section Number

General Notes

The watershed contributing to the main channel flow system immediately downstream (north) of the Adams Blvd. bridge was included in this study so that backwater effects could be evaluated at the Adams Blvd. bridge box culvert. This watershed area was added to this map by scaling a portion of the digital USGS quadrangle map to fit the topographic map produced by the October 17, 2000 aerial photography.

N

1000 500 0 500 1000

Scale: 1" = 1000'
Contour Interval: 2 foot

Base Map: Planimetric and 2 ft. contour layers are derived from 200 ft. aerial photogrammetric imagery collected on 10/17/2000 by Aero-Graphics, Inc., Salt lake City, UT.

Horizontal Datum NAD 27, ID East Zone, State Plane Coord
Vertical Datum NGVD 29
Units: U.S. Survey Foot

Subcontract No. 00000088, Rel. #3	INEEL
Requester: Neil Hutten	Sheet 1: Main Flow Control System 100-Year Flood Plain
Report IDR: INEEL/EXT-02-00093	
Drawn: Tim Funderburg	
Project No. NA	
Spec Code NA	
For review/approval signatures See DAR No.	Size E; Cage Code; Index Code Number (Area, Type, CL, ORG.); DEQ_SHEET_1.dwg; Rev 0
Effective Date: 12-13-2001	Scale: 1"=1000'; Sheet 1

5. CONCLUSIONS

The conclusions of this hydrologic and hydraulic study at the RWMC facility are presented below:

1. The extent of the 100-year floodplain, as determined in this study, is shown in Sheet 1. Based on this analysis, there are no RCRA treatment, storage, or disposal facilities located within the 100-year floodplain at the RWMC. The floodplain is primarily contained within the MCFS in the SDA and TSA areas. As a result of this study, these facilities are outside of the 100-year floodplain and there will be no "washout" of hazardous waste as a result of the 100-year event.

2. The hydrologic and hydraulic modeling indicates that there are areas around the SDA and TSA perimeters subject to some degree of flooding during the 100-year flood. In general, the areas immediately around the SDA and TSA perimeters within 100-year floodplain are low-lying areas acting as small storage reservoirs that will fill prior to discharging water to the main channel. This flooding around the SDA and TSA perimeters does not impact any administrative buildings, buildings inside the SDA perimeter dike, or structures within the TSA complex.

3. The 100-year floodplain encompasses the fenced construction lay-down area north of the SDA perimeter. This flooding is the result of excess storm water runoff in sub-areas 16, 17 and 18 which will combine in shallow surface storage and cross over the sub area boundaries, ultimately discharging west through basins 17 and 16, and east through basin 18, where the lay-down area is located. The area surrounding the lay-down area has been encompassed in the 100-year floodplain because of limited topographic relief in this vicinity.

4. The 100-year floodplain encompasses the area around the Adams Boulevard Bridge. A downstream junction provides additional storm water runoff to the main channel in a channel reach with little or no slope combined with shallow channel geometry. This combination of additional flow and limited channel capacity causes a significant amount of flooding around the Adams Boulevard Bridge, however, does not impact any buildings at the RWMC facility.

5. Backwater effects from hydraulic structures on the main channel were analyzed in the hydraulic models in order to identify any flooding potential created by bridges or culverts. The analysis of peak flows anticipated during the 100-year flood event indicates that all hydraulic structures on the main channel have sufficient capacity to convey the flood flow with little or no backwater effects.

6. Backwater effects on the storm drains located in the TSA perimeter and near the administrative buildings from the water surface elevation in the main channel resulting from the 100-year flood event were evaluated to determine any flooding potential resulting from the storm drain piping and inlets. Flood water from the MCFS will have minor effects on the storm drain function. The TSA storm drain system will safely pass the 25-year 24-hour peak flow.

7. The only facility area that would be inundated as a result of the 100-year flood is a construction/lay-down area north of Pit 9.

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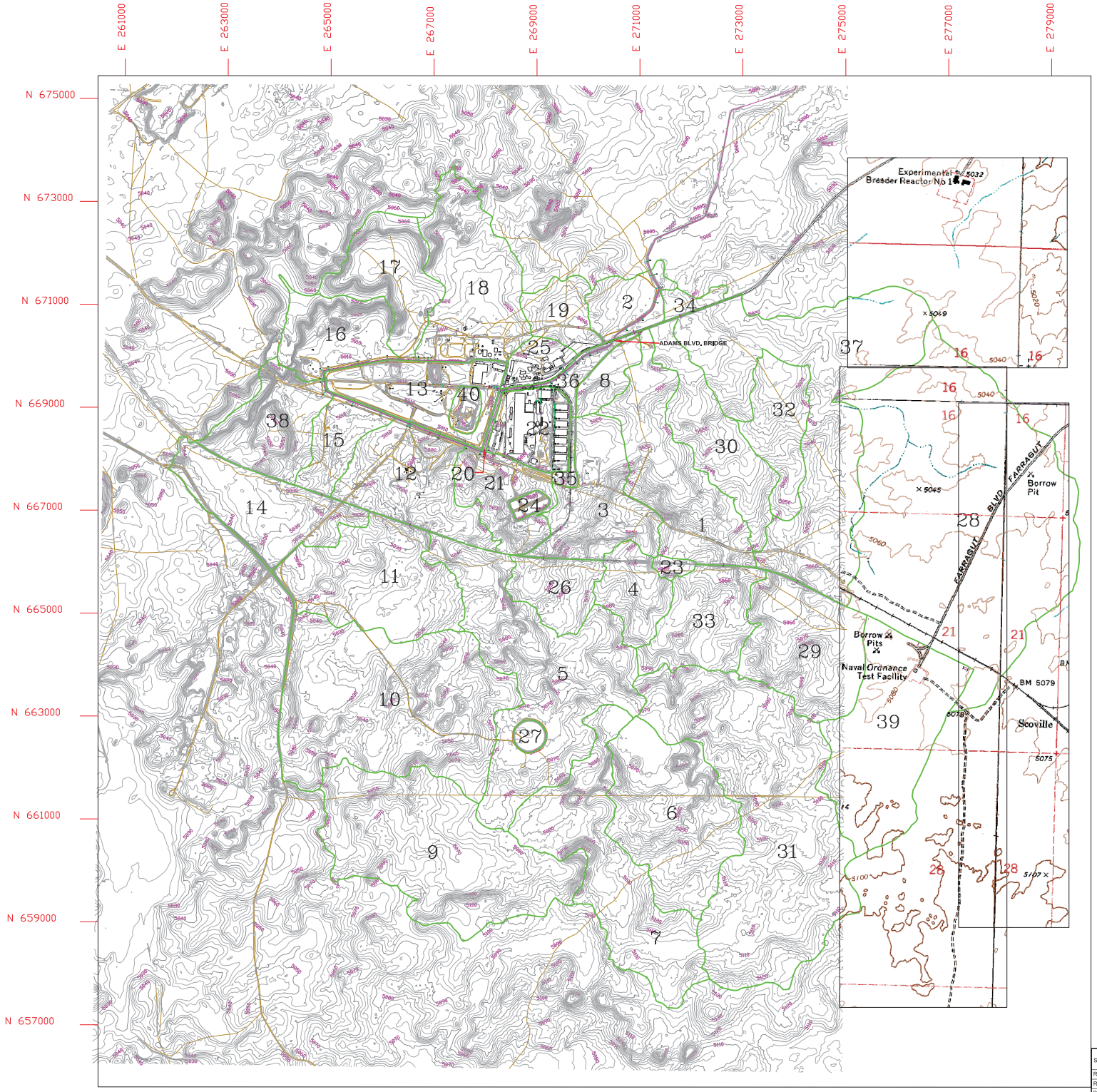
Appendix A

RWMC Watershed Boundary



LEGEND

- Main Channel Flow System
- Paved Road
- Dirt Road
- Concrete
- Building
- Tanks
- Fence
- Rail Road
- Guard Rail
- Catch Basin
- Index Contour (7000)
- Intermediate Contour
- Sub Watershed Boundary
- 28 Sub Watershed Number
- 21 USGS Quad Section Number

General Notes

The watershed contributing to the main channel flow system immediately downstream (north) of the Adams Blvd. bridge was included in this study so that backwater effects could be evaluated at the Adams Blvd. bridge box culvert. This watershed area was added to this map by scaling a portion of the digital USGS quadrangle map to fit the topographic map produced by the October 17, 2000 aerial photography.

N

1000 500 0 500 1000

Scale: 1" = 1000'
Contour Interval: 2 foot

Base Map: Planimetric and 2 ft. contour layers are derived from 200 ft. aerial photogrammetric imagery collected on 10/17/2000 by Aero-Graphics, Inc., Salt lake City, UT.

Horizontal Datum NAD 27, ID East Zone, State Plane Coord
Vertical Datum NGVD 29
Units: U.S. Survey Foot

Subcontract No. 00000088, Rel. #3	INEEL	
Requester: Neil Hutten	Appendix A RWMC Watershed Boundary	
Report ID#: INEEL/EXT-02-00093		
Drawn: Tim Funderburg		
Project No. NA		
Spec Code NA		
For review/approval signatures See DAR No.	Size E; Cage Code; Index Code Number (Area, Type, CI, Dig); DEQ_APPENDIX_A.dwg; Rev 0	
Effective Date: 12-13-2001	Scale: 1"=1000'; Sheet A	

APPENDIX 3

CCP-AK-INL-005
CENTRAL CHARACTERIZATION PROJECT
ACCEPTABLE KNOWLEDGE SUMMARY REPORT
FOR ROCKY FLATS IMMOBILIZED ORGANIC LIQUIDS
STORED AT THE IDAHO NATIONAL LABORATORY
WASTE STREAMS: ID-RF-S3114 AND ID-RF-S3150-A

Revision 8 – February 28, 2013

Controlled
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CCP-AK-INL-005

Central Characterization Program
Acceptable Knowledge Summary Report
For

Rocky Flats Immobilized Organic Liquids
Stored at the Idaho National Laboratory

Waste Streams: ID-RF-S3114 and ID-RF-S3150-A

REVISION 8

February 28, 2013

Mike Ramirez

Printed Name

APPROVED FOR USE

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RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	06/13/2005	Initial issue.
1	01/04/2006	1. Clarified that there are only 2 layers of confinement in ID-RF-S3150-A even if more than 2 horsetails are present. 2. Updated waste stream volumes. 3. Added chlorobenzene to Tables 4-2 and 6-5, and added a paragraph in Section 6.4.3.3 explaining why D021 (chlorobenzene) was not assigned. 4. Revised Tables 5-4 and 6-4 to include relative weight percentages of each radionuclide. 5. Since IDC 003 drums with any amount of liquid are returned to the host site, the last paragraph in Section 5.4.4 is not necessary and was deleted. 6. Added plastic ties as a possible drum bag closure method to ID-RF-S3114. 7. Other editorial changes and corrections. 8. Added plastic waste to the waste stream description and waste material parameters. 9. Removed EPA hazardous waste number D043 from ID-RF-S3114 and D027 from ID-RF-S3150-A.

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RECORD OF REVISION (Continued)

Revision Number	Date Approved	Description of Revision
2	11/16//2006	1. Added a summary of waste material parameter weight percentages for both waste streams. 2. Added TRUCON Code SQ 154 to both waste streams. 3. Deleted footnote in Section 2.2 (CAR 06-025) 4. Updated waste stream volumes and generation dates for both waste streams to reflect the inventory of waste containers that have been retrieved from the TSA at AMWT. 5. Added trichlorofluoromethane as an F001- and F002-listed constituent to ID-RF-3114 based on an AK re-evaluation. 6. Added a paragraph describing the removal of EPA hazardous waste number D043 from ID- RF-S3114. 7. Added a paragraph describing the removal of EPA hazardous waste number D027 from ID- RF-S3150-A. 8. Moved two drums with significant quantities of uranium from ID-RF-S3150-A to ID-RF-S3114 based on an AK re-evaluation. 9. Made other editorial corrections and changes.

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RECORD OF REVISION (Continued)

Revision Number	Date Approved	Description of Revision
3	07/31/2008	1. Updated waste stream volumes and generation dates for Waste Stream ID-RF-S3114 to reflect the inventory of waste containers that have been retrieved from the Transuranic Storage Area (TSA) at Advanced Mixed Waste Treatment Project (AMWTP). 2. Revised Ignitibility and Corrosivity discussions for both waste streams to include more extensive descriptions of potential ignitable or corrosive liquids in the waste. 3. Added prohibited quantities of liquids as a prohibited item for Waste Stream ID-RF-S3150-A. 4. Updated Transuranic Waste Baseline Inventory Report reference to 2004 version. 5. Other editorial changes as required.
4	10/20/2009	1. Updated to add description of liquid remediation operations conducted by Advanced Mixed Waste Treatment Project (AMWTP) to Sections 4.3, 5.3, 5.5, 6.3, and 6.5 2. Added reference to Discrepancy Reports D013 and D014. 3. Other editorial changes as necessary.
5	08/24/2011	1. Updated to add description of liquid remediation operations conducted by Advanced Mixed Waste Treatment Project (AMWTP) to Sections 4.3, 5.3, 5.5, 6.3, and 6.5. 2. Revised to address permit modification changes in the November 30, 2010 *Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Waste Analysis Plan* (WIPP-WAP). 3. Other miscellaneous changes incorporated as necessary. 4. Approximately 250 drums retrieved from Pits 11 and 12 in the Subsurface Disposal Area (SDA) were added to waste stream ID-RF-S3114.

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RECORD OF REVISION (Continued)

Revision Number	Date Approved	Description of Revision
6	08/15/2012	1. Added 85-gallon drum packaging configuration. 2. Updated waste stream description and waste stream ID-RF-S3114 Waste Material Parameter estimates based on additional radiography and visual examination data. 3. Incorporated changes necessary to address concerns identified in the 2012 Idaho National Laboratory recertification audit. 4. Other miscellaneous changes incorporated as necessary.
7	09/28/2012	1. Revised Sections 4.3, 5.3, 5.4, 5.5, 6.3, 6.4, and 6.5 to add description of waste repackaging operations conducted by the Sludge Repackage Project (SRP) in the Accelerated Retrieval Area-V (ARP-V) enclosure. 2. Other miscellaneous changes incorporated as necessary.
8	02/28/2013	1. Revised to add United States Environmental Protection Agency (EPA) hazardous waste number (HWN) D008 to both waste streams. 2. Other miscellaneous changes incorporated as necessary.

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LIST OF ACRONYMS AND ABBREVIATIONS

AEC	U.S. Atomic Energy Commission
AK	acceptable knowledge
AMWTF	Advanced Mixed Waste Treatment Facility
AMWTP	Advanced Mixed Waste Treatment Project
ATWIR	*Annual Transuranic Waste Inventory Report*
ARP-V	Accelerated Retrieval Project-V
CAS	Chemical Abstract Service
CCP	Central Characterization Program
CFR	Code of Federal Regulations
CH	contact-handled
Ci	Curie
DOE	U.S. Department of Energy
DTF	Drum Treatment Facility
EPA	U.S. Environmental Protection Agency
HEPA	high-efficiency particulate air
HWN	Hazardous Waste Number
IDC	Item Description Code
INL	Idaho National Laboratory
m^3	cubic meters
MBA	material balance account
MDL	method detection limit
mg/kg	milligrams per kilogram
nCi	nano-curie
NDA	nondestructive assay
NGS	neutrons/gram/second
NWPA	*Nuclear Waste Policy Act*
OASIS	Organic and Sludge Immobilization System
PCB	polychlorinated biphenyl
ppm	parts-per-million
PRQL	program required quantitation limit
PVC	polyvinyl chloride
QA	quality assurance
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
RTL	regulatory threshold limit

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LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

RTR	real-time radiography
RWMC	Radioactive Waste Management Complex
SRP	Sludge Repackage Project
SVOC	semi-volatile organic compound
TIC	tentatively identified compound
TRU	Transuranic
TRUCON	TRUPACT-II Content Code
TSA	Transuranic Storage Area
TSCA	Toxic Substances Control Act
TWBIR	*Transuranic Waste Baseline Inventory Report*
UCL_{90}	90-percent Upper Confidence Limit
VE	visual examination
wt%	weight percent
WIPP	Waste Isolation Pilot Plant
WIPP-WAC	*Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
WIPP-WAP	*Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Waste Analysis Plan*
WWIS	WIPP Waste Information System

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1.0 EXECUTIVE SUMMARY

This acceptable knowledge (AK) Summary Report has been prepared for the Central Characterization Program (CCP) for contact-handled (CH) transuranic (TRU) immobilized organic liquid waste (waste streams ID-RF-S3114 and ID-RF-S3150-A) generated at the Rocky Flats Environmental Technology Site (formerly Rocky Flats Plant) in Golden, Colorado, and transferred to the Idaho National Laboratory (INL). The waste is stored at Radioactive Waste Management Complex (RWMC) Transuranic Storage Area (TSA) at the INL. This report was prepared in accordance with CCP-TP-005, *CCP Acceptable Knowledge Documentation* (Reference 1), to implement the AK requirements of *Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Waste Analysis Plan* (WIPP-WAP) (Reference 2); and DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant* (WIPP-WAC) (Reference 3).

The WIPP-WAP AK requirements are addressed in CCP-PO-001, *CCP Transuranic Waste Characterization Quality Assurance Project Plan* (Reference 5). The WIPP-WAC AK requirements are addressed in CCP-PO-002, *CCP Transuranic Waste Certification Plan* (Reference 9). Additionally, this report provides the AK information required by CCP-PO-003, *CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC)* (Reference 11).

The CCP is tasked with certification of CH TRU waste for transportation to and disposal at the Waste Isolation Pilot Plant (WIPP). This document was developed in accordance with procedure CCP-TP-005 (Reference 1), that directs how AK is collected, reviewed, and managed by the CCP. The CCP is responsible for AK development in accordance with CCP-TP-005 and reviews and approves this AK Summary Report. CCP maintains responsibility for this AK Summary Report and all CCP-TP-005 generated forms and records as quality assurance (QA) records. In addition, CCP maintains a copy of the "historical source documents" as non-QA records.

This AK Summary Report, along with referenced supporting documents, provides a defensible and auditable record of AK for immobilized organic liquid waste streams ID-RF-S3114 and ID-RF-S3150-A from the Building 774. The references and AK source documents used to prepare this report are listed in Sections 8.0 and 9.0. The source documents cited throughout this report are identified by alphanumeric designations corresponding to a unique Source Document Tracking Number (i.e., C001, D001, M001, P001, and U001).

This AK Summary Report includes information relating to Rocky Flats history, process operations, and waste management practices. Information contained in this report was obtained from numerous sources, including historical document archives, generator and storage facility waste records and documents, and interviews with cognizant personnel. Additionally, AK generated by the Rocky Flats, the 3,100 cubic meters (m^3) Project at INL, and the Advanced Mixed Waste Treatment Project (AMWTP) at INL, TRU waste certification programs for immobilized organic liquid wastes were compiled and incorporated into the CCP AK record for waste streams ID-RF-S3114 and

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ID-RF-S3150-A. This AK Summary Report includes original source documentation, AK reports, waste stream profiles, and confirmation data generated for Rocky Flats immobilized organic liquid wastes assessed by these programs.

This AK Summary Report and supporting source documentation provide the mandatory waste program and waste stream-specific information required by the WIPP-WAP (Reference 2). The AK sources referenced within this report by alphanumeric designators (i.e., C001, M001, P001, and U001) correspond to a unique CCP Source Document Tracking Number as defined in Section 3.0.

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2.0 WASTE STREAM IDENTIFICATION SUMMARY

Site Where TRU Waste Was Generated and Stored

Generation Location:
Rocky Flats Environmental Technology Site
10808 Highway 93
Golden CO, 80402
U.S. Environmental Protection Agency (EPA) ID No. CO7890010526

Storage Location:
INL RWMC
EPA ID No. ID4890008952

Facility Where TRU Waste Was Generated

This waste was generated at Rocky Flats in Building 774. Refer to Section 4.1.2.

Facility Mission

Rocky Flats had two primary missions: the production of triggers for nuclear weapons, and the processing of retired weapons for plutonium recovery. The triggers, also known as pits, were the first-stage fission bombs used to initiate the second-stage fusion reaction in hydrogen bombs. Plutonium metal was recovered from retired warheads and manufacturing residues for reuse (Refer to Section 4.2).

Table 2-1. Immobilized Organic Liquids Waste Stream Summary

Waste Stream Number	EPA Hazardous Waste Numbers (HWN)	IDC/Description
ID-RF-S3114	D008, D022, D026, D027, D028, D029, D030, D032, D034, D036, D037, F001, F002, F005	003, Organic Setups
ID-RF-S3150-A	D008, D022, D028, D029, D030, D032, D034, D036, D043, F001, F002, F005	700, OASIS Waste
		801, Solidified Organics

2.1 Waste Stream ID-RF-S3114

Summary Category Group: S3000 – Homogeneous Solids

Waste Matrix Code Group: Solidified Organics

Waste Matrix Code: S3114, Absorbed Organic Liquids

TRUPACT-II Content (TRUCON) Code: ID 112/ID 212

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Waste Stream Annual Transuranic Waste Inventory Report (ATWIR) ID: IN-ID-RF-S3114

Layers of Confinement: Maximum of two (2) layers

Waste Stream Description:

This waste consists of various organic liquids that were transferred to Building 774 where they were immobilized using Micro-cel E® (a synthetic calcium silicate) to form a grease or paste-like material. The organic liquids were primarily a mixture of oils and chlorinated solvents. Small amounts of Oil-Dri® were sometimes added to the mixture as well. This waste is assigned Item Description Code (IDC) 003, Organic Setups. Small quantities of soil and debris may be present including aluminum, cloth, leather, latex, and Silver Shield gloves, knives, cutters, drum filters, paper, wood, plastic bottles, plastic sleeving, bags, bag stubs, aprons, rubber bands and O-rings, glovebox gloves, high-efficiency particulate air (HEPA) filters, empty cans, graphite, glass, tile, metal liner baskets, lead items (e.g., lead tape, scrap lead, leaded rubber gloves, and lead seals), metal tools, and tray liners (Refer to Section 5.4.1).

Based on generator reported radionuclides, the two predominant isotopes by mass are uranium-238 and plutonium-239. A discussion relating to the radiological characterization of this stream is provided in Section 5.4.2.

Prohibited items potentially in this waste stream are sealed containers greater than four liters, and prohibited liquids (Refer to Section 5.4.4).

Organic setups may be packaged in different configurations. There may be various combinations of rigid liners, polyethylene round bottom drum liners, polyethylene drum bags, and polyvinyl chloride (PVC) O-ring bags used to prepare 55-gallon drums for shipment. Generally, Oil-Dri® was placed in the bottom of the rigid liner, if present, the round bottom liner or drum bag, and the O-ring bag. Organic setup (IDC 003) waste was then placed in the O-ring bag. When a drum was full, the drum liners were twisted and taped closed, the lid was secured with a bolted ring, and a tamper indicating device was attached to the drum. Plastic ties (“zip-ties”) have also been used to seal the plastic drum bags. Hydrogen diffusion rate testing of this supplemental sealing device indicates that it is an acceptable closure method. Absorbent material Oil-Dri® or vermiculite may have been added to the top of the sealed drum bag, or used to fill the space between the outer, sealed polyethylene drum bag and the top of the 90-mil rigid liner.

Based on a review of several waste packaging and inspection procedures, the original drum and rigid liner lids were not vented, nor did the rigid liner lid contain a vent hole when the waste was shipped from the Rocky Flats to INL. As the drums are retrieved for characterization, they are vented and aspirated to ensure equilibration of any gases that may accumulated in the closed container. The maximum number of confinement layers, however, is expected to be two. The rigid liner must be vented and, therefore is not considered a layer of confinement.

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Drums processed in the AMWTP Drum Treatment Facility (DTF) have the rigid liner lids cut out or removed or holes cut and confinement layer bag closures and/or plastic ties cut. Horsetails (i.e., twist and tape bag closure) cut during these operations may be placed on top of the waste. Drums processed in the Advanced Mixed Waste Treatment Facility (AMWTF) will have a rigid liner without a lid and one layer of confinement. Repackaged drums from the Sludge Repackage Project (SRP) will have a rigid liner without a lid and one layer of confinement consisting of a filtered liner bag. Certified 85- or 83-gallon drums containing vented 55-gallon drums with, a rigid liner without a lid, or a punctured rigid liner or with no rigid liner present. A maximum of one layer of confinement due to the TRUCON code used to certify the 85- or 83-gallon drum (Refer to Section 5.5).

Waste stream ID-RF-S3114 meets the WIPP-WAP waste stream definition. The waste stream consists of waste materials that have common physical form, that contain similar hazardous constituents, and that are generated from a single process or activity.

2.2 Waste Stream ID-RF-S3150-A

Summary Category Group:	S3000 – Homogeneous Solids
Waste Matrix Code Group:	Solidified Organics
Waste Matrix Code:	S3150, Solidified Homogeneous Solids
TRUCON Code:	ID 112/ID 212
ATWIR ID:	IN-ID-RF-S3150-A
Layers of Confinement:	Maximum of two (2) layers

Waste Stream Description:

This waste consists of various organic liquids immobilized into a solid monolith by the Organic and Sludge Immobilization System (OASIS) in Building 774. Oil and chlorinated solvent mixtures were the primary liquids treated by OASIS. The organic liquids were immobilized by mixing with water, ENVIROSTONE® emulsifier, accelerator, and gypsum cement. The emulsifier was a polyethylene glycol ether, and the accelerator contained gypsum and potassium sulfate. This waste may also include small amounts of metal and plastic wastes. This waste is assigned IDC 700, OASIS Waste, and IDC 801, Solidified Organics – Building 774. Repackaged solidified organics may also contain Oil Dri® and small quantities of sludge contaminated debris from reprocessing such as tray liners, plastic sheeting, bags, bag stubs, rubber bands, glovebox gloves, lead items (e.g., leaded rubber aprons), HEPA filters, and metal tools (Refer to Section 6.4.1).

Based on generator reported radionuclides, the two predominant isotopes by mass are plutonium-239 or uranium-238. A discussion relating to the radiological characterization of this stream is provided in Section 6.4.2.

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Prohibited items potentially in this waste stream are sealed containers greater than four liters, and prohibited liquids (Refer to Section 6.4.4).

Solidified organics may be packaged in different configurations. There may be various combinations of rigid liner and polyethylene round bottom drum liners, polyethylene drum bags, and PVC O-ring bags. When a drum was full, the drum liners were twisted and taped closed, the lid was secured with a bolted ring, and a tamper indicating device was attached to the drum. Vermiculite and/or Oil-Dri® may have been added or used to fill the space between the outer, sealed polyethylene drum bag and the top of the 90-mil rigid liner. The quantity of absorbent varied and some drums may contain no absorbent.

Based on a review of several waste packaging and inspection procedures, the drum and rigid liner lids were not vented, nor did the rigid liner lid contain a vent hole when the waste was shipped from Rocky Flats to INL. As the drums are retrieved for characterization, they are vented and aspirated to ensure equilibration of any gases that may have accumulated in the closed container. The maximum number of confinement layers however is expected to be two. The rigid liner must be vented and therefore is not considered a layer of confinement.

In some instances, a drum may appear to contain three horsetails (i.e., twist and tape bag closure) because in addition to the two plastic bags that were twisted and taped closed, a bag stub remaining from a previous bag cut was put on top of the waste in the subsequent run. In some cases, only two horsetails may be present because two or three bag stubs were collected in the glovebox before adding them to the top of the waste. This resulted in some drums with what may appear to be four or five horsetails (two plastic bags that were twisted and taped closed plus two or three bag stubs). When the OASIS process first started, sometimes there were problems with the agitator tearing into the inner plastic bag. In this instance, another plastic bag was put around the waste. There will be very few drums like this because the problem was quickly fixed by attaching Tygon tubing to a vacuum pump and inserting the tubing between the rigid liner and the polyethylene drum liner bag which kept the agitator from contacting the plastic bag. With any of these conditions, only the two plastic bags that were twisted and taped closed are considered layers of confinement.

Drums processed in the AMWTP DTF have the rigid liner lids cut out or removed or holes cut and confinement layer bag closures and/or plastic ties cut. Horsetails (i.e., twist and tape bag closure) cut during these operations may be placed on top of the waste.

Repackaged drums from the SRP will have a rigid liner without a lid and one layer of confinement consisting of a filtered liner bag (Refer to Section 6.5).

Waste stream ID-RF-S3150-A meets the WIPP-WAP waste stream definition. The waste stream consists of waste materials that have common physical form, that contain similar hazardous constituents, and that are generated from a single process or activity.

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3.0 ACCEPTABLE KNOWLEDGE DATA AND INFORMATION

TRU waste destined for disposal at the WIPP must be characterized prior to shipment. The WIPP-WAP (Reference 2) requires the use of knowledge of the materials and processes that generate and control the waste to provide a clear and convincing argument about the characteristics of each waste stream. The AK characterization documented herein complies with the requirements of the WIPP-WAP and was developed in accordance with CCP-PO-001 (Reference 5), and CCP-TP-005 (Reference 1).

This AK Summary Report includes information relating to the facility's history, process operations, and waste management practices related to management and certification of the immobilized organic liquid waste streams ID-RF-S3114 and ID-RF-S3150-A. Information contained in this report was obtained from numerous sources, including historical reports, standard operating procedures, waste inventory information, historical confirmation results (visual examination [VE], real-time radiography [RTR], and headspace gas data), interviews with cognizant personnel, and waste packaging and shipping documentation. The references and AK sources used to prepare this report are listed in Section 8.0. The AK sources referenced within this report by an alphanumeric designator (i.e., C001, M001, P001, and U001) correspond to the Source Document Tracking Number using the following convention:

- C – Correspondence (e.g., interview notes)
- D – Discrepancy reports
- M - Miscellaneous
- P – Published documentation
- U – Unpublished documents and databases

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4.0 REQUIRED PROGRAM INFORMATION

This section provides the waste management program information required by the WIPP-WAP (Reference 2). Included are a brief history of Rocky Flats, a summary of the missions, a discussion of the operations associated with the generation of TRU immobilized organic liquid wastes, and descriptions of the TRU waste management programs at both Rocky Flats and INL. Attachment 1, Acceptable Knowledge Documentation Checklist, for each waste stream (created in accordance with procedure CCP-TP-005) provides a list of TRU waste management program information required to be developed as part of the AK record (Reference 1). This section satisfies those requirements.

4.1 Facility Location and Description

4.1.1 Facility Location

Rocky Flats Environmental Technology Site (formerly Rocky Flats Plant) is located in northern Jefferson County, Colorado, approximately 16 miles northwest of downtown Denver. The 6,550 acre government-owned and contractor-operated facility was part of the nationwide nuclear weapons production complex. A map of the plant highlighting Building 774 which generated immobilized organic liquid TRU waste is provided in Figure 1, Rocky Flats Environmental Technology Site Map, at the end of this report (References P004 and P053).

The drums of immobilized organic liquid waste from Rocky Flats are stored at the INL RWMC located approximately 51 miles west of Idaho Falls, Idaho. The TSA is a 58-acre area in the eastern section of the RWMC dedicated to the storage of TRU waste received at the RWMC after 1970. TRU waste received from Rocky Flats was placed in retrievable storage on asphalt pads and covered with earth. More recently, waste in drums and boxes was stored in metal buildings called storage modules. Maps showing the location of the RWMC and TSAs are provided in Figure 2, Location of the INL Radioactive Waste Management Complex and Figure 3, Radioactive Waste Management Complex Map (References P508 and P509).

4.1.2 Facility Description

Ground breaking for the first permanent buildings at Rocky Flats began in 1951. By 1954, approximately 700,000 square feet of building space had been completed. As the plant operations expanded, as much as 1.6 million square feet were occupied by manufacturing, chemical processing, plutonium recovery, and waste treatment operations. Plutonium operations were located primarily in the 384 acre high-security area (Reference P053).

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Building 774, Liquid Waste Processing Facility – When Building 774 was built in 1953, its primary purpose was to treat radioactive aqueous waste from Building 771. In 1965, the Building 774 Grease Plant began processing organic liquid wastes generated from plutonium machining and other operations. The Grease Plant shut down in 1985 and was replaced by a new treatment process called the Organic and Sludge Immobilization System, or OASIS (References P052 and P053).

4.2 Mission

Rocky Flats had two primary missions during the period of operations from 1952 through 1990: the production of triggers for nuclear weapons, and the processing of retired weapons for plutonium recovery. The triggers, also known as pits, were the first-stage fission bombs used to initiate the second-stage fusion reaction in hydrogen bombs. Plutonium (Pu) metal was recovered from retired warheads and manufacturing residues and was also imported from the Hanford Reservation in Washington State and the Savannah River Plant in South Carolina (References P004 and P053).

In general, the plant's primary mission changed little from 1952 until 1990 when plutonium operations were suspended. In the early 1960s, the U.S. Atomic Energy Commission (AEC) implemented the single mission concept to reduce redundant operations between AEC facilities. At that time, Rocky Flats became the primary manufacturer for nuclear weapons triggers. With the exception of periodic refinements, only three trigger configurations were manufactured at the plant. The first two trigger designs were solid units manufactured primarily of uranium, similar to the devices used during World War II. In 1957, the trigger design was changed to sealed hollow spheres which were manufactured with much less uranium and more plutonium. This design change resulted in lighter, smaller, and more powerful weapons (Reference P053).

The general design of the trigger has not changed dramatically since 1958, although modifications to the relative amounts of metals, dimensions, and other features of the parts were modified over the years. The plant also supported weapons development programs responsible for fabricating, testing, and assembling parts with new geometries or metal compositions. Because of the plant's metal manufacturing capabilities, Rocky Flats often fabricated other weapons parts, including components made of stainless steel and beryllium (Reference P053).

4.2.1 Defense Waste Assessment

The WIPP-WAC (Reference 3) requires generator sites to use 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 part by one of the atomic energy defense activities listed in Section 10101(3) of the *Nuclear Waste Policy Act of 1982* (NWPA) (Reference 6). As previously described, the atomic energy defense activity that applies to the TRU wastes generated by Rocky Flats is weapons activities.

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4.2.2 Spent Nuclear Fuel and High-Level Waste Assessment

The *Waste Isolation Pilot Plant Land Withdrawal Act* bans the disposal of spent nuclear fuel and high-level waste, as defined by the NWPA, at WIPP. According to the NWPA, spent nuclear fuel is "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing." High-level waste is defined by the NWPA as "the highly radioactive material resulting from the reprocessing of spent nuclear fuel, 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 (References 6 and 14)."

Rocky Flats did not have a reactor, and the waste does not contain irradiated fuel elements withdrawn from a reactor (References P004 and P053). Therefore, the waste is not spent nuclear fuel or high-level waste and is eligible for disposal at WIPP (References 3 and 6).

4.3 Description of Waste Generating Process

Organic liquid wastes from numerous buildings on site were transferred to Building 774 for treatment. The liquids were then treated as described in the following sections.

4.3.1 Organic Liquid Waste Generation

The organic liquids were transferred to Building 774 by pipeline or in containers. The organic liquids originated in Buildings 334, 371, 443, 444, 447, 559, 707, 776, 777, 778, 779, 865, 881, 883, and 991 (References U040 and U043). In about 1985, organic wastes were segregated into either low-level or TRU tank systems. Prior to this, low-level and TRU liquids were collected together (Reference U040).

Waste oils and solvents were generated primarily in Buildings 707 and 777. A cutting oil, usually Texaco Regal® A (a nonhazardous oil similar to Regal® R&O 32), flowed onto a part during machining (References P052, P077, and P518). After machining, the part was rinsed to remove residual oil. Various solvents were used to rinse machined parts and degrease tools. These included carbon tetrachloride, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,1-trichloroethane, trichloroethylene, and tetrachloroethylene. Ultrasonic cleaner baths using 1,1,1-trichloroethane were used to clean parts. Metal turnings and scrap were cleaned in carbon tetrachloride baths before forming the turnings into briquettes (References P052, P053, and P077).

Trichloroethylene was replaced by 1,1,1-trichloroethane for vapor degreasing of plutonium parts beginning around 1973. By the end of 1974, trichloroethylene remained in use in only one plutonium operation, and by February 1975, was used only in research and analytical activities (Reference P023). Since 1985, the solidified organic waste was derived almost exclusively from Buildings 707 and 777 (Reference U040).

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A logbook was used in Building 774 to record the types of organic waste and generation source of the liquids that made up the immobilized organic liquids wastes. The date of treatment, generation location, waste description, and volume of waste were entered in the logbook. A description of the organic liquids and the buildings from which they originated are presented in Table 4-1, Organic Liquid Wastes Identified in Building 774 Logbooks (References U040 and U043). Information in parentheses does not appear in the logbook but is provided as clarification.

Table 4-1. Organic Liquid Wastes Identified in Building 774 Logbooks

Building	Organic Liquid Waste Description
334	Waste oil, PCBs (polychlorinated biphenyls), Zyglo (Zyglo is a dye penetrant compound containing fluoranthene, petroleum distillates, and kerosene) (Reference P142)
371	Oil
443	Oil
444	Oil, trichlor (assumed to be 1,1,1-trichloroethane), Freon
447	Oil
559	Pump oil, oil, toluene/H_3 (assumed to be tritium), silicon oil, organic waste (xylene/DHDECMP [dihexyl-n,n-diethylcarbamoyl methylphosphonate]) (References C032 and C086)
707	Oil samples, hydraulic oil
771	Oil, etch solution, Freon oil, oil/CCl_4, mixed organics, halocarbon oil, TBP (assumed to be tributyl phosphate), organic extract, Chlorothene (Chlorothene is a trade name for 1,1,1-trichloroethane)
776	Engine oil, tube oil, lathe cutting oil
777	Coolant oil/CCl_4, perc (assumed to be tetrachloroethylene), trichloroethylene
778	Oil, Pydraul oil (Pydraul products are hydraulic oils containing triphenyl phosphate, trialkylphenyl phosphates, and alkyl aryl phosphates) (Reference P091)
779	Hydraulic oil, equipment oil, H_3 (assumed to be tritium)/toluene, Freon
865	Beryllium waste oil
881	Oil, machine coolant, perchlor (assumed to be tetrachloroethylene), waste cocktail (assumed to be scintillation cocktail), Varsol oil (Varsol is a trade name petroleum solvent containing primarily saturated hydrocarbons and less than 2 percent toluene, xylene, and ethyl benzene) (Reference P084)
883	Oil, cooling solvent, D-38 (depleted uranium) oil, oil and perk (assumed to be tetrachloroethylene)
991	Coolant, band saw coolant

In addition to information obtained from treatment logbooks, other sources of information were reviewed to identify potential organic chemicals treated in Building 774. This information is presented in Table 4-2, Organic Liquid Wastes Generation.

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Table 4-2. Organic Liquid Wastes Generation

Chemical	Use
1,1,1-Trichloroethane	Plutonium fabrication (References P060, P079, and P520) Research and development (References P079 and P520) Analytical laboratory reagent (References P053 and P076) Metallography laboratory (Reference P520)
1,1,2-Trichloro-1,2,2-triflouroethane (Freon TF)	Plutonium fabrication (References P060 and P079) Depleted uranium fabrication (Reference P520) Beryllium fabrication (Reference P520) Stainless-steel fabrication (Reference P520) Research and development (Reference P520) Analytical laboratory reagent (References P052 and P076)
1,1-Dichloroethylene	Analytical laboratory reagent (Reference P052)
1,2-Dichloroethane	Analytical laboratory reagent (Reference P052)
2-Ethoxyethanol	Analytical laboratory reagent (Reference P052)
Acetone	Plutonium fabrication (Reference P520) Beryllium fabrication (Reference P520) Research and development (Reference P062) Analytical laboratory reagent (References P052 and P076)
Benzene	Plutonium fabrication (Reference P053) Analytical laboratory reagent (References P053 and P076)
Carbon disulfide	Analytical laboratory reagent (Reference P076)
Carbon tetrachloride	Plutonium fabrication (References P060 and P520) Analytical laboratory reagent (References P053 and P076)
Chloroform	Analytical laboratory reagent (References P053 and P076) Research and development (Reference P052)
Chlorobenzene	Analytical laboratory reagent (Reference P081)
Cyclohexane	Analytical laboratory reagent (Reference P081)
Decane	Analytical laboratory reagent (Reference P076)
Dodecane	Analytical laboratory reagent (Reference P076)
Ethanol	Plutonium fabrication (Reference P520) Beryllium fabrication (Reference P520) Research and development (References P062 and P520) Metallography laboratory (Reference P520)

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Table 4-2. Organic Liquid Wastes Generation (Continued)

Chemical	Use
Ethyl benzene	Depleted uranium fabrication (Reference P052) Research and development (Reference P052) Analytical laboratory reagent (Reference P052)
Ethyl ether	Analytical laboratory reagent (Reference P076)
Hexadecane	Analytical laboratory reagent (Reference P076)
Hexane	Analytical laboratory reagent (References P076 and P520)
Isooctane	Analytical laboratory reagent (Reference P076)
Isopropanol	Beryllium fabrication (Reference P520) Analytical laboratory reagent (References P052 and P076)
Methanol	Research and development (Reference P062) Analytical laboratory reagent (References P052 and P076)
Methyl ethyl ketone	Research and development (References P052 and P062) Analytical laboratory reagent (Reference P052)
Methylene chloride	Research and development (References P052 and P062) Analytical laboratory reagent (References P053 and P076)
Naphthalene	Analytical laboratory reagent (Reference P076)
Nitrobenzene	Analytical laboratory reagent; non-solvent use (Reference P052)
Oil	Plutonium fabrication (References P060, P078, and P079) Depleted uranium fabrication (Reference P520) Equipment lubrication (References P061, P077, P078, P082, and P520) Hydraulic equipment (References P060, P061, P078, and P079)
Petroleum ether	Analytical laboratory reagent (Reference P076)
Tetrachloroethylene	Plutonium fabrication (Reference P520) Depleted uranium fabrication (Reference P053) Stainless-steel fabrication (Reference P520) Analytical laboratory reagent (References P052 and P053)
Toluene	Analytical laboratory reagent (References P052 and P076)
Trichloroethylene	Plutonium fabrication (References P023 and, P052) Beryllium and uranium fabrication (Reference P053) Stainless-steel fabrication (Reference P520) Analytical laboratory reagent (References P053 and P076) Decontamination solvent (Reference P053)
Xylene	Analytical laboratory reagent (References P052 and P076)

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4.3.2 Organic Liquid Waste Treatment

In 1965, the Building 774 Grease Plant began processing organic liquid wastes generated from plutonium machining and other operations. In this process, the organic liquids were processed through an extruder with a synthetic calcium silicate called Micro-cel E® to form a grease or paste-like material (References P002, P024, and P517). A more detailed description of this process is provided in Section 5.3.

Although the calcium silicate was thought to produce an acceptable waste form, it was later determined to cause problems with water desorption. Beginning in 1983, the suitability of various other solidification media were investigated using simulated TRU organic waste (i.e., non-radioactive). The media investigation included ENVIROSTONE® gypsum cement, Type I Portland cement, Portland cement with Oil-Dri® clay absorbent, gypsum cement with Portland cement, and gypsum cement with clay absorbent. Evaluation of the various solidification media was based on suitability for immobilizing organic wastes, waste loading efficiency, required set time, production of a free-standing monolithic solid containing no free liquid, and the estimated cost of production-scale operation. ENVIROSTONE® gypsum cement proved most applicable to the organic wastes handled by the Building 774 Liquid Waste Processing Facility (References P002, P519, and U010).

The Grease Plant shut down in 1985 and was replaced by the new ENVIROSTONE® process called the OASIS. In this process, the liquids were immobilized by mixing with water, and ENVIROSTONE® emulsifier, accelerator, and gypsum cement to produce a solid monolith (References P016, P052, and P053). A more detailed description of this process is provided in Section 6.3.

4.3.3 Waste Repackaging and Liquid Waste Remediation

Drums of solidified organic waste containing liquids are remediated and or repackaged in the AMWTP DTF, located in Building WMF-628; the AMWTF), Building WMF-676; or the SRP. In the DTF drums are processed to remove liquids as necessary by liquid absorption with Aquaset-IIG or Micro-cel E® or shaker table operations. As part of the processing, the rigid liner lids are cut out or removed and all layers of confinement are breached. Rigid liner lids may be replaced provided vent holes are visible by RTR. Other operations conducted may include drum rigid liner removal and repackaging, replacing drum lids, and over packing or un-over packing 55-gallon drums in 83- or 85-gallon drums (References C515, P535, and P536).

Drums repackaged in the AMWTF will be characterized by VE to remove prohibited items including liquids through absorption as necessary with Micro-cel E® (References C518 and P536).

Drums repackaged in the SRP will be characterized by VE in the Accelerated Retrieval Project-V (ARP-V) enclosure to breach layers of confinement, segregate prohibited items, and remove liquids as necessary with granular absorbent such as Oil Dri® (References C522, P542, P543, P544, and P545).

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4.4 TRU Waste Management

Waste materials contaminated with TRU radionuclides were generated during the fabrication, assembly, and processing of nuclear weapons components. The term "transuranic" refers to the man-made actinide elements with atomic numbers greater than uranium (atomic number 92). Plutonium and americium are the primary TRU actinides encountered in DOE weapons facilities, including Rocky Flats (Reference P020). Since the mid 1980s, the DOE has defined TRU waste as materials contaminated with greater than or equal to 100 nanocuries (nCi) of alpha-emitting TRU radionuclides with a half-life greater than 20 years per gram (g) of waste.

After containers were assayed, they were sent to Building 776 for inspection. Containers would undergo a physical inspection that included content verification, free liquid detection, and a waste packaging conformance check. Rejected waste packages were returned to the generator for corrective action (References P014 and P043). As a final quality assurance verification, RTR was performed on each container to verify correct contents and the absence of free liquids (Reference P001).

4.4.1 Types and Quantity of TRU Waste Generated

Waste streams ID-RF-S3114 and ID-RF-S3150-A are characterized under the Resource Conservation and Recovery Act (RCRA) as hazardous waste. These wastes have been historically managed at Rocky Flats and INL as mixed waste. The physical, radiological, and chemical characteristics of these wastes are presented in Sections 5.4 and 6.4. The approximate number of 55-gallon drums by IDC in each waste stream is provided in Table 4-3, Waste Stream Volumes (References C521, D005, P515, P539, and U092).

Table 4-3. Waste Stream Volumes

Waste Stream Number	Item Description Code	Number of 55-Gallon Drums
ID-RF-S3114	003	9,879[1]
ID-RF-S3150-A	700	60
	801	798

1. This includes 836 drums overpacked in 85-gallon drums to be certified and shipped to WIPP in the 85-gallon drums.

4.4.2 Correlation of Waste Streams Generated from the Same Building and Process

The WIPP-WAP defines a waste stream as waste materials that have common physical form, that contain similar hazardous constituents, and that are generated from a single process or activity. Although IDCs 003, 700, and 801 were generated by organic liquid waste treatment operations in Building 774, the treatment process that produced IDC 003 was different from that of IDCs 700 and 801 resulting in two distinctly different waste forms. Therefore, two separate waste streams were delineated. The delineation of these waste forms as two separate waste streams is consistent with the Rocky Flats, AMWTP, and 3,100 m^3 TRU Waste Programs for the same IDCs (References P507,

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P516, P521, P522, and U099). CAO-95-1121, Revision 3, *Transuranic Waste Baseline Inventory Report* (TWBIR) and ATWIR Identification Numbers assigned to this waste are identified in Table 4-4, ATWIR Identification Numbers.

Table 4-4. ATWIR Identification Numbers

Waste Stream Number	1995 TWBIR (Reference 7)	2012 ATWIR (Reference 8)
ID-RF-S3114	IN-W167.149, IN-W167.926, IN-W309.609, IN-W309.610	IN-ID-RF-S3114
ID-RF-S3150-A	IN-W164.153, IN-W164.1060	IN-ID-RF-S3150-A

Container specific AK information has been reviewed for every drum in waste streams ID-RF-3114 and ID-RF-S3150-A to verify the physical composition (i.e., verify the assigned IDC) and area of generation (container prefix) assuring that each container was generated by the Rocky Flats operations described in this report. Each container evaluated will be incorporated into the most current *AK Containers List* (refer to Section 7.0).

4.5 Waste Identification and Categorization Schemes

When waste was initially packaged, it was segregated by the type of waste matrix and identified by an IDC. IDCs are a series of three-digit numbers used to identify nuclear material forms or process materials (References P004 and P063). The IDCs assigned to the waste in this waste stream are as follows (Reference P507):

- IDC 003, Organic Setups
- IDC 700, OASIS Waste
- IDC 801, Solidified Organics – Building 774

Refer to Sections 5.4.1 and 6.4.1 for a more detailed description of these IDCs.

Once a drum was full, a prefix and serial number were assigned by nuclear material accountability personnel. The prefix corresponds to a material balance account (MBA) used to control the transfer of nuclear material. The MBA can be correlated to an area within a particular building. The prefix is identified by the middle part of the container number (i.e., 0743 is the prefix for drum number IDRF074311598). The last five digits of the drum number are the serial numbers that indicate the sequence in which drums were packaged within a given prefix (References C170, C184, P090, P502, P505, U059, and U069).

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Organic setups or “grease” historically generated prior to the development of IDC 003 (prior to 1971) are categorized as “743 series sludge” or “743 grease” (References C516, P532, and P537). Drums of the pre-IDC 003 grease assigned IDC RF-743 are considered part of the ID-RF-S3114 waste stream. These RF-743 drums were retrieved from Pits 11 and 12 in the subsurface disposal area (SDA) (References C518, P536, and P539).

4.6 Waste Certification Procedures

In the CCP program under which the subject waste streams will be certified for shipment to WIPP, CCP-TP-005 (Reference 1), directs compilation and confirmation of AK. CCP certifies TRU waste under the program described in CCP-PO-002 (Reference 9).

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5.0 REQUIRED WASTE STREAM INFORMATION – WASTE STREAM ID-RF-S3114

This section presents the mandatory AK for waste stream ID-RF-S3114 required by the WIPP-WAP (Reference 2). Attachment 1 for this waste stream (created in accordance with procedure CCP-TP-005) provides a list of TRU waste stream information required to be developed as part of the AK record (Reference 1).

5.1 Area and Building of Generation

Waste stream ID-RF-S3114 was generated by the Grease Plant in Building 774 (References P090, P502, P505, U059, U069, and U505).

5.2 Waste Stream Volume and Period of Generation

The volume and generation date range for the drums that have been evaluated for inclusion in waste stream ID-RF-S3114, as well as the projected volumes, are presented in Table 5-1a, Waste Stream ID-RF-S3114 Volume and Generation Dates (References C517, C521, M001, P515, P539, and U092). The specific container numbers are provided in the *AK Container List* (refer to Section 7.0).

Table 5-1a. Waste Stream ID-RF-S3114 Volume and Generation Dates

Item Description Code	Current Volume		Future Projections	Total[2]
	Number of 55-Gallon Drums[2]	Generation Date Range	Number of 55-Gallon Drums[1]	
003	7,440	6/1968 – 4/1998	2,439	9,879

1. These drums are either in accessible storage without filter vents or remain in retrievable storage on pads under earthen cover.
2. The current volume and total volume includes 836 drums overpacked in 85-gallon drums to be certified and shipped to WIPP in the 85-gallon drums (Reference C521).

The Grease Plant shut down in 1985 and was replaced by the OASIS process. Waste stored at the TSA with closure dates later than 1986 are the result of waste characterization activities, such as VE or repackaging (References P052 and P507).

5.3 Waste Generating Activities

Waste stream ID-RF-S3114 consists of immobilized organic liquids produced in the Grease Plant. In this process, the organic liquids were processed through an extruder with Micro-cel E®, a synthetic calcium silicate (References P002 and P517). Small amounts of Oil-Dri® absorbent were sometimes added to the mixture as well (Reference P024). The amounts of materials added to the mixture were not metered; however, the operator would adjust the composition if the outgoing mixture did not have a paste-like consistency. The mixture would then drop into a PVC O-ring bag contained in a 55-gallon drum (Reference P016). The composition of organic setups was approximately 30-gallons of liquid organic waste to 100 pounds of Micro-cel E®

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(Reference P024). The Grease Plant is illustrated in Figure 4, Grease Plant (Reference P052).

As described in Section 4.3.3 drums in this waste stream are remediated in the AMWTP DTF, AMWTF, or SRP. The drums are processed in the DTF to breach layers of confinement, segregate prohibited items, and remove liquids as necessary by liquid absorption and/ or shaker table operations. Other operations conducted may include rigid liner removal and repackaging, and drum over packing and un-over packing. Secondary waste items, such as leather, latex, and Silver Shield gloves, knives, cutters, drum filters, and plastic sleeving and aprons, may be packaged in the remediated drums (References C515, P535, and P536).

Drums repackaged in the AMWTF and SRP will be characterized by VE to breach layers of confinement, segregate prohibited items, and remove liquids as necessary by absorption (References C518, C522, P536, P542, P543, and P544). Incidental spills of waste material during SRP reprocessing activities will be collected with small quantities of surrounding soil and included with the sludge (References P542, P543, and P546).

5.4 Type of Wastes Generated

This section describes the process inputs, Waste Matrix Code assignment, radionuclide contaminants, and hazardous waste determinations for waste stream ID-RF-S3114.

5.4.1 Material Input Related to Physical Form

Waste stream ID-RF-S3114 consists of organic liquids that have been mixed with an absorbent material. The following is a description of this waste:

IDC 003, Organic Setups: This waste consists of various organic liquids that were transferred to Building 774 where they were immobilized using Micro-cel E® (a synthetic calcium silicate) to form a grease or paste-like material (References P002, P024, and P517). The organic liquids were primarily oil and chlorinated solvent mixtures (References P016, P024, P052, and P518). Small amounts of Oil-Dri® were sometimes added to the mixture as well (References P024, P542, P543, and P544). Sludge repackaged in the SRP may also include small quantities of solidified decontamination solution and soil. Equipment in the ARP-V enclosure may be decontaminated with water and Simple Green prior to maintenance and the resulting liquid absorbed with Oil- Dri® and added to the sludge (Reference C522). Incidental spills of waste material during reprocessing activities will be collected with small quantities of surrounding soil and included with the sludge (References P542, P543, and P546). Small quantities of debris may be present including aluminum, cloth, leather, latex, and Silver Shield gloves, knives, cutters, drum filters, paper, wood, plastic bottles, plastic sleeving, bags, bag stubs, aprons, rubber bands and O-rings, glovebox gloves, HEPA filters, empty cans, graphite, glass, tile, metal liner baskets, lead items (e.g., lead tape, scrap lead, leaded rubber gloves, and lead seals), metal tools, and tray liners (References C515, D023, D024, P024, P535, P536, P542, P543, P544, U517, U518, U519 and U520).

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5.4.1.1 Waste Matrix Code

As described in Section 5.4.1, this waste stream is comprised of organic liquids that have been mixed with an absorbent material. Therefore, Waste Matrix Code S3114, Absorbed Organic Liquids, is applied to waste stream ID-RF-S3114. The definition of this Waste Matrix Code is provided in DOE/LLW-217, *DOE Waste Treatability Group Guidance* (Reference 10). This category includes waste that is at least 50 percent, by volume, inorganic particulate absorbent with absorbed organic liquids (Reference D004).

5.4.1.2 Waste Material Parameters

The predominant waste material parameters associated with waste stream ID-RF-S3114 are:

- Organic matrix (absorbent and organic liquid mixture)
- Other inorganic materials (Oil-Dri® or vermiculite)[1]
- Steel (packaging materials)
- Plastic (packaging materials)
- Cellulosics (paper and wood)

To estimate the waste material parameter weight percentages for waste stream ID-RF-S3114, data were obtained from CCP, AMWTP, and the WIPP Waste Information System (WWIS) database as of October 3, 2006. The CCP and AMWTP data were derived from RTR and VE of Rocky Flats absorbed organic liquid wastes by the CCP and AMWTP TRU waste certification programs at INL. The WWIS data were derived from RTR and VE of Rocky Flats absorbed organic liquid wastes by the Rocky Flats TRU waste certification program.

The number of containers from the Rocky Flats TRU waste certification program that were evaluated is 11. The number of containers from the CCP and AMWTP TRU waste certification programs that were evaluated is 2,932. The current volume of waste stream ID-RF-S3114 is 7,440 containers. Therefore, these 2,932 containers represent 39 percent of the current CCP waste stream volume. The original closure dates for the 7,440 containers in this waste stream range from October 1969 to September 1988. There are more than 2,000 containers in the waste stream generated before August 1975, but only 17 containers generated after February 1986. Although the evaluation is based on a relatively small percentage of the waste stream, the Grease Plant was a waste treatment process that produced a consistent sludge-like material, and that process did not change during this time period. It is not expected that the waste generated prior to 1975 would be dissimilar to the wastes that have undergone RTR and VE. Therefore, the WWIS data for these 2,943 containers are representative of waste stream ID-RF-S3114 as a whole.

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[1] Additional absorbents (e.g., Oil-Dri® or vermiculite) were sometimes added on top and bottom of the waste inside and outside the plastic bag. These absorbents may not be distinguishable from the organic matrix.

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A statistical analysis of the data was performed, the results of which are presented in Table 5-1b, Waste Stream ID-RF-S3114 Waste Material Parameter Weights. This evaluation is documented in a memorandum (included with Attachment 6) as required by CCP-TP-005 (Reference 1).

Table 5-1b. Waste Stream ID-RF-S3114 Waste Material Parameter Weights

Waste Material Parameter	Average Weight Percent	Weight Percent Range
Iron-Based Metals/Alloys	0. 53%	0.0 – 17.22%
Aluminum-Based Metals/Alloys	<0.01%	0.0 – 0.01%
Other Metals	<0.01%	0.0 – 2.44%
Other Inorganic Materials	1.96%	0.0 – 7.28%
Cellulosics	0.02%	0.0 – 9.95%
Plastics (waste materials)	0. 84%	0.0 – 5.06%
Rubber	<0.01%	0.0 – 8.36%
Organic Matrix	96.58%	75.65 – 100%
Inorganic Matrix	0.0%	0.0 – 0.0%
Soils/Gravels	<0.01%	0.0 – <0.01%
Total Inorganic Waste Average	**2.49%**	
Total Organic Waste Average	**97.51%**	

5.4.2 Radiological Characterization

Historical assay values for waste drums were obtained from radiochemical analyses of batch treatments or analysis results of individual bottles and drums that were received for processing. Average values were usually assigned to waste drums (References P016 and P024). Documented assay results and treatment logbook descriptions for this waste indicate the presence of plutonium, americium-241, tritium, uranium-235, and uranium-238 (References P016, P024, P033, and U040).

TRU waste oils and solvents were generated primarily in Buildings 707 and 777. Radionuclide contamination in waste from Building 707 primarily consisted of weapons-grade plutonium from fabrication operations (References P052 and P053). Building 777 performed disassembly of site-return parts and fabrication operations (References C184, P052, and P079). Waste from fabrication operations will be contaminated with weapons-grade plutonium and enriched uranium. Wastes generated by disassembly operations will be contaminated with site-return plutonium (higher americium-241 decay product) and enriched uranium (References C184 and P079). Tritium may also be present from disassembly and subsequent processing of site-return components (Reference P053). The isotopic compositions of weapons-grade plutonium and enriched uranium are presented in Section 5.4.2.2.

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Waste oils or solvents contaminated with depleted uranium were generated from fabrication operations in Buildings 444, 447, 865, and 883 (Reference P053). The isotopic composition of depleted uranium is presented in Section 5.4.2.2.

Research and Development (R&D) and analytical support operations also generated waste oils and solvents (References U040 and U043). In addition to supporting production operations, these R&D and analytical activities used several other radioisotopes that may be present in trace quantities, including (References C134, C137, C154, C159, C171, C185, P053, P164, P167, P178, P179, P180, P181, P182, P183, P184, P185, P186, P187, P188, P189, P190, P191, P192, P193, P194, P195, P196, P197, P198, P199, P200, P201, P202, P507, and U064):

- Americium-240, -241, -243
- Californium-252
- Curium-244
- Neptunium-237
- Plutonium-238, -241, -242 (non-weapons-grade material)
- Plutonium (12 weight percent [wt%] Plutonium-238 and ~6 wt% Plutonium-240)
- Plutonium-Low neutrons/gram/second (NGS) (97.7 wt% Plutonium-239 and 2.2 wt% Plutonium-240)
- Thorium-228
- Uranium-232, -233, -235, -236, -238

5.4.2.1 Estimated Radionuclide Quantities

During the INL 3,100 m^3 Project, containers of IDC 003 were assayed for radionuclide content. Table 5-2, Radioassay Data for IDC 003 from the INL 3,100 m^3 Project, contains a summary of these radioassay data (Reference P507).

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Table 5-2. Radioassay Data for IDC 003 from the INL 3,100 m^3 Project

Radionuclide/Calculation	Average	Range		Events
		Low[1]	High	
Americium-241 (g)	5.367E-03	-2.458E-04	2.616E-01	152
Plutonium-238 (g)	1.776E-04	-1.212E-05	1.123E-03	152
Plutonium-239 (g)	1.361E+00	-1.086E-01	7.032E+00	152
Plutonium-240 (g)	8.367E-02	-6.603E-03	4.394E-01	152
Plutonium-241 (g)	2.317E-03	-1.997E-04	1.234E-02	152
Plutonium-242 (g)	5.202E-04	-4.963E-05	3.066E-03	152
Uranium-233 (g)	3.430E-02	3.430E-02	3.430E-02	1
Uranium-234 (g)	2.585E-04	-4.622E-06	5.926E-03	48
Uranium-235 (g)	1.341E-01	-3.477E-02	3.023E+00	66
Uranium-238 (g)	7.027E+01	2.988E-02	8.058E+02	21
Plutonium Equivalent Curies (Ci)	1.263E-01	-9.391E-03	1.146E+00	152
Plutonium Fissile Gram Equivalents (g)	1.427E+00	-1.092E-01	7.066E+00	152
TRU Alpha Activity Concentration (nCi/g)	7.751E+02	-5.440E+01	6.287E+03	152

1. Table 5-2 values are listed directly from the AK source documents. The negative low values are from deficient NDA data results. The assays were outside the system's capabilities; however, since this table summarizes the data the values were left in for completeness (Reference P507).

As can be seen in the above table, uranium-238 may be present in less than 15 percent of the drums but will be in relatively large quantities in those few drums.

5.4.2.2 Use of Radionuclide Isotopic Ratios

The primary radionuclides processed at Rocky Flats included weapons-grade plutonium, enriched uranium, and depleted uranium. The approximate isotopic compositions of these materials are presented in Table 5-3, Isotopic Compositions of Rocky Flats Plutonium and Uranium (References C039, C130, P069, P152, P161, P166, P169, P210, P227, and U064).

Table 5-3. Isotopic Compositions of Rocky Flats Plutonium and Uranium

Weapons-Grade Plutonium	Enriched Uranium	Depleted Uranium
Plutonium-238 0.01 – 0.05%	Uranium-234 0.1 – 1.02%	Uranium-234 0.0006%
Plutonium-239 92.8 – 94.4%	Uranium-235 90 – 94%	Uranium-235 0.2 – 0.3%
Plutonium-240 4.85 – 6.5%	Uranium-236 0.4 – 0.5%	Uranium-238 99.7 – 99.8%
Plutonium-241* 0.3 – 1.0%	Uranium-238 5.3 – 5.5%	
Plutonium-242 0.005 – 0.60%		

* Includes americium-241 daughter product.

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For waste containers where direct measurement does not yield useable isotopic ratio information, AK may be used to supplement direct measurement data in accordance with the WIPP-WAC (Reference 3). The specific ratios that may be used, and the use and confirmation of AK related to WIPP-certified assay measurements of containers in this waste stream, is documented in the nondestructive assay (NDA) Memorandum.

There are certain radionuclides (i.e., uranium-234, plutonium-242, and strontium-90) that cannot be measured by NDA equipment. Uranium-234 will be calculated based on ratios with detected uranium isotopes. Determination of plutonium-242 will be based on its mass fraction in weapons-grade plutonium. Although plutonium-242 was used in R&D and special order work, these activities were small in comparison of the weapons-grade stream. And the specific drums, if any, that include waste contaminated with this plutonium-242 are not known.

Fission products, including cesium-137 and strontium-90, were not expected components of any of the Rocky Flats TRU waste streams. Cs-137 was not detected during radioassay by the INL 3,100 m^3 Project. Sr-90, because its presence was predicated on the presence of Cs-137 (as a fission product), has never been reported for any of the Rocky Flats wastes analyzed to date (Reference P507). The AMWTP had previously written an AK Discrepancy Resolution to add cesium-137 and strontium-90 to Rocky Flats waste streams. However, physicists from Rocky Flats and the AMWTP completed a review of spectra for several waste streams and concluded that Cs-137 and Sr-90 were not present in those wastes in detectable quantities and were reported due to an interference with Am-241 (References C502 and D009). It is the position of the CCP that the reported Cs-137 values cannot always be clearly dismissed as being due to the presence of Am-241. Therefore, CCP will continue to report the presence of Cs-137 by application of their routine analysis methods for nondestructive assay (Reference D009).

Based on previous assay data and other information, a summary of the potential radionuclides in waste stream ID-RF-S3114 has been compiled and provided in Table 5-4, Summary of Radionuclides in Waste Stream ID-RF-S3114. To determine isotopic ratios for waste stream ID-RF-S3114 as a whole, the average gram values for each radionuclide from the 3,100 m^3 Project data were first multiplied by the number of events to obtain the total gram value for each individual radionuclide. These totals were then divided by the total mass of all radioactive constituents in the waste stream and converted to a percentage. These results are listed as “Relative Weight %.” As shown in Table 5-4, the two most prevalent radionuclides are U-238 and Pu-239. Radiological AK will be confirmed by the method specified in the NDA Memorandum as required by CCP-TP-005 (Reference 1).

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Table 5-4. Summary of Radionuclides in Waste Stream ID-RF-S3114

Radionuclide	Average Weight (g)	Events	Total Weight (g)	Relative Weight %	Expected Present
WIPP Required Radionuclides					
Americium-241	5.37E-03	152	8.16E-01	0.05%	Yes
Plutonium-238	1.78E-04	152	2.70E-02	<0.01%	Yes
Plutonium-239	1.36E+00	152	2.07E+02	12.13%	Yes
Plutonium-240	8.37E-02	152	1.27E+01	0.75%	Yes
Plutonium-242	5.20E-04	152	7.91E-02	<0.01%	Yes
Uranium-233	3.43E-02	1	3.43E-02	<0.01%	Yes
Uranium-234	2.59E-04	48	1.24E-02	<0.01%	Yes
Uranium-238	7.03E+01	21	1.48E+03	86.53%	Yes
Cesium-137	N/A	N/A	N/A	N/A	Yes
Strontium-90	N/A	N/A	N/A	N/A	Yes
Other Measured Radionuclides					
Plutonium-241	2.32E-03	152	3.52E-01	0.02%	Yes
Uranium-235	1.34E-01	66	8.85E+00	0.52%	Yes
Other Potentially Present Radionuclides					
Americium-240	Californium-252	Neptunium-237	Thorium-228	Uranium-232	
Americium-243	Curium-244	Tritium (H-3)		Uranium-236	

5.4.2.3 TRU Alpha Activity Concentration

Prior to 1982, TRU waste was defined as containing greater than 10 nCi/g TRU alpha contamination. In 1982, the DOE redefined TRU waste as materials contaminated with greater than or equal to 100 nCi/g TRU alpha. Much of the TRU wastes (based on these definitions) were shipped to the INL. This entire population has been managed as TRU waste since receipt at the INL (Reference P513). Based on historical assay data from the waste generator, the percentage of IDC 003 drums above 100 nCi/g is 36 percent, and the percentage of the drums below 100 nCi/g is 64 percent (Reference P512). Each payload container shipped to WIPP will be certified in accordance with CCP-PO-002 (Reference 9) as containing more than 100 nCi/g of alpha emitting isotopes with half-lives greater than 20 years.

5.4.3 Chemical Content Identification – Hazardous Constituents

Available AK documentation was reviewed for waste stream ID-RF-S3114 to identify organic chemical usage and potentially hazardous organic liquids that may have been treated in Building 774. The primary solvents treated in Building 774 were carbon tetrachloride, 1,1,1-trichloroethane, and 1,1,2-trichloro-1,2,2-trifluoroethane, which is supported by past sampling and analysis (References P052, P077, P507, and P520). Numerous other organic liquids were also identified as previously shown in Tables 4-1 and 4-2. Table 5-5, EPA Hazardous Waste Numbers for Waste Stream

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ID-RF-S3114 summarizes the potential hazardous chemical contaminants and associated EPA HWNs applicable to this waste stream.

Table 5-5. EPA Hazardous Waste Numbers for Waste Stream ID-RF-S3114

EPA Hazardous Waste Number	Constituent
Toxicity Characteristic Metals	
D008	Lead
Toxicity Characteristic Organic Compounds	
D022	Chloroform
D026	Cresol
D027	1,4-Dichlorobenzene
D028	1,2-Dichloroethane
D029	1,1-Dichloroethylene
D030	2,4-Dinitrotoluene
D032	Hexachlorobenzene
D034	Hexachloroethane
D036	Nitrobenzene
D037	Pentachlorophenol
F-Listed Organic Solvents	
F001	Carbon tetrachloride
F001 and F002	1,1,1-Trichloroethane
F001 and F002	Trichlorofluoromethane
F002	1,1,2-Trichloro-1,2,2-trifluorethane (Freon 113)
F002	1,2-Dichlorobenzene (ortho-dichlorobenzene)
F002	Methylene chloride
F002	Tetrachloroethylene
F002	Trichloroethylene
F005	2-Ethoxyethanol
F005	Benzene
F005	Carbon disulfide
F005	Methyl ethyl ketone
F005	Pyridine
F005	Toluene

The waste described in this report has been historically managed in accordance with INL waste management practices in compliance with the requirements imposed by the Idaho Department of Environment Quality. As indicated in Section 4.4, this waste has been historically managed as TRU mixed waste. In addition, this waste stream has been characterized by several different TRU waste programs. For this reason, the

assignment of EPA HWNs to waste stream ID-RF-S3114 considered the EPA HWNs assigned by these programs in addition to the review of the AK record described in this section (References C522, D005, P052, P507, and P521).

5.4.3.1 Toxicity Characteristic Metals

Waste stream ID-RF-S3114 exhibits the characteristic of toxicity for metal compounds as defined in Title 40 of the Code of Federal Regulations (CFR), Part 261, Subpart C (40 CFR 261.24) (Reference 15). EPA hazardous waste codes for metals were assigned to organic liquid wastes that may have been treated in Building 774, but have never been assigned to organic setups (IDC 003). Analysis of the organic setups waste conducted by the Rocky Flats and INL 3100 m^3 TRU Waste Programs demonstrates that the 90-percent Upper Confidence Limit (UCL_{90}) does not exceed the regulatory threshold limit (RTL) for any of the RCRA-regulated metals (References P507, P521, and U098). However, lead items (D008), such as lead tape, scrap lead, leaded rubber gloves, and lead seals, have been identified by RTR in some of the drums in this waste stream. Therefore, EPA HWN D008 is also assigned to waste stream ID-RF-S3114 (Reference D024).

5.4.3.2 Toxicity Characteristic Organics

Waste stream ID-RF-S3114 exhibits the characteristic of toxicity for organic compounds as defined in 40 CFR 261, Subpart C (40 CFR 261.24). As shown in Tables 4-1 and 4-2, chloroform (D022); 1,2-dichloroethane (D028); 1,1-dichloroethylene (D029); and nitrobenzene (D036) were identified as potential organic constituents in organic setups waste. Therefore, EPA HWNs D022, D028, D029, and D036 are assigned to waste stream ID-RF-S3114 (Reference D005).

Homogeneous solids sampling and analysis of organic setups was previously conducted by both the Rocky Flats and INL 3,100 m^3 TRU Waste Programs. Based on the analytical data from one or both programs, the UCL_{90} exceeded the RTL for carbon tetrachloride (D019/F001), chloroform (D022), 1,2-dichloroethane (D028), 1,1-dichloroethylene (D029), tetrachloroethylene (D039/F002), and trichloroethylene (D040/F002) in the organic setups waste, confirming AK. In addition, the UCL_{90} for hexachloroethane (D034) exceeded the RTL in both Rocky Flats and INL 3,100 m^3 data. Therefore, EPA HWN D034 is also assigned to waste stream ID-RF-S3114 (References P507, P521, and U098).

Although carbon tetrachloride, tetrachloroethylene, and trichloroethylene are present in this waste above the RTL, these compounds were used as solvents (i.e., for cleaning and degreasing); and therefore, the F-listed EPA HWN is applied. The toxicity characteristic EPA HWNs are not assigned (refer to Section 5.4.3.3).

During the analytical data review of the “non-detect” observations for homogeneous solids data, Rocky Flats determined that the method detection limit (MDL) exceeded the program required quantification limit (PRQL) for cresols (D026), 1,4-dichlorobenzene (D027), 2,4-dinitrotoluene (D030), hexachlorobenzene (D032), nitrobenzene (D036),

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and pentachlorophenol (D037) due to dilution. The dilution was due to high hydrocarbon content in the waste matrix that caused difficulties in analysis per the required methodology. Subsequent review of the solid sampling data and reconsideration of process knowledge confirms that cresols, 1,4-dichlorobenzene, 2,4-dinitrotoluene, hexachlorobenzene, and pentachlorophenol were not expected contaminants in this waste stream (potential sources for nitrobenzene have been identified as previously described). Where a constituent has been identified and there is no or limited quantitative data available to demonstrate that the concentration of a constituent is below regulatory threshold levels, the applicable EPA HWN is applied to the waste stream. Therefore, EPA HWNs D026, D027, D030, D032, and D037 are also assigned to waste stream ID-RF-S3114 (Reference P521).

Headspace gas sampling and analysis of organic setups was also conducted by the Rocky Flats and INL 3,100 m^3 TRU Waste Programs. Based on the analytical data from one or both programs, the UCL_{90} exceeded the PRQL for carbon tetrachloride (D019/F001), chloroform (D022), and 1,1-dichloroethylene (D029) in the organic setups waste, confirming AK (References P507 and P521).

Organic laboratory solutions containing vinyl chloride were generated at Rocky Flats, but these laboratory operations did not use vinyl chloride until after TRU waste shipments to INL ceased. For this reason, EPA HWN D043 has been removed from waste stream ID-RF-S3114 (Reference D005).

5.4.3.3 F-Listed Constituents

Waste stream ID-RF-S3114 was derived from the treatment of hazardous wastes from non-specific sources as listed in 40 CFR 261, Subpart D (40 CFR 261.31). As shown in Tables 4-1 and 4-2, carbon tetrachloride, 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluorethane, methylene chloride, tetrachloroethylene, trichloroethylene, 2-ethoxyethanol, benzene, carbon disulfide, methyl ethyl ketone, and toluene were used for their solvent properties, and therefore meet the definition of an F-listed waste. Therefore, EPA HWNs F001, F002, and F005 are assigned to waste stream ID-RF-S3114 (Reference D005).

Homogeneous solids sampling and analysis of organic setups was previously conducted by both the Rocky Flats and INL 3,100 m^3 TRU Waste Programs. Based on the analytical data from one or both programs, the UCL_{90} exceeded the RTL for 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluorethane, carbon tetrachloride, tetrachloroethylene, and trichloroethylene in the organic setups waste, confirming AK (References P507, P521, and U098).

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Pyridine (F005) was detected in several samples of organic setups from the INL 3,100 m^3 Project, and although the UCL_{90} for pyridine is below the RTL, the maximum concentration of pyridine was well above the RTL (References P507 and U098). Pyridine was not specifically identified as a contaminant of organic setups waste by AK; however, it was used at Rocky Flats as a solvent in analytical laboratory operations (Reference P076). For that reason, EPA HWN F005 for pyridine is included in waste stream ID-RF-S3114.

During the analytical data review of the “non-detect” observations for homogeneous solids data, Rocky Flats determined that the MDL exceeded the PRQL for 1,2-dichlorobenzene (F002) due to dilution. The dilution was due to high hydrocarbon content in the waste matrix that caused difficulties in analysis per the required methodology. Review of the Rocky Flats solid sampling data and reconsideration of process knowledge confirms that 1,2-dichlorobenzene was not an expected contaminant in this waste stream. Where a constituent has been identified and there is no or limited quantitative data available to demonstrate that the concentration of a constituent is below regulatory threshold levels, the applicable EPA HWN is applied to the waste stream. Therefore, EPA HWN F002 for 1,2-dichlorobenzene is included in waste stream ID-RF-S3114 (Reference P521).

Headspace gas sampling and analysis of organic setups was also conducted by the Rocky Flats and INL 3,100 m^3 TRU Waste Programs. Based on the analytical data from one or both programs, the UCL_{90} exceeded the PRQL for 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluorethane, carbon tetrachloride, and methylene chloride in the organic setups waste, confirming AK (References P507 and P521).

Based on headspace gas results for waste stream ID-RF-S3114, trichlorofluoromethane is present as a tentatively identified compound. This compound is a component of Kester Residue Remover – Formula 5211, and was identified as an F001-listed constituent in combustibles and plastics. Therefore, trichlorofluoromethane will be added as an F001- and F002-listed constituent to this waste stream (Reference P540).

As shown in Tables 4-1 and 4-2, the flammable F003-listed solvents, acetone, ethyl benzene, ethyl ether, methanol, and xylene were used at Rocky Flats and are potential contaminants of the organic setups waste. Homogeneous solids and/or headspace gas data from the Rocky Flats and/or INL 3,100 m^3 TRU Waste Programs detected acetone, butanol, methanol, and xylene in the organic setups waste. However, F003-listed solvents are listed solely for ignitability, and this waste stream does not exhibit the characteristic of ignitability because the solvents are not in liquid form. Therefore, this waste stream is not an F003-listed hazardous waste (References P052, P077, P507, and P521).

Nitrobenzene, an F004-listed constituent, was used for its solvent properties at Rocky Flats in 1967; however, this pre-dates the containers in this waste stream. Other documentation also identifies nitrobenzene as potentially present in IDC 003, but its specific use was not identified (References C517, D022, P052, and P538). Therefore,

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this waste stream is assigned EPA HWN D036 as described in Section 5.4.3.2 and is not an F004-listed hazardous waste.

5.4.3.4 U-, P-, and K-Listed Wastes

There is no documentation indicating that waste stream ID-RF-S3114 contains discarded commercial chemical products, off-specification species, container residues, or spill residues thereof (References P052, P077, P507, P521, and U099). This waste stream is therefore not a P- or U-listed hazardous waste as defined in 40 CFR 261, Subpart D (40 CFR 261.33).

Beryllium is regulated as a P-listed waste, but only as the commercial chemical product beryllium powder. Most of the beryllium used on site, primarily in Buildings 444 and 883, was in the form of metal (not powder). The exception is experimental work in Building 865 that involved pressing of the powder into shapes; however, only beryllium-contaminated oil from Building 865 was solidified (refer to Table 4-1). Therefore, waste stream ID-RF-S3114 is not a P015-listed waste (References P052 and P053).

Beryllium may be present in the organic setups waste but only in particulate form as a trace contaminant. Analysis conducted by Rocky Flats shows that the UCL_{90} for beryllium in IDC 003 is 3.4 milligrams per kilogram (mg/kg) (Reference P521). Therefore, beryllium concentrations will be less than one percent by weight of the waste in each drum and less than 18.14 kilograms in any payload container, including ten drum overpacks.

The constituent 1,2-benzenedicarboxylic acid, bis (2-ethylhexyl) ester (Chemical Abstract Service [CAS] No. 117-81-7), also known as bis (2-ethylhexyl) phthalate, was detected as a tentatively identified compound (TIC) in Rocky Flats semi-volatile organic compound (SVOC) analysis of IDCs 003 and 801. An evaluation to compare the TIC identification with AK was performed by Rocky Flats to determine if this TIC is a U-listed hazardous waste in this waste stream. This evaluation (which included the onsite use of bis [2-ethylhexyl] phthalate for filter testing and in vacuum pump oil) determined that this constituent was not present as an unused commercial chemical product. There is no evidence that bis (2-ethylhexyl) phthalate used on site for filter testing would have contributed to this waste stream; however, AK does indicate that the vacuum pump oil used in mass spectrometers in Buildings 707 and 777 may have been composed of this constituent and this oil may have been disposed of in the oil/solvent mixture feed to the Grease Plant process, but not as an unused product. Bis (2-ethylhexyl) phthalate is also a common plasticizer used in plastic, including the plastic bags/packaging used to package this waste. Accordingly, this waste stream is not a U028-listed hazardous waste (Reference P521).

Hydrofluoric acid was not identified as a potential chemical input to the waste stream, and therefore, waste stream ID-RF-S3114 is not a U134-listed waste.

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Waste stream ID-RF-S3114 does not contain hazardous waste from the specific sources in 40 CFR 261.32 and therefore is not a K-listed waste.

5.4.3.5 Ignitables, Corrosives, and Reactives

Ignitability

The materials in this waste stream do not meet the definition of ignitability as defined in 40 CFR 261.21. The materials are not liquid and absorbents were added to wastes having the potential of generating free liquids (i.e., dewatering of wastes) (References P015, P024, P501, and P503). However, RTR and VE identified drums of organic setup waste (IDC 003) containing free liquid (Reference P015). Liquid wastes treated (refer to Section 4.3.1) included alcohols and acetone so the possibility exists that the liquids are ignitable. Refer to Tables 4-1 and 4-2 for a more complete listing of organic liquids treated in Building 774 (Reference P015). The waste is not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change (References P012, P016, P024, and P501). The materials are not compressed gases, nor do the wastes contain compressed gases, and the waste is not an oxidizer (References P012, P013, P015, P016, P022, P024, and P501). Waste stream ID-RF-S3114 is therefore not an ignitable waste (D001).

RTR and/or VE are performed to ensure no amount of liquid is present in the IDC 003 waste, and to verify the absence of ignitable compressed gases. Any drum that contains any amount of liquid or compressed gas cylinders will be segregated from the waste stream during confirmation and will not be eligible for disposal at WIPP until further characterization and/or processing is conducted. The basis for not allowing residual liquids in this waste stream is described in Section 5.4.4.

Corrosivity

The materials in this waste stream do not meet the definition of corrosivity as defined in 40 CFR 261.22. The materials are not liquids but the waste may contain some free liquids (Reference P015). Absorbents were added to wastes having the potential of generating free liquids (i.e., dewatering of wastes) (References P015, P024, P501, and P503). VE identified drums of organic setup waste (IDC 003) containing free liquid (Reference P015). The liquids potentially consist of any of the organic liquids identified in Tables 4-1 and 4-2 which are not corrosive. However, hydrochloric acid may also be present. The hydrochloric acid is formed from the radiolytic and/or chemical decay of chlorinated hydrocarbons, such as carbon tetrachloride, in the presence of moisture (References C514 and P534).

RTR and/or VE are performed to ensure no amount of liquid is present in the IDC 003 waste. Any drum that contains any amount of liquid will be segregated from the waste stream during confirmation and will not be eligible for disposal at WIPP until further characterization and/or processing is conducted. The basis for not allowing residual liquids in this waste stream is described in Section 5.4.4. Waste stream ID-RF-S3114 is, therefore, not a corrosive waste (D002).

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Reactivity

The materials in this waste stream do not meet the definition of reactivity as defined in 40 CFR 261.23. The materials are stable and will not undergo violent chemical change. The materials will not react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors, or fumes when mixed with water. The materials do not contain cyanides or sulfides and are not capable of detonation or explosive reaction. The materials are not explosive, nor do the drums contain any explosives (References P012, P013, P015, P016, P022, and P024). Explosives were not handled or used around radioactive material. Waste stream ID-RF-S3114 is therefore not a reactive waste (D003).

RTR and/or VE are performed to ensure the waste does not contain explosive materials. Any drum suspected of containing explosives will be segregated from the waste stream during confirmation and will not be eligible for disposal at the WIPP until further characterization and/or processing is conducted.

5.4.3.6 Polychlorinated Biphenyls (PCBs)

Waste stream ID-RF-S3114 contains greater than 50 parts-per-million (ppm) polychlorinated biphenyls (PCBs) and is regulated as a Toxic Substances Control Act (TSCA) waste under 40 CFR 761. Based on written communications with the EPA, this waste is categorized as PCB Remediation Waste (References C505, C506, C519, C520, and P546).

From 1962 to 1977, radioactively-contaminated oils containing PCBs (e.g., vacuum pump and hydraulic press oils) were solidified with calcium silicate (i.e., Micro-cel E®) and shipped to INL for disposal. According to a Building 774 treatment logbook that dates back to mid-1976, there are two instances (8/27/76 and 1/26/78) of PCB contaminated oils from Building 334 being processed (References C207, P024, and U040).

In 1977, preparations were started by Rocky Flats to retrofill several transformers known to contain a total of nearly 10,000 gallons of PCB fluid. The fluids were to be taken to Building 774 for solidification and disposal as radioactive waste. When the EPA regulations for PCBs were first published May 31, 1979, approximately 894 gallons of PCB fluids had been drained, leaving a total of 8,601 gallons. In June 1979, all action to solidify the PCB fluids was suspended by DOE pending approval by the EPA of a disposal method. These transformer oils were eventually incinerated off site and were never solidified (Reference C207).

However, sampling events at Rocky Flats in late-1984 and July 1985 identified several mineral oil-filled transformers that were not previously identified as containing PCB fluid. No documentation has been identified that indicates the PCB-contaminated mineral oil was investigated by Rocky Flats. Therefore, IDC 003 waste generated after 1977 and up to the 1985 sampling event are suspect for PCB contamination (Reference C207).

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Sampling and analysis of organic setups (IDC 003) was conducted by the INL 3,100 m^3 Project. Analytical results for IDC 003 solid samples collected from waste generated through 1984 had a UCL_{90} exceeding 50 ppm PCBs (References P507 and U099).

5.4.4 Prohibited Items

Prohibited items potentially in this waste stream based on VE and RTR are sealed containers greater than four liters and liquids.

Based on a review of several waste packaging and inspection procedures, the drum and rigid liner lids were not vented, nor did the rigid liner lid contain a vent hole when the waste was shipped from Rocky Flats to INL (References P008, P026, P063, P064, P501, P502, P503, and P505). As the drums are retrieved for characterization, they are vented and aspirated to ensure equilibration of any gases that may have accumulated in the closed container (Reference 11).

Three drums in this waste stream were found to contain predominantly (greater than 50 volume percent) debris materials during characterization activities. This is not consistent with the physical form of the waste stream and the drums were segregated and removed from the waste stream (References D013 and D014).

Since this waste stream contains greater than 50 ppm PCBs, any residual liquids including containerized liquids, identified during RTR and/or VE are assumed to contain greater than 50 ppm PCBs. Residual liquids containing PCBs are prohibited by the WIPP-WAC (Reference 3, P024, and U519). Therefore, any amount of liquid in a drum of IDC 003 must be segregated from the waste stream during confirmation and will not be eligible for disposal at the WIPP.

5.5 Waste Packaging

Depending on waste packaging requirements at the time, several combinations of bags and liners were used to prepare 55-gallon drums for shipment. From 1970 to 1972, waste drums were lined with two polyethylene drum bags. About four pounds of Oil-Dri® was placed in the bottom of the drum and in the bottom of each drum bag. Organic setup (IDC 003) waste was then placed in the drum. Use of the 90-mil rigid polyethylene liner began in 1972. The rigid liner was placed in each drum and lined with one polyethylene round bottom drum liner or a polyethylene drum bag. A PVC O-ring bag and a polyethylene bag were used if the drum was attached to the glovebox. The polyethylene drum bag was not required from a packaging standpoint but would aid in contamination control. About four pounds of Oil-Dri® was placed in the bottom of the rigid liner, the round bottom liner or drum bag, and the O-ring bag. The organic setup waste (IDC 003) was then placed in the O-ring bag. When a drum was full, the drum liners were twisted and taped closed, the lid was secured with a bolted ring, and a tamper indicating device was attached to the drum (References P012, P016, P024, P063, P064, and P503). Plastic ties (“zip-ties”) have also been used to seal the plastic drum bags. Hydrogen diffusion rate testing of this supplemental sealing device

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indicates that it is an acceptable closure method in accordance with Appendix 3.8 of the *CH-TRU Payload Appendices* (References 13, C510, and P524).

Prior to 1972, absorbent material Oil-Dri® may have been added to the top of the sealed drum bag, which contained the organic setup waste (IDC 003). Since approximately 1972, after drums were inspected, one to two quarts of Oil-Dri® was placed on the top of the outer, sealed polyethylene drum bag. This procedure changed in February 1982 when vermiculite was used to fill the space between the outer, sealed polyethylene drum bag and the top of the 90-mil rigid liner. The quantity of vermiculite varied from 3-12 pounds according to the amount of waste contained in each drum (Reference P024).

Waste repackaged in the AMWTF or the SRP are placed directly in prepared 55-gallon drums. Prepared drums are lined with a rigid liner and a plastic drum bag, or filtered drum bag in the SRP. After loading, the drum bags are twisted and taped closed and the drums closed with filtered drum lids (References P536, P542, and P543).

A small portion of the waste stream will be certified and shipped to WIPP in 85-gallon or 83-gallon drums. These drums each contain one 55-gallon drum lined with a rigid liner and drum liner bag (Reference C521). The 55-gallon drum may be contained in an overpack bag. These open top, woven nylon fabric bags are used to lift 55-gallon drums into overpack drums (References M003 and M004).

5.5.1 Filter Vents

Based on a review of several waste packaging and inspection procedures, the drum and rigid liner lids were not vented, nor did the rigid liner lid contain a vent hole when the waste was shipped from Rocky Flats to INL. Carbon composite filter vents were not used until the late 1980s (References C057, P008, P026, P063, P064, P501, P502, P503, P504, and P505). As the drums are retrieved for characterization, they are vented and aspirated to ensure equilibration of any gases that may have accumulated in the closed container.

Certified 85- or 83-gallon drums contain vented 55-gallon drums. The 55-gallon drums may be inverted. To ensure the inner drums are vented, the 55-gallon drum lids and rigid liners are vented through the overpack drum using a long punch. This ensures both layers of confinement are vented (References C521 and P541).

5.5.2 Layers of Confinement

Based on the discussion in Section 5.5, several packaging configurations are possible. There may be various combinations of polyethylene round bottom drum liners, polyethylene drum bags, and PVC O-ring bags. The maximum number of confinement layers, however, is expected to be two. The rigid liner must be vented and, therefore, is not considered a layer of confinement.

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Drums processed in the AMWTP DTF have the rigid liner lids cut out or removed or holes cut and confinement layer bag closures and/or plastic ties cut. Horsetails (i.e., twist and tape bag closure) cut during these operations may be placed on top of the waste (References C515 and P535).

Drums processed in the AMWTF will have a rigid liner without a lid and one layer of confinement (Reference P536).

Repackaged drums from the SRP will have a rigid liner without a lid and one layer of confinement consisting of a filtered liner bag (References P542, P543, and P547).

Certified 85- or 83-gallon drums containing vented 55-gallon drums with a rigid liner without a lid, or a punctured rigid liner or with no rigid liner present. A maximum of one layer of confinement due to the TRUCON code used to certify the 85- or 83-gallon drum (Reference C521).

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6.0 REQUIRED WASTE STREAM INFORMATION – WASTE STREAM ID-RF-S3150-A

This section presents the mandatory AK for waste stream ID-RF-S3150-A required by Attachment B4 of the WIPP-WAP (Reference 2). Attachment 1 for this waste stream (created in accordance with procedure CCP-TP-005) provides a list of TRU waste stream information required to be developed as part of the AK record (Reference 1).

6.1 Area and Building of Generation

Waste stream ID-RF-S3150-A was generated by the OASIS in Building 774 (References P090, P502, P505, U059, U069, and U505).

6.2 Waste Stream Volume and Period of Generation

The volume and generation date range by IDC for the drums that have been evaluated for inclusion in waste stream ID-RF-S3150-A are presented in Table 6-1a, Waste Stream ID-RF-S3150-A Volume and Generation Dates (References P515 and U092). The specific container numbers are provided in the *AK Container List* (refer to Section 7.0).

Table 6-1a. Waste Stream ID-RF-S3150-A Volume and Generation Dates

Item Description Code	Current Volume		Future Projections[1]	Total
	Number of 55-Gallon Drums	Generation Date Range	Number of 55-Gallon Drums	
700	57	3/1986 – 5/1986	3	60
801	797	2/1986 – 11/1998	1	798
				858

1. These drums are in 85-gallon overpacks and are not currently included in this waste stream.

The waste inventory at the TSA was only generated through 1988 because shipments from Rocky Flats to INL ceased at that time. Waste stored at the TSA with closure dates later than 1988 are the result of waste characterization activities, such as VE or repackaging (Reference P507).

6.3 Waste Generating Activities

Solidified organics (IDCs 700 and 801) were produced by the OASIS process, which began operating in November 1985. IDC 700 was assigned to the waste generated by the experimental prototype OASIS process in Building 774 that would later generate IDC 801 (References P016, P052, and P077).

OASIS was a batch type process generating one drum per run. Waste oil and solvent mixtures were pumped into a PVC O-ring bag inside a 55-gallon drum attached to the bottom of the OASIS glovebox. ENVIROSTONE® emulsifier and water were then added to the mix. An agitator was lowered into the drum and run for two minutes.

ENVIROSTONE® gypsum cement was then added to the mix for approximately two minutes. A 90-second mix time allowed dispersement of cement throughout the matrix. Mix time was kept to a minimum because of the fast initial set time resulting from addition of ENVIROSTONE® accelerator. The accelerator was added to the gypsum cement in the cement transfer station before transport into cement storage bins. Figure 5, Organic and Sludge Immobilization System, illustrates the OASIS process (References P002, P016, P052, P077, and P089).

The typical composition of solidified organic waste is 170 pounds of organic liquid waste, 250 pounds of gypsum cement, 25 pounds of emulsifier, 10 pounds of accelerator, and 42 pounds of water (Reference U010).

As described in Section 4.3.3, drums in this waste stream are remediated and/or repackaged in the AMWTP DTF or the SRP. The drums are processed to breach layers of confinement, segregate prohibited items, and remove liquids as necessary by liquid absorption. Other operations conducted may include rigid liner removal and repackaging, and drum over packing and un-over packing. Secondary waste items, such as leather, latex, and Silver Shield gloves, knives, cutters, drum filters, aspirator/siphon pumps, and plastic sleeving and aprons, may be packaged in the remediated drums (References C515 and P535).

Drums repackaged in the SRP will be characterized by VE to breach layers of confinement, segregate prohibited items, and remove liquids as necessary by absorption (References C522, P542, P543, and P544).

6.4 Type of Wastes Generated

This section describes the process inputs, Waste Matrix Code assignment, radionuclide contaminants, and hazardous waste determinations for waste stream ID-RF-S3150-A.

6.4.1 Material Input Related to Physical Form

Waste stream ID-RF-S3150-A consists of solidified organic liquids. The following is a description of this waste.

IDC 700, OASIS Waste: This waste consists of various organic liquids cemented to form a solid monolith. IDC 700 was assigned to the waste generated by the experimental prototype OASIS process in Building 774 that would later generate IDC 801. The organic liquids solidified as well as the solidifying agents are the same for both IDCs 700 and 801 (Reference P016). See the description for IDC 801 for more information about this waste.

IDC 801, Solidified Organics – Building 774: This waste consists of various organic liquids immobilized into a solid monolith in the OASIS process in Building 774. Oils and chlorinated solvents were the primary liquids treated by the OASIS process (References P016, P052, P077, and P518). The organic liquids were immobilized by mixing with water, ENVIROSTONE® emulsifier, accelerator, and gypsum cement. The

emulsifier was a polyethylene glycol ether, and the accelerator contained gypsum and potassium sulfate (Reference P066). Based on RTR by the INL 3,100 m^3 Project, some IDC 801 drums will contain small amount of metal (Reference P507). This waste may also contain plastic bag stubs remaining from previous bag cuts that were placed on top of the waste in subsequent runs (Reference C511).

Repackaged solidified organics may also contain Oil-Dri® and small quantities of sludge contaminated debris from reprocessing such as tray liners, leather, latex, and Silver Shield gloves, knives, cutters, drum filters, aspirator/siphon pumps, plastic sleeving, aprons, sheeting, bags, bag stubs, rubber bands, glovebox gloves, lead items (e.g., leaded rubber aprons), HEPA filters, and metal tools (References C511, C515, D025, P535, P542, P543, and P544). Sludge repackaged in the SRP may also include small quantities of solidified decontamination solution and soil. Equipment in the ARP-V enclosure may be decontaminated with water and Simple Green prior to maintenance and the resulting liquid solidified with Oil-Dri® and added to the sludge (Reference C522). Incidental spills of waste material during reprocessing activities will be collected with small quantities of surrounding soil and included with the sludge (References P542, P543, and P546).

6.4.1.1 Waste Matrix Code

As described in Section 6.4.1, this waste stream is comprised of organic liquid wastes that have been mixed with water and solidification agents to form a solid monolith. Therefore, Waste Matrix Code S3150, Solidified Homogeneous Solids, is applied to waste stream ID-RF-S3150-A. The definition of this Waste Matrix Code is provided in the (Reference 10). This category includes waste that is at least 50 percent, by volume, solidified waste forms such as a particulate or sludge that has been immobilized with cement and cured into a solidified form (Reference D004).

6.4.1.2 Waste Material Parameters

The waste material parameters associated with waste stream ID-RF-S3150-A are:

- Organic matrix (solidification agents, water, and organic liquid mixture)
- Other inorganic materials (Oil-Dri® or vermiculite)[2]
- Plastic (waste materials)
- Iron-based metals (small quantities of metal items)
- Steel (packaging materials)
- Plastic (packaging materials)

To estimate the waste material parameter weight percentages for waste stream

[2] Additional absorbents (e.g., Oil-Dri® or vermiculite) were sometimes added on top and bottom of the waste inside and outside the plastic bag. These absorbents may not be distinguishable from the organic matrix.

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ID-RF-S3150-A, data were obtained from the WWIS database as of October 3, 2006. The WWIS data were derived from RTR and VE of Rocky Flats solidified organics waste by the CCP TRU waste certification program at INL and the Rocky Flats TRU waste certification program.

The number of containers from the Rocky Flats TRU waste certification program that were evaluated is 499. The number of containers from the CCP TRU waste certification program that were evaluated is 516. The current volume of waste stream ID-RF-S3150-A is 854 containers. Therefore, these 516 containers represent 60 percent of the current CCP waste stream volume. The original closure dates for the 854 containers in this waste stream range from February 1986 to September 1988. The closure dates for the drums in WWIS for the CCP waste stream also range from February 1986 to September 1988. Therefore, the WWIS data for these 1,015 containers are representative of waste stream ID-RF-S3150-A as a whole. A statistical analysis of the data were performed using the WWIS data, the results of which are presented in Table 6-1b, Waste Stream ID-RF-S3150-A Waste Material Parameter Weights. This evaluation is documented in a memorandum (included with Attachment 6) as required by CCP-TP-005 (Reference 1).

Table 6-1b. Waste Stream ID-RF-S3150-A Waste Material Parameter Weights

Waste Material Parameter	Average Weight Percent	Weight Percent Range
Iron-Based Metals/Alloys	<0.01%	0.0 – 0.44%
Aluminum-Based Metals/Alloys	0.0%	0.0 – 0.0%
Other Metals	≤0.01%	0.0 - <0.01%
Other Inorganic Materials	0.32%	0.0 – 3.09%
Cellulosics	<0.01%	0.0 – 2.79%
Plastics (waste materials)	0.32%	0.0 – 3.53%
Rubber	<0.01%	0.0 -2.15%
Organic Matrix	99.35%	99.35 – 100%
Inorganic Matrix	0.0%	0.0 – 0.0%
Soils/Gravels	<0.01%	0.0 - <0.01%
Total Inorganic Waste Average	**0.32%**	
Total Organic Waste Average	**99.67%**	

6.4.2 Radiological Characterization

Historical assay values for waste drums were obtained from radiochemical analyses of batch treatments or analysis results of individual bottles and drums that were received for processing. Average values were usually assigned to waste drums (References P016 and P024). Documented assay results and treatment log book descriptions for this waste indicate the presence of plutonium, americium-241, tritium, uranium-235, and uranium-238 (References P016, P024, P033, and U040).

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TRU waste oils and solvents were generated primarily in Buildings 707 and 777. Radionuclide contamination in waste from Building 707 primarily consisted of weapons-grade plutonium from fabrication operations (References P052 and P053). Building 777 performed disassembly of site-return parts and fabrication operations (References C184, P052, and P079). Waste from fabrication operations will be contaminated with weapons-grade plutonium and enriched uranium. Wastes generated by disassembly operations will be contaminated with site-return plutonium (higher americium-241 decay product) and enriched uranium (References C184 and P079). Tritium may also be present from disassembly and subsequent processing of site-return components (References P053). The isotopic compositions of weapons-grade plutonium and enriched uranium are presented in Section 6.4.2.2.

Most of the waste oils or solvents contaminated with depleted uranium were generated from fabrication operations in Buildings 444, 447, 865, and 883 (Reference P053). However, these oils have been segregated from TRU oils since 1985, and therefore, were not processed by the OASIS. There is documentation however that indicates waste oil 238 (assumed to be uranium-238) from Building 771 was introduced into solidified organic waste in 1986. There were also organic liquids processed by the OASIS that originated in other facilities that potentially included depleted uranium, such as Buildings 559 and 881 (Reference U040). Therefore, there is a potential for depleted uranium contamination in the solidified organics waste. The isotopic composition of depleted uranium is presented in Section 6.4.2.2.

R&D and analytical support operations also generated waste oils and solvents (References U040 and U043). In addition to supporting production operations, these R&D and analytical activities used several other radioisotopes that may be present in trace quantities, including (References C134, C137, C154, C159, C171, C185, P053, P164, P167, P178, P179, P180, P181, P182, P183, P184, P185, P186, P187, P188, P189, P190, P191, P192, P193, P194, P195, P196, P197, P198, P199, P200, P201, P202, P507, and U064):

- Americium-240, -241, -243
- Californium-252
- Curium-244
- Neptunium-237
- Plutonium-238, -241, -242 (non-weapons-grade material)
- Plutonium (12 wt% Plutonium-238 and ~6 wt% Plutonium-240)
- Plutonium-Low NGS (97.7 wt% Plutonium-239 and 2.2 wt% Plutonium-240)
- Thorium-228
- Uranium-232, -233, -235, -236, -238

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CCP radioassay identified two drums of IDC 801 with large quantities of uranium. Based on historical liquid waste segregation practices (i.e., plutonium from uranium) as well as the weight and fill percent of these drums compared to typical IDC 003 waste, it is believed that these drums are misidentified. These two drums will be moved to waste stream ID-RF-S3114 (refer to Acceptable Knowledge Re-evaluation Checklist, 1/6/06 and 1/9/06).

6.4.2.1 Estimated Radionuclide Quantities

During the INL 3,100 m^3 Project, containers of IDC 700 and 801 were assayed for radionuclide content. Table 6-2, Radioassay Data for IDC 700 and 801 from the INL 3,100 m^3 Project, contains a summary of these radioassay data (Reference P507).

Table 6-2. Radioassay Data for IDC 700 and 801 from the INL 3,100 m^3 Project

Radionuclide/Calculation	Average	Range		Events
		Low	High	
Americium-241 (g)	1.178E-02	5.282E-04	1.485E-01	65
Plutonium-238 (g)	6.141E-04	2.536E-05	7.972E-03	65
Plutonium-239 (g)	4.989E+00	2.272E-01	7.141E+01	65
Plutonium-240 (g)	3.054E-01	1.382E-02	4.343E+00	65
Plutonium-241 (g)	8.760E-03	4.178E-04	1.313E-01	65
Plutonium-242 (g)	2.053E-03	1.039E-04	3.265E-02	65
Uranium-233 (g)	2.120E-02	2.120E-02	2.120E-02	1
Uranium-234 (g)	3.390E-04	2.269E-05	5.892E-03	33
Uranium-235 (g)	2.728E-01	2.110E-02	5.481E+00	39
Uranium-238 (g)	4.411E+01	4.437E+00	9.516E+01	3
Plutonium Equivalent Curies (Ci)	4.346E-01	1.970E-02	6.131E+00	65
Plutonium Fissile Gram Equivalents (g)	5.179E+00	2.284E-01	7.332E+01	65
TRU Alpha Activity Concentration (nCi/g)	2.133E+03	8.900E+01	3.195E+04	65

As can be seen in the above table, uranium-238 may be present in less than five percent of the drums but will be in relatively large quantities in those few drums.

6.4.2.2 Use of Radionuclide Isotopic Ratios

The primary radionuclides processed at Rocky Flats included weapons-grade plutonium, enriched uranium, and depleted uranium. The approximate isotopic compositions of these materials are presented in Table 6-3, Isotopic Compositions of Rocky Flats Plutonium and Uranium (References C039, C130, P069, P152, P161, P166, P169, P210, P227, and U064).

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Table 6-3. Isotopic Compositions of Rocky Flats Plutonium and Uranium

Weapons-Grade Plutonium		Enriched Uranium		Depleted Uranium	
Plutonium-238	0.01 – 0.05%	Uranium-234	0.1 – 1.02%	Uranium-234	0.0006%
Plutonium-239	92.8 – 94.4%	Uranium-235	90 – 94%	Uranium-235	0.2 – 0.3%
Plutonium-240	4.85 – 6.5%	Uranium-236	0.4 – 0.5%	Uranium-238	99.7 – 99.8%
Plutonium-241*	0.3 – 1.0%	Uranium-238	5.3 – 5.5%		
Plutonium-242	0.005 – 0.60%				

* Includes americium-241 daughter product.

For waste containers where direct measurement does not yield useable isotopic ratio information, AK may be used to supplement direct measurement data in accordance with the WIPP-WAC (Reference 3). The specific ratios that may be used, and the use and confirmation of AK related to WIPP-certified assay measurements of containers in this waste stream, is documented in the NDA Memorandum.

There are certain radionuclides (i.e., uranium-234, plutonium-242, and strontium-90) that cannot be measured by NDA equipment. Uranium-234 will be calculated based on ratios with detected uranium isotopes. Determination of plutonium-242 will be based on its mass fraction in weapons grade plutonium. Although plutonium-242 was used in R&D and special order work, these activities were small in comparison of the weapons-grade stream. And the specific drums, if any, that include waste contaminated with this plutonium-242 are not known.

Fission products, including cesium-137 and strontium-90, were not expected components of any of the Rockly Flats TRU waste streams. Cs-137 was not detected during radioassay by the INL 3,100 m^3 Project. Sr-90, because its presence was predicated on the presence of Cs-137 (as a fission product), has never been reported for any of the Rocky Flats wastes analyzed to date (Reference P507). The AMWTP had previously written an AK Discrepancy Resolution to add cesium-137 and strontium-90 to Rocky Flats waste streams. However, physicists from Rocky Flats and the AMWTP completed a review of spectra for several waste streams and concluded that Cs-137 and Sr-90 were not present in those wastes in detectable quantities and were reported due to an interference with Am-241 (References C502 and D009). It is the position of the CCP that the reported Cs-137 values cannot always be clearly dismissed as being due to the presence of Am-241. Therefore, CCP will continue to report the presence of Cs-137 by application of their routine analysis methods for nondestructive assay (Reference D009).

Based on previous assay data and other information, a summary of the potential radionuclides in waste stream ID-RF-S3150-A has been compiled and provided in Table 6-4, Summary of Radionuclides in Waste Stream ID-RF-S3150-A. To determine isotopic ratios for waste stream ID-RF-S3150-A as a whole, the average gram values for each radionuclide from the 3,100 m^3 Project data were first multiplied by the number of events to obtain the total gram value for each individual radionuclide. These totals

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were then divided by the total mass of all radioactive constituents in the waste stream and converted to a percentage. These results are listed as "Relative Weight %." As shown in Table 6-4, the two most prevalent radionuclides are Pu-239 and U-238. Radiological AK will be confirmed by the method specified in the NDA Memorandum as required by CCP-TP-005 (Reference 1).

Table 6-4. Summary of Radionuclides in Waste Stream ID-RF-S3150-A

Radionuclide	Average Weight (g)	Events	Total Weight (g)	Relative Weight %	Expected Present
WIPP Required Radionuclides					
Americium-241	1.18E-02	65	7.66E-01	0.16%	Yes
Plutonium-238	6.14E-04	65	3.99E-02	0.01%	Yes
Plutonium-239	4.99E+00	65	3.24E+02	**66.36%**	Yes
Plutonium-240	3.05E-01	65	1.99E+01	4.06%	Yes
Plutonium-242	2.05E-03	65	1.33E-01	0.03%	Yes
Uranium-233	2.12E-02	1	2.12E-02	<0.01%	Yes
Uranium-234	3.39E-04	33	1.12E-02	<0.01%	Yes
Uranium-238	4.41E+01	3	1.32E+02	**27.08%**	Yes
Cesium-137	N/A	N/A	N/A	N/A	Yes
Strontium-90	N/A	N/A	N/A	N/A	Yes
Other Measured Radionuclides					
Plutonium-241	8.76E-03	65	5.69E-01	0.12%	Yes
Uranium-235	2.73E-01	39	1.06E+01	2.18%	Yes
Other Potentially Present Radionuclides					
Americium-240	Californium-252	Neptunium-237	Thorium-228	Uranium-232	
Americium-243	Curium-244	Tritium (H-3)		Uranium-236	

6.4.2.3 TRU Alpha Activity Concentration

Prior to 1982, TRU waste was defined as containing greater than 10 nCi/g TRU alpha contamination. In 1982, the DOE redefined TRU waste as materials contaminated with greater than or equal to 100 nCi/g TRU alpha. Much of the TRU wastes (based on these definitions) were shipped to the INL. IDC 700 and 801 wastes were all generated after 1982 and have been managed as TRU waste since receipt at the INL. Based on historical assay data from the waste generator, the percentage of this waste stream above 100 nCi/g is 93.1 percent, and the percentage of this waste stream below 100 nCi/g is 6.9 percent (Reference P513). Each payload container shipped to WIPP will be certified in accordance with CCP-PO-002 (Reference 9) as containing more than 100 nCi/g of alpha emitting isotopes with half-lives greater than 20 years.

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6.4.3 Chemical Content Identification – Hazardous Constituents

Available AK documentation was reviewed for waste stream ID-RF-S3150 to identify organic chemical usage and potentially hazardous organic liquids that may have been treated in Building 774. The primary solvents treated in Building 774 were carbon tetrachloride; 1,1,1-trichloroethane; and 1,1,2-trichloro-1,2,2-trifluoroethane, which is supported by past sampling and analysis (References P052, P077, P507, and P520). Numerous other organic liquids were also identified as previously shown in Tables 4-1 and 4-2. Table 6-5, EPA Hazardous Waste Numbers for Waste Stream ID-RF-S3150-A, summarizes the potential hazardous chemical contaminants and associated EPA HWNs applicable to this waste stream.

Table 6-5. EPA Hazardous Waste Numbers for Waste Stream ID-RF-S3150-A

EPA Hazardous Waste Number	Constituent
Toxicity Characteristic Metals	
D008	Lead
Toxicity Characteristic Organic Compounds	
D022	Chloroform
D028	1,2-Dichloroethane
D029	1,1-Dichloroethylene
D030	2,4-Dintrotoluene
D032	Hexachlorobenzene
D034	Hexachloroethane
D036	Nitrobenzene
D043	Vinyl chloride
F-Listed Organic Solvents	
F001	Carbon tetrachloride
F001 and F002	1,1,1-Trichloroethane
F002	1,1,2-Trichloro-1,2,2-trifluorethane (Freon 113)
F002	Chlorobenzene
F002	Methylene chloride
F002	Tetrachloroethylene
F002	Trichloroethylene
F005	2-Ethoxyethanol
F005	Benzene
F005	Carbon disulfide
F005	Methyl ethyl ketone
F005	Toluene

The waste described in this report has been historically managed in accordance with INL waste management practices in compliance with the requirements imposed by the Idaho Department of Environment Quality. As indicated in Section 4.4, this waste has been historically managed as TRU mixed waste. In addition, this waste stream has been characterized by several different TRU waste programs. For this reason, the assignment of EPA HWNs to waste stream ID-RF-S3150-A considered the EPA HWNs assigned by these programs in addition to the review of the AK record described in this section (References D005, P052, P077, P507, P522, and U099).

6.4.3.1 Toxicity Characteristic Metals

Waste stream ID-RF-S3150-A exhibits the characteristic of toxicity for metal compounds as defined in 40 CFR 261.24. EPA hazardous waste codes for metals were assigned to organic liquid wastes that may have been treated in Building 774, but have never been assigned to solidified organics (IDCs 700 and 801). Analysis of the solidified organics waste conducted by the Rocky Flats and INL 3,100 m^3 TRU Waste Programs demonstrates that the UCL_{90} does not exceed the RTL for any of the RCRA-regulated metals (References P507, P522, and U099). However, lead items (D008), such as leaded rubber aprons have been identified by RTR in some of the drums in this waste stream. Therefore, EPA HWN D008 is also assigned to waste stream ID-RF-S3150-A (Reference D025).

6.4.3.2 Toxicity Characteristic Organics

Waste stream ID-RF-S3150-A exhibits the characteristic of toxicity for organic compounds as defined in 40 CFR 261.24. As shown in Tables 4-1 and 4-2, chloroform (D022); 1,2-dichloroethane (D028); 1,1-dichloroethylene (D029); and nitrobenzene (D036) were identified as potential organic constituents in solidified organics waste. Therefore, EPA hazardous waste numbers D022, D028, D029, and D036, are assigned to waste stream ID-RF-S3150-A (Reference D005).

Although nitrobenzene (D036) is also an F004-listed constituent, solvent use has not been identified (References C517, D022, P052, P507, and P538).

Homogeneous solids sampling and analysis of solidified organics waste was previously conducted by both the Rocky Flats and INL 3,100 m^3 TRU Waste Programs. Based on the analytical data from one or both programs, the UCL_{90} exceeded the RTL for carbon tetrachloride (D019/F001), chloroform (D022), 1,1-dichloroethylene (D029), nitrobenzene (D036), and tetrachloroethylene (D039/F002) in the solidified organics waste, confirming AK. In addition, the UCL_{90} for hexachloroethane (D034) exceeded the RTL in the Rocky Flats data. Therefore, EPA HWND034 is also assigned to waste stream ID-RF-S3150-A (References P507, P522, and U099).

Although carbon tetrachloride and tetrachloroethylene are present in this waste above the RTL, these compounds were used as solvents (i.e., for cleaning and degreasing), and therefore, the F-listed EPA HWN is applied. The toxicity characteristic EPA HWNs are not assigned (Refer to Section 6.4.3.3).

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During the analytical data review of the "non-detect" observations for homogeneous solids data, both the Rocky Flats and INL 3,100 m^3 Project determined that the MDL exceeded the PRQL for 2,4-dinitrotoluene (D030) and hexachlorobenzene (D032) due to dilution. The dilution was due to high hydrocarbon content in the waste matrix that caused difficulties in analysis per the required methodology. Subsequent review of the solid sampling data and reconsideration of process knowledge confirms that 2,4-dinitrotoluene and hexachlorobenzene were not expected contaminants in this waste stream. Where a constituent has been identified and there is no or limited quantitative data available to demonstrate that the concentration of a constituent is below regulatory threshold levels, the applicable EPA HWN is applied to the waste stream. Therefore, EPA HWNs D030 and D032 are also assigned to waste stream ID-RF-S3150-A (References P522 and U099). This same problem occurred with the INL 3,100 m^3 Project analytical data review for hexachloroethane (D034), nitrobenzene (D036), and vinyl chloride (D043); therefore, these EPA HWNs are assigned to this waste stream (Reference U099).

Headspace gas sampling and analysis of solidified organics waste was also conducted by the Rocky Flats and INL 3,100 m^3 TRU Waste Programs. Based on the analytical data from one or both programs, the UCL_{90} exceeded the PRQL for carbon tetrachloride (D019/F001), chloroform (D022), 1,2-dichloroethane (D028), and 1,1-dichloroethylene (D029) in the solidified organics waste, confirming AK (References P507, P522 and U099).

Organic laboratory solutions containing 1,4-dichlorobenzene were generated at Rocky Flats, but these laboratory operations did not use 1,4-dichlorobenzene until after TRU waste shipments to INL ceased. For this reason, EPA HWN D027 has been removed from waste stream ID-RF-S3150-A (Reference D005).

6.4.3.3 F-Listed Constituents

Waste stream ID-RF-S3150-A was derived from the treatment of hazardous wastes from non-specific sources as listed in 40 CFR 261.31. As shown in Tables 4-1 and 4-2, carbon tetrachloride, 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluorethane, methylene chloride, tetrachloroethylene, trichloroethylene, 2-ethoxyethanol, benzene, carbon disulfide, methyl ethyl ketone, and toluene were used for their solvent properties, and therefore meet the definition of an F-listed waste. Therefore, EPA HWNs F001, F002, and F005 are assigned to waste stream ID-RF-S3150-A (Reference D005).

Homogeneous solids sampling and analysis of solidified organics waste was previously conducted by both the Rocky Flats and INL 3,100 m^3 TRU Waste Programs. Based on the analytical data from one or both programs, the UCL_{90} exceeded the RTL for 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluorethane, carbon tetrachloride, and tetrachloroethylene in the solidified organics waste, confirming AK (References P507, P522, and U099).

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Headspace gas sampling and analysis of solidified organics waste was also conducted by the Rocky Flats and INL 3,100 m^3 TRU Waste Programs. Based on the analytical data from one or both programs, the UCL_{90} exceeded the PRQL for 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluorethane, carbon tetrachloride, and methylene chloride in the solidified organics waste, confirming AK (References P507, P522, and U099).

EPA HWN D021 (chlorobenzene) was assigned to the INL 3,100 m^3 Project solidified organics waste stream because during the analytical data review of the “non-detect” observations for headspace gas data, it was determined that the MDL exceeded the PRQL for chlorobenzene (Reference U099). However, chlorobenzene is also an F002-listed hazardous waste and has been used in analytical laboratory operations as a solvent (Reference P081). Therefore, the more specific EPA HWN F002 for chlorobenzene is assigned to this waste stream.

As shown in Tables 4-1 and 4-2, the flammable F003-listed solvents acetone, ethyl benzene, ethyl ether, methanol, and xylene were used at Rocky Flats and are potential contaminants of the solidified organics waste. Homogeneous solids and/or headspace gas data from the Rocky Flats and/or INL 3,100 m^3 TRU Waste Programs detected acetone and methanol in the solidified organics waste. However, F003-listed solvents are listed solely for ignitability, and this waste stream does not exhibit the characteristic of ignitability because the solvents are not in liquid form. Therefore, this waste stream is not an F003-listed hazardous waste (References P052, P077, P507, P521, and U099).

Nitrobenzene, an F004-listed constituent, was used at Rocky Flats but not for its solvent properties (References C517, D022, P052, and P538). Therefore, this waste stream is not an F004-listed hazardous waste.

6.4.3.4 U-, P-, and K-Listed Wastes

There is no documentation indicating that waste stream ID-RF-S3150-A contains discarded commercial chemical products, off-specification species, container residues, or spill residues thereof (References P052, P077, P507, P522, and U099). This waste stream is therefore not a P- or U-listed hazardous waste as defined in 40 CFR 261, Subpart D (40 CFR 261.33).

Beryllium is regulated as a P-listed waste, but only as the commercial chemical product beryllium powder. Most of the beryllium used on site, primarily in Buildings 444 and 883, was in the form of metal (not powder). The exception is experimental work in Building 865 that involved pressing of the powder into shapes; however, only beryllium-contaminated oil from Building 865 was solidified (refer to Table 4-1). Therefore, waste stream ID-RF-S3150-A is not a P015-listed waste (References P052 and P053).

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Beryllium may be present in solidified organics waste but only in particulate form as a trace contaminant. Analysis conducted by the INL 3,100 m^3 Project indicates that the UCL_{90} for beryllium in this waste is 0.296 mg/kg. Analysis performed by the Rocky Flats TRU Waste Program shows that the UCL_{90} for beryllium in this waste is 0.1 mg/kg (References P522 and U099). Therefore, beryllium concentrations will be less than one percent by weight of the waste in each drum and less than 18.14 kilograms in any payload container, including ten drum overpacks.

The constituent 1,2-benzenedicarboxylic acid, bis (2-ethylhexyl) ester (CAS No. 117-81-7), also known as bis (2-ethylhexyl) phthalate, was detected as a TIC in Rocky Flats SVOC analysis of IDCs 003 and 801. An evaluation to compare the TIC identification with AK was performed by Rocky Flats to determine if this TIC is a U-listed hazardous waste in this waste stream. This evaluation (which included the onsite use of bis [2-ethylhexyl] phthalate for filter testing and in vacuum pump oil) determined that this constituent was not present as an unused commercial chemical product. There is no evidence that bis (2-ethylhexyl) phthalate used on site for filter testing would have contributed to this waste stream; however, AK does indicate that the vacuum pump oil used in mass spectrometers in Buildings 707 and 777 may have been composed of this constituent and this oil may have been disposed of in the oil/solvent mixture feed to the Grease Plant process, but not as an unused product. Bis (2-ethylhexyl) phthalate is also a common plasticizer used in plastic, including the plastic bags/packaging used to package this waste. Accordingly, this waste stream is not a U028-listed hazardous waste (Reference P522).

The constituent 1,4-dioxane (CAS No. 123-91-1) was detected as a TIC in Rocky Flats headspace gas analysis of IDC 801. An evaluation to compare the TIC identification with AK was performed by Rocky Flats to determine if this TIC is a U-listed hazardous waste in the waste stream. This evaluation revealed that 1,4-dioxane was added by the manufacturer to chlorinate solvents, particularly 1,1,1-trichloroethane, as a stabilizer and corrosion inhibitor; however, there is no indication that 1,4-dioxane is present as an unused commercial chemical product. Accordingly, this waste stream is not a U108-listed hazardous waste (Reference P522).

Hydrofluoric acid was not identified as a potential chemical input to the waste stream, and therefore, waste stream ID-RF-S3150-A is not a U134-listed waste.

Waste stream ID-RF-S3150-A does not contain hazardous waste from the specific sources in 40 CFR 261.32 and therefore is not a K-listed waste.

6.4.3.5 Ignitables, Corrosives, and Reactives

Ignitability

The materials in this waste stream do not meet the definition of ignitability as defined in 40 CFR 261.21. The materials are not liquid, and absorbents were added to wastes having the potential of generating free liquids (i.e., dewatering of wastes) (Reference P501). The waste is not capable of causing fire through friction, absorption

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of moisture, or spontaneous chemical change (References P012, P016, and P501). The materials are not compressed gases, nor do the wastes contain compressed gases, and the waste is not an oxidizer (References P012, P013, P015, P016, P022, and P501).
RTR and VE identified drums of solidified organics containing liquid wastes (References D019, P507, and U099). Since oils and chlorinated solvents (e.g., carbon tetrachloride, 1,1,1-trichloroethane) were the predominant liquid wastes treated (Refer to Section 4.3.1), the liquids discovered during RTR and/or VE are not likely ignitable. However, solvents such as alcohols and acetone were also treated so the possibility exists that the liquids are ignitable. Refer to Tables 4-1 and 4-2 for a more complete listing of organic liquids treated in Building 774. RTR and/or VE are performed to ensure liquids do not exceed the amount allowed by the WIPP-WAP and to verify the absence of compresses gases. Any drum that contains liquids in excess of the amount allowed by the WIPP-WAP or compressed gases will be segregated from the waste stream during confirmation and will not be eligible for disposal at WIPP until further characterization and/or processing is conducted. Waste stream ID-RF-S3150-A is, therefore, not an ignitable waste (D001).

Corrosivity

The materials in this waste stream do not meet the definition of corrosivity as defined in 40 CFR 261.22. The materials are not liquid, and absorbents were added to wastes having the potential of generating free liquids (i.e., dewatering of wastes) (Reference P501).

RTR and VE identified drums of solidified organics containing liquid wastes (References D019, P507, P534, U099). The liquids potentially consist of any of the organic liquids identified in Tables 4-1 and 4-2 which are not corrosive. However, hydrochloric acid may also be present. The hydrochloric acid is formed from the radiolytic and/or chemical decay of chlorinated hydrocarbons, such as carbon tetrachloride, in the presence of moisture (Reference P534). RTR and/or VE are performed to ensure liquids do not exceed the amount allowed by the WIPP-WAP. Any drum that contains liquids in excess of the amount allowed by the WIPP-WAP will be segregated from the waste stream during confirmation and will not be eligible for disposal at WIPP until further characterization and/or processing is conducted. Waste stream ID-RF-S3150-A is therefore not a corrosive waste (D002).

Reactivity

The materials in this waste stream do not meet the definition of reactivity as defined in 40 CFR 261.23. The materials are stable and will not undergo violent chemical change. The materials will not react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors, or fumes when mixed with water. The materials do not contain cyanides or sulfides, and are not capable of detonation or explosive reaction. The materials are not explosive, nor do the drums contain any explosives (References P012, P013, P015, P016, and P022). Explosives were not handled or

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used around radioactive material. Waste stream ID-RF-S3150-A is, therefore, not a reactive waste (D003).

RTR and/or VE are performed to ensure the waste does not contain explosive materials. Any drum suspected of containing explosives will be segregated from the waste stream during confirmation and will not be eligible for disposal at the WIPP until further characterization and/or processing is conducted.

6.4.3.6 Polychlorinated Biphenyls

Waste stream ID-RF-S3150-A is not regulated as a TSCA waste under 40 CFR 761. Treatment of PCB-contaminated oils in Building 774 did occur prior to 1985; however, solidified organic wastes (IDCs 700 and 801) were not generated until February 1986 (also refer to Section 5.4.3.6). Therefore, PCB-containing fluids would not have been processed by the OASIS (References C207, P507, and U099).

6.4.4 Prohibited Items

Prohibited items potentially in this waste stream based on VE and RTR are sealed containers greater than four liters and free liquids.

Based on a review of several waste packaging and inspection procedures, the drum and rigid liner lids were not vented, nor did the rigid liner lid contain a vent hole when the waste was shipped from Rocky Flats to INL (References P008, P026, P063, P064, P501, P502, P503, and P505). As the drums are retrieved for characterization, they are vented and aspirated to ensure equilibration of any gases that may have accumulated in the closed container (Reference 11).

Prohibited quantities of residual liquids have been identified by VE or RTR in drums of solidified organics. These drums will be segregated and the liquids removed or immobilized prior to re-characterization and certification for shipment to the WIPP (Reference D019).

6.5 Waste Packaging

Depending on waste packaging requirements at the time, several combinations of bags and liners were used to prepare 55-gallon drums for shipment. A rigid liner was placed in each drum and lined with one polyethylene round bottom drum liner or a polyethylene drum bag. A PVC O-ring bag and a polyethylene bag were used if the drum was attached to the glovebox. The polyethylene drum bag was not required from a packaging standpoint but would aid in contamination control. When a drum was full, the drum liners were twisted and taped closed, the lid was secured with a bolted ring, and a tamper indicating device was attached to the drum (References P002, P012, P016, P063, P064, and P501). During the INL 3100 m^3 Project, several combinations of drum bags, poly bags, and O-ring bags used as packaging were identified for thenIDC 700 and IDC 801 wastes (Reference U099).

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Since February 1982, vermiculite was used to fill the space between the outer, sealed polyethylene drum bag and the top of the 90-mil rigid liner. The quantity of vermiculite varied from 3-12 pounds according to the amount of waste contained in each drum (Reference P024). During the INL 3,100 m^3 Project, it was determined during RTR examinations of IDC 700 and IDC 801 wastes that quantities of absorbent can vary significantly from expected quantities, and some drums may contain no absorbent. In addition, both Oil-Dri® and vermiculite may have been used (Reference U099).

Waste repackaged in the SRP are placed directly in prepared 55-gallon drums. Prepared drums are lined with a rigid liner and a filtered plastic drum bag. After loading, the drum bags are twist and taped closed and the drums closed with filtered drum lids (References P542 and P543).

6.5.1 Filter Vents

Based on a review of several waste packaging and inspection procedures, the drum and rigid liner lids were not vented, nor did the rigid liner lid contain a vent hole when the waste was shipped from Rocky Flats to INL. Carbon composite filter vents were not used until the late 1980s (References C057, P008, P026, P063, P064, P501, P502, P503, P504, and P505). As the drums are retrieved for characterization, they are vented and aspirated to ensure equilibration of any gases that may have accumulated in the closed container.

6.5.2 Layers of Confinement

Based on the discussion in Section 6.5, several packaging configurations are possible. There may be various combinations of polyethylene round bottom drum liners, polyethylene drum bags, and PVC O-ring bags. The maximum number of confinement layers however is expected to be two. The rigid liner must be vented and therefore is not considered a layer of confinement.

In some instances, a drum may appear to contain three horsetails (i.e., twist and tape bag closure) because in addition to the two plastic bags that were twisted and taped closed, a bag stub remaining from a previous bag cut was put on top of the waste in the subsequent run. In some cases, only two horsetails may be present because two or three bag stubs were collected in the glovebox before adding them to the top of the waste. This resulted in some drums with what may appear to be four or five horsetails (two plastic bags that were twisted and taped closed plus two or three bag stubs). When the OASIS process first started, sometimes there were problems with the agitator tearing into the inner plastic bag. In this instance, another plastic bag was put around the waste. There will be very few drums like this because the problem was quickly fixed by attaching Tygon tubing to a vacuum pump and inserting the tubing between the rigid liner and the polyethylene drum liner bag which kept the agitator from contacting the plastic bag. With any of these conditions, only the two plastic bags that were twisted and taped closed are considered layers of confinement (Reference C511).
Drums processed in the AMWTP DTF have the rigid liner lids cut out or removed or holes cut and confinement layer bag closures and/or plastic ties cut. Horsetails

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(i.e., twist and tape bag closure) cut during these operations may be placed on top of the waste (References C515 and P535).

Repackaged drums from the SRP will have a rigid liner without a lid and one layer of confinement consisting of a filtered liner bag (References P542, P543, and P547).

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7.0 CONTAINER SPECIFIC INFORMATION

Container specific information for immobilized organic liquid waste drums in waste streams ID-RF-S3114 and ID-RF-S3150-A has been provided to the CCP by the AMWTP. This information originated from the Waste Tracking System database. The data have been compiled and included in the *AK Containers List* which is maintained as a quality record as required by procedure CCP-TP-005 (Reference 1). The information includes:

- Container ID
- Historical Container ID
- IDC
- Generation Date
- Vent Date

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8.0 REFERENCE INFORMATION

1. CCP-TP-005, *CCP Acceptable Knowledge Documentation*, Carlsbad, New Mexico, Nuclear Waste Partnership, LLC.

2. *Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Waste Analysis Plan,* New Mexico Environment Department, Santa Fe, New Mexico

3. DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, Carlsbad, New Mexico, U.S. Department of Energy

4. DOE/WIPP 01-3194, *CH-TRU Waste Content Codes (CH-TRUCON)*, U.S. Department of Energy

5. CCP-PO-001, *CCP Transuranic Waste Characterization Quality Assurance Project Plan*, Carlsbad, New Mexico, Nuclear Waste Partnership, LLC.

6. 42 U.S.C 10101, *The Nuclear Waste Policy Act of 1982*

7. CAO-95-1121, Revision 3, *Transuranic Waste Baseline Inventory Report*, U.S. Department of Energy Carlsbad, 1995

8. DOE/TRU-12-3425, *Annual Transuranic Waste Inventory Report – 2012,* Carlsbad, New Mexico, U.S. DOE

9. CCP-PO-002, *CCP Transuranic Waste Certification Plan*, Carlsbad, New Mexico, Nuclear Waste Partnership, LLC.

10. DOE/LLW-217, *DOE Waste Treatability Group Guidance*, Idaho Falls, Idaho, INEL-Lockheed Idaho Technologies

11. CCP-PO-003, *CCP Transuranic Authorized Methods For Payload Control (CCP CH-TRAMPAC)*, Carlsbad, New Mexico, Nuclear Waste Partnership, LLC.

12. McCoy's RCRA Compliance CD. 2004 Edition. McCoy and Associates, Inc. Golden, Colorado

13. *CH-TRU Payload Appendices,* Waste Isolation Pilot Plant

14. Public Law 102-579, *The Waste Isolation Pilot Plant Land Withdrawal Act* (as amended)

15. 40 CFR Part 261, *Identification and Listing of Hazardous Waste*, U.S. EPA

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9.0 AK Source Documents

Source Document Number	Title
C032	External letter from J. K. Paynter to J. N. Davis, Idaho National Engineering Laboratory Data Package Information Change for Drum D40197-0743-18283
C039	Internal Correspondence from J. K. Paynter to B. C. Barrett
C057	Drum, gasket, liner usage at RFP compiled by Larry Bearly
C086	Memorandum from Jeff Paynter to Pamela of IT Corporation. Use of the Complexing Agent DHDECMP
C130	Fax from Steve Cunningham, Rocky Flats, to Jeff Paynter
C134	Interview Record and associated documentation of several former Rocky Flats employees
C137	Interview Record of E. Putzier and E. Vejvoda by D. Herrick and J. Lamb
C154	Interview Record of W. V. Conner by T Widner and D. Lamb
C159	Interview Record of R. Hoffman by D. Herrick and J. Lamb
C170	Telecon between Al Morgan of Rocky Flats (retired) and Jeff Harrison
C171	Telecon between Bill Connor of Kaiser-Hill LATO and Jeff Harrison
C184	Interview Record of Al Morgan by Jeff Harrison
C185	Telecon between Bill Connor of LAPO and Jeff Harrison
C207	Summary of Review of PCB AK Sources
C502	Letter from John A. Ciucci to Joseph A. Legare. Resolution of Cesium-137 AK Discrepancy Between Rocky Flats Environmental Technology Site and Idaho National Engineering and Environmental Laboratory
C505	Letter from Cynthia Zvonar, Department of Energy Carlsbad Field Office, to Lou E. Roberts, Environmental Protection Agency
C506	Letter from John H. Smith, Environmental Protection Agency, to Lynne Smith, Department of Energy WIPP Office Director, EM-23
C510	E-mail Correspondence from Murthy Devarakonda to Michael Rivera. Subject: IDC 003 Packaging
C511	Record of Communication with Mark Crocker. Subject: OASIS Waste Packaging
C514	Email from Mike Rivera to Kathy Leonard, “WMF-633 ARP Drums”
C515	Email from Whitney St Michel to Barbara Broomfield, Vince Medina, Bill Verlanic, "RF-003 Treated Drums"
C516	Letter to Vincent C. Vespe, "Request for Approval - Shipments of Radioactive Waste in 55-Gallon Steel Drums"
C517	Earliest Pack Date for Rocky Flats Waste Retrieved From Pits 11 and 12
C518	Email from Jason P. Lance to Jim Vernon, "RF-743 Summary"

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Source Document Number	Title
C519	Letter from Scott Raish, AMWTP, to Dave Wessman, U.S. DOE Idaho, "Toxic Substances Control Act Application for a Risk-Based Disposal Approval to Process Radiologically Contaminated Liquids Containing Polychlorinated Biphenyls-SCR-003-07
C520	Letter from Michael Bussell, U.S. EPA, to David Wessman, U.S. DOE Idaho, "Approval of the (TSCA) RBDA Application for Management of Transuranic PCB Remediation Waste at AMWTP Facility
C521	Memorandum to CCP Records: Waste Stream Volume Adjustment for Waste Stream ID-RF-S3114, Rocky Flats Organic Setups Waste, Shipped in 85-Gallon Drums
C522	Internal Memo re: Evaluation of Chemicals Used in the Sludge Repackage Project for Waste Streams ID-RF-S3114 and ID-RF-S3150-A, Rocky Flats Absorbed and Solidfied Organic Liquids Waste
D004	Discrepancy Resolution for Waste Matrix Code Assignments for Waste Streams ID-RF-S3114 and ID-RF-S3150-A
D005	Discrepancy Resolution for EPA Hazardous Waste Number Assignments for Waste Streams ID-RF-S3114 and ID-RF-S3150-A, Rev. 1
D009	Discrepancy Resolution for Cs-137 and Sr-90 in Rocky Flats TRU Waster
D013	Discrepancy Resolution. Incorrect Waste Matrix Code
D014	Discrepancy Resolution. Incorrect Waste Matrix Code
D019	Discrepancy Resolution. Liquids Identified During Characterization
D022	Discrepancy Resolution. Solvent Use of Nitrobenzene
D023	Graphite in Waste
D024	Discrepancy Resolution. Addition of EPA Hazardous Waste Number D008 to Waste Stream ID-RF-S3114.
D025	Discrepancy Resolution. Addition of EPA Hazardous Waste Number D008 to Waste Stream ID-RF-S3150-A.
M001	Memorandum to CCP Records: Addition of Containers to Waste Stream ID-RF-S3114
M003	RTR Analysis Report
M004	Material Safety Data Sheet for Fabric
P001	TRU Waste Compliance Program for WIPP-WAC (U)
P002	Organic and Sludge Immobilization System
P004	Rocky Flats Plant Waste Management Site Plan
P008	Packaging and Handling Line- and Nonline-Generated Materials (U)

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Source Document Number	Title
P012	TRUPACT-II Content Codes (TRUCON)
P013	EG&G Sampling Program Results FY1987
P014	TRU Waste Certification Program for WIPP-WAC (U)
P015	TRU Waste Sampling Program: Volume I-Waste Characterization
P016	Idaho National Engineering Laboratory Code Assessment of the Rocky Flats Transuranic Waste
P020	Characteristics of Transuranic Waste at Department of Energy Sites
P022	EG&G Sampling Program Results FY1989
P023	(Task 5 Draft Report) Estimating Historical Emissions from Rocky Flats (Partial)
P024	Content Code Assessments for INEL Contact-Handled Stored Transuranic Wastes
P026	Transuranic Solid Waste Inspection (U)
P033	Summary of Transuranic Waste Characterization Programs at the INEL (1979-Present)
P043	TRU Waste Compliance Program for WIPP-WAC (U)
P052	Backlog Waste Reassessment Baseline Book
P053	(Tasks 3&4 Final Draft Report) Reconstruction of Historical Rocky Flats Operations and Identification of Release Points
P060	Waste Stream and Residue Identification and Characterization Building 707
P061	Waste Stream and Residue Identification and Characterization Building 771
P062	Waste Stream and Residue Identification and Characterization Building 779
P063	Packaging Wastes for Shipment Offsite (U)
P064	Waste Packaging Requirements
P066	Material Safety Data Sheets for Envirostone Accelerator, Envirostone Emulsifier, and Envirostone Gypsum Cement
P069	Nuclear Materials Control Elements printout. SAN Database Report
P076	Waste Stream and Residue Identification and Characterization Building 559
P077	Waste Stream Residue Identification and Characterization Building 774
P078	Waste Stream Residue Identification and Characterization Building 776
P079	Waste Stream Residue Identification and Characterization Building 777
P081	Waste Stream Residue Identification and Characterization Building 371
P082	Waste Stream Residue Identification and Characterization Building 374
P084	Material Safety Data Sheet for Varsol 1
P089	Waste Systems Progress Report March 1984 through February 1985

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Source Document Number	Title
P090	History of Rocky Flats Waste Streams
P091	Materials Hazards Manual
P142	Material Safety Data Sheet for ZL-22A Zyglo Penetrant
P152	Plutonium Metal Feed Specification for Use in the Weapons Program. Volume 1
P161	Dose Reconstruction Project Task 5
P164	A History of The Rocky Flats Plutonium/Actinide Recovery Plant 1952-1991
P166	Rocky Flats Risk Assessment Guide
P167	Neptunium Processing at the Rocky Flats Plant
P169	Plutonium Isotopic Ratios at Rocky Flats
P178	Research and Development Quarterly Progress Report. October, November, and December 1968
P179	Research and Development Quarterly Progress Report. April, May, and June 1969
P180	Research and Development Quarterly Progress Report. July, August, and September 1969
P181	Research and Development Quarterly Progress Report. January, February, and March 1970; Chemistry
P182	Research and Development Quarterly Progress Report. April, May, and June 1970; Chemistry
P183	Research and Development Quarterly Progress Report. July, August, and September 1970; Chemistry
P184	Research and Development Quarterly Progress Report. October, November, and December 1970; Chemistry
P185	Research and Development Quarterly Progress Report. January, February, and March 1971; Chemistry
P186	Research and Development Quarterly Progress Report. April, May, and June 1971; Chemistry
P187	Research and Development Quarterly Progress Report. July, August, and September 1971
P188	Research and Ecology Annual Report. Chemistry Research and Development
P189	Research and Ecology Semi-Annual Progress Report January – June 1972
P190	Research and Ecology Semi-Annual Progress Report. Chemistry Research and Development. July through December 1972
P191	Research and Ecology Semi-Annual Progress Report. Chemistry Research and Development. January-June 1973
P192	Research and Ecology Semi-Annual Progress Report. Chemistry Research and Development. July-December 1973

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Source Document Number	Title
P193	Research and Development Semi-Annual Progress Report for July through December 1974; Chemistry
P194	Research and Development Semi-Annual Progress Report for January through June 1975
P195	Research and Development Semi-Annual Progress Report for January through June 1977
P196	Chemistry Research and Development Annual Progress Report November 1, 1979 through October 31, 1980
P197	Chemistry Research and Development Annual Progress Report November 1, 1980 to September 30, 1981
P198	Chemistry Research and Development Annual Progress Report. October 1, 1981 to September 30, 1982
P199	Chemistry Research and Development Annual Progress Report October 1, 1982 to September 30, 1983
P200	Chemistry Research and Development Annual Progress Report October 1, 1983 to September 30, 1984
P201	Chemistry Research and Development Annual Progress Report October 1, 1984 through September 30, 1985
P202	Chemistry R&D Monthly Progress Report
P210	Default Plutonium Mass Fractions for Rocky Flats Plant Waste
P227	Plutonium Mass Fractions Derived from SGRS Data
P501	Packaging Waste for Shipment Offsite
P502	Packaging and Handling Plutonium Wastes and Residues
P503	Packaging Wastes for Shipment Off-Site
P504	Packaging Waste for Shipment Offsite
P505	Procedure for Packaging and Handling Pu Waste and Residue Drums
P507	Acceptable Knowledge Document for INEEL Stored Transuranic Waste – Rocky Flats Plant Waste
P508	Radioactive Waste Management Complex Map Drawing
P509	Radioactive Waste Management Complex – Idaho Completion Project
P512	Waste Description Information for Transuranically Contaminated Wastes Stored at Idaho National Engineering Laboratory.
P513	Determination of Radioisotopic Content In TRU Waste Based on Acceptable Knowledge.
P515	Estimated Earthen and Geofabric Covered TRU Waste Inventory in the TSA at Radioactive Waste Management Complex (RWMC)

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Source Document Number	Title
P516	Advanced Mixed Waste Treatment Project Waste Stream Designations
P517	Material Safety Data Sheet, Micro-Cel® E (All Grades)
P518	Material Safety Data Sheets for Various Texaco Oils and Shell Vitrea M Oil
P519	Waste Systems Progress Report March 1983 through February 1984
P520	Building Histories for Building 371, 444, 447, 460, 707, 771, 776/777, 881, 883, and 991 Historical Release Report (HRR)
P521	Rocky Flats Environmental Technology Site WIPP Waste Stream Profile Form, TRM Solidified Organic Waste
P522	Rocky Flats Environmental Technology Site WIPP Waste Stream Profile Form, TRM Solidified Organic Waste
P524	Determination of H2 Diffusion Rates through Various Closures on TRU Waste Bag-Out Bags
P532	Summary of Rocky Flats Waste Buried in the Subsurface Disposal Area
P534	Shipment And Disposal Of Solidified Organic Waste (Waste Type IV) TO The Waste Isolation Pilot Plant (WIPP), Presented at WM'06 Conference, February 26-March 2, 2006, Tucson, AZ.
P535	Drum Treatment Facility Operations
P536	Visual Examination of S3000 Waste in the Facility
P537	Subsurface Disposal Area (SDA) Waste Identification (1952-1970 Emphasis)
P538	Colorimetric Determination of Iron in Plutonium Metal Using a Nitrobenzene Extraction Technique
P539	Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant
P540	Acceptable Knowledge Re-evaluation Checklist, CCP-TP-005, Attachment 10, 3/28/06
P541	WMF-615 Filter Insertion Operations
P542	SRP DPS Waste Packaging
P543	SRP RA V Waste Processing
P544	WMF-1617 SRP-Support Systems
P545	RWMC Waste Handling and Overpacking
P546	Risk-Based Disposal Approval Application for Management of Polychlorinated Biphenyl (PCB) Remediation Waste Contaminated with Transuranic Radioisotopes at the Idaho Cleanup Project (ICP) Accelerated Retrieval Project V (ARP V) Facility
P547	RWMC-55 Gallon Drum Assembly

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Source Document Number	Title
U010	OASIS Solidification and Off Gas Analysis
U040	Building 774 Low Level Organic and TRU-Waste Organic Waste Log Book.
U043	Building 774 Set Up Log Book
U059	Drum Prefix Numbers and Corresponding Material Balance Areas
U064	Radioactive Materials Associated with Rocky Flats
U069	Drum Prefix Issue Dates Log Book
U092	Inventory values as generated by TRIPS Change Request (TCR) 1821
U098	Preliminary data for the IDC 003 waste stream
U099	Draft Waste Stream Profile Form – Solidified Organics and Supporting Documentation
U505	Rocky Flats Prefix History Timeline
U517	Advanced Mixed Waste Treatment Project (AMWTP) Visual Examination (VE) Data Sheets
U518	Advanced Mixed Waste Treatment Project (AMWTP) Glove Box Glove Specifications
U519	Excerpts of CCP Nonconformance Reports (NCRs) for Prohibited Liquids
U520	Att 1 – CCP Waste Visual Examination Technique Data Form SCO#798 Addendum 5 Windows XP 2002 MX Excel 2003

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Figure 1. Rocky Flats Environmental Technology Site Map

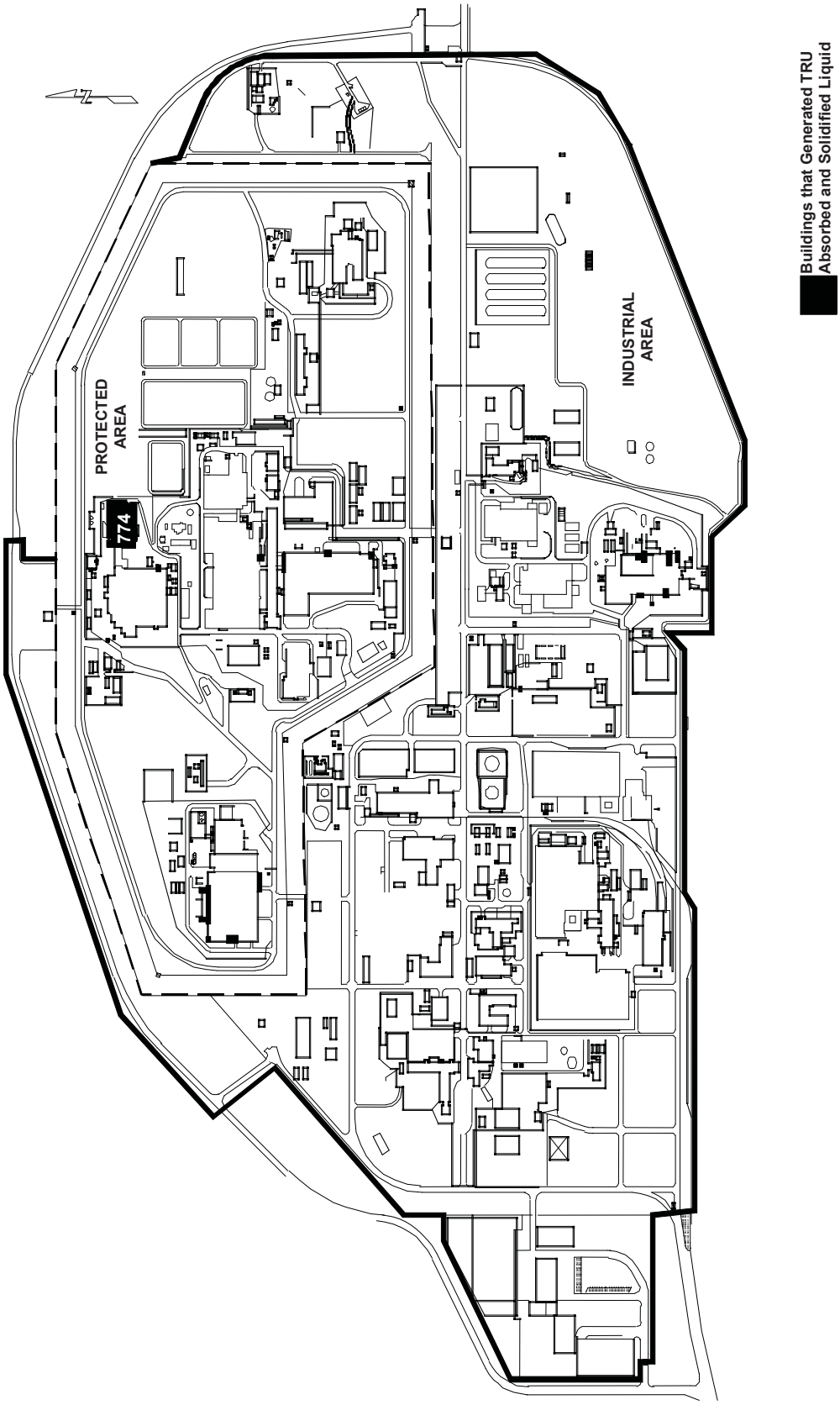

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Figure 2. Location of the INL Radioactive Waste Management Complex

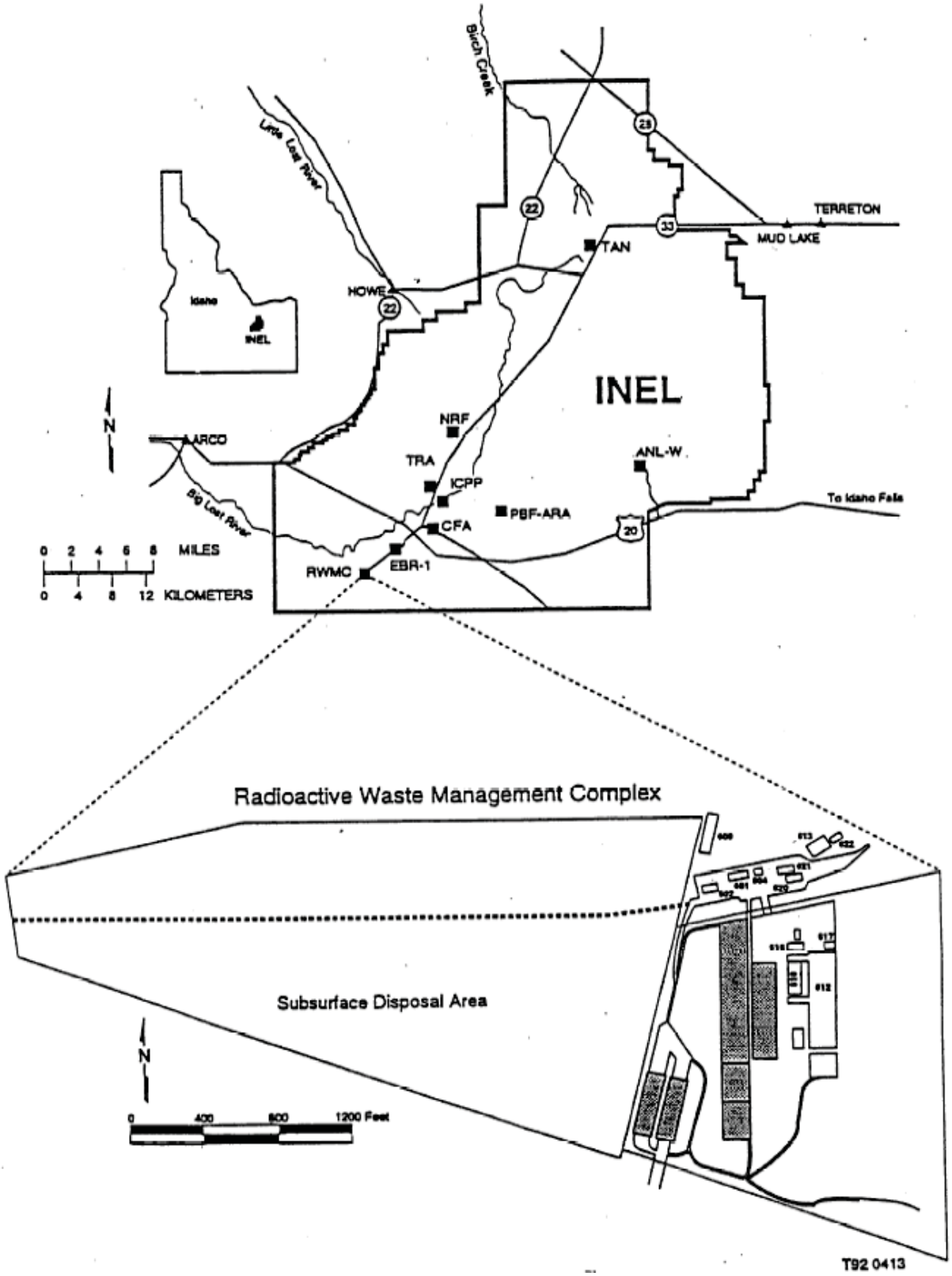

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Figure 3. Radioactive Waste Management Complex Map

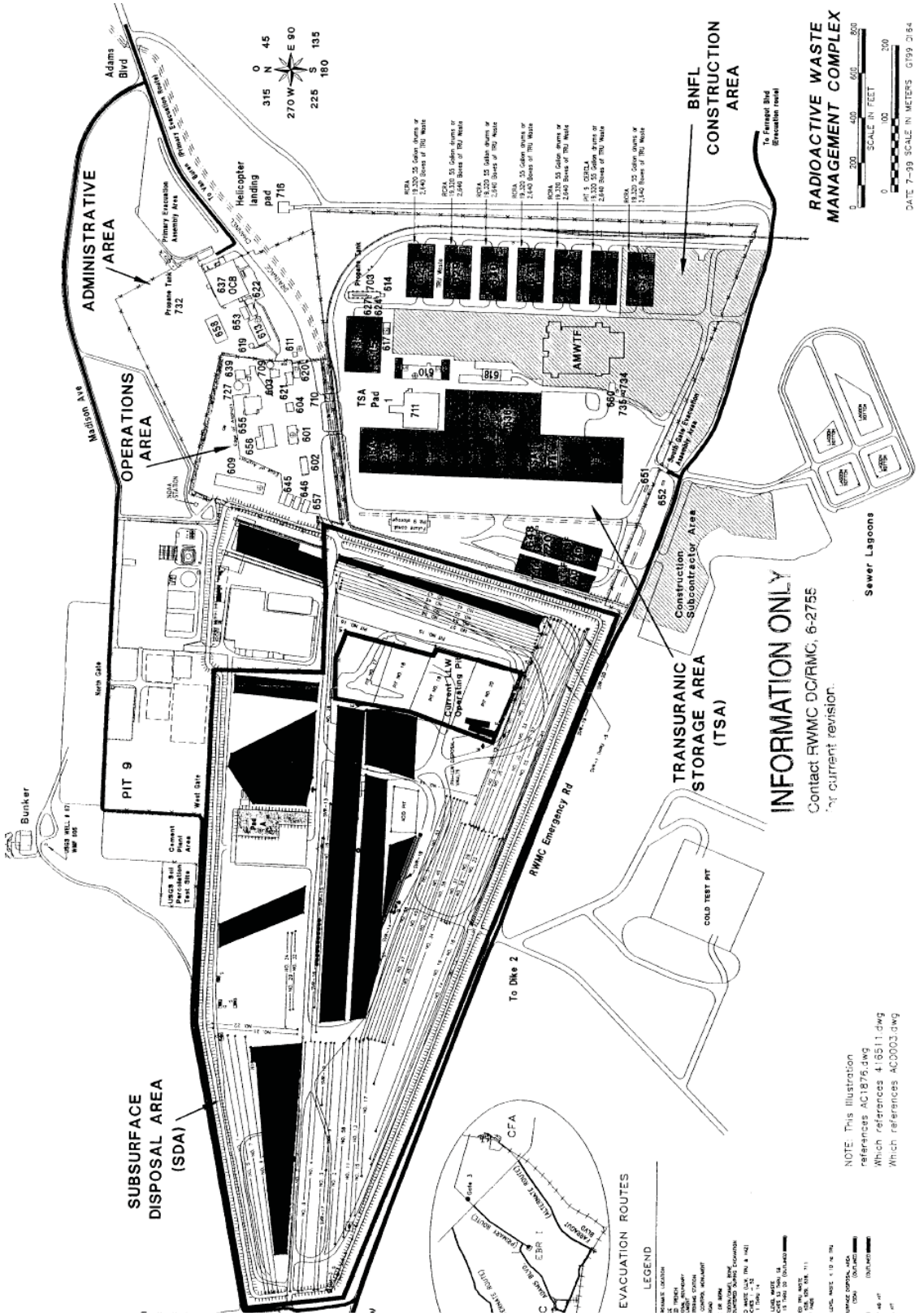

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Figure 4. Grease Plant

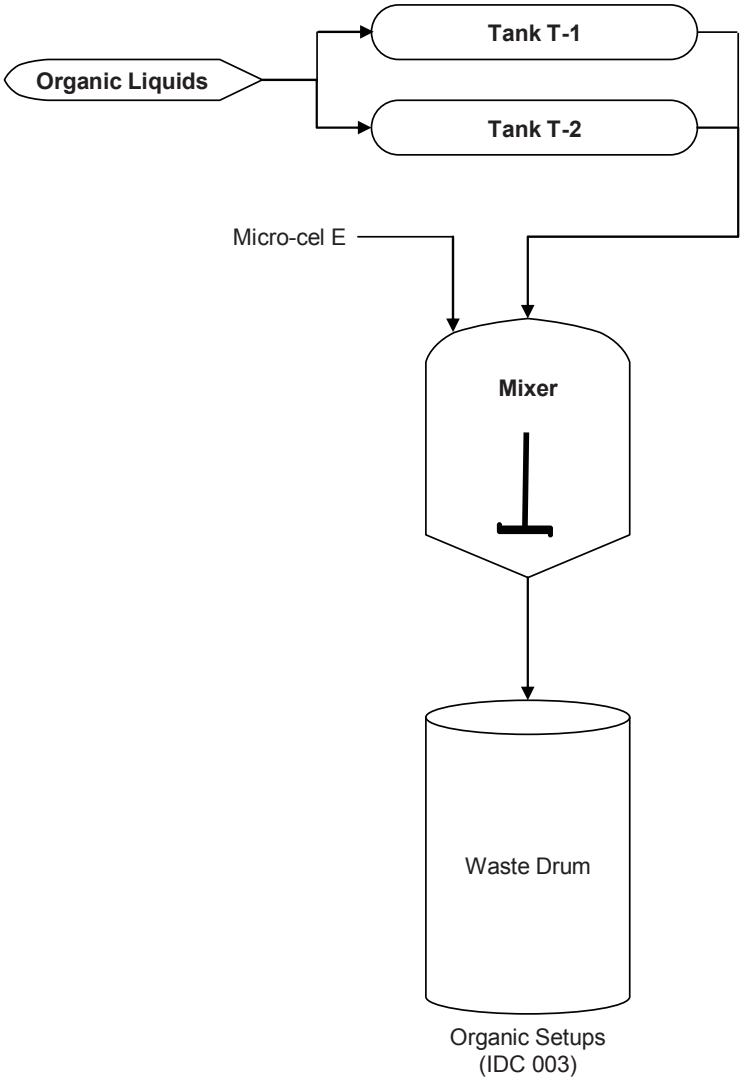

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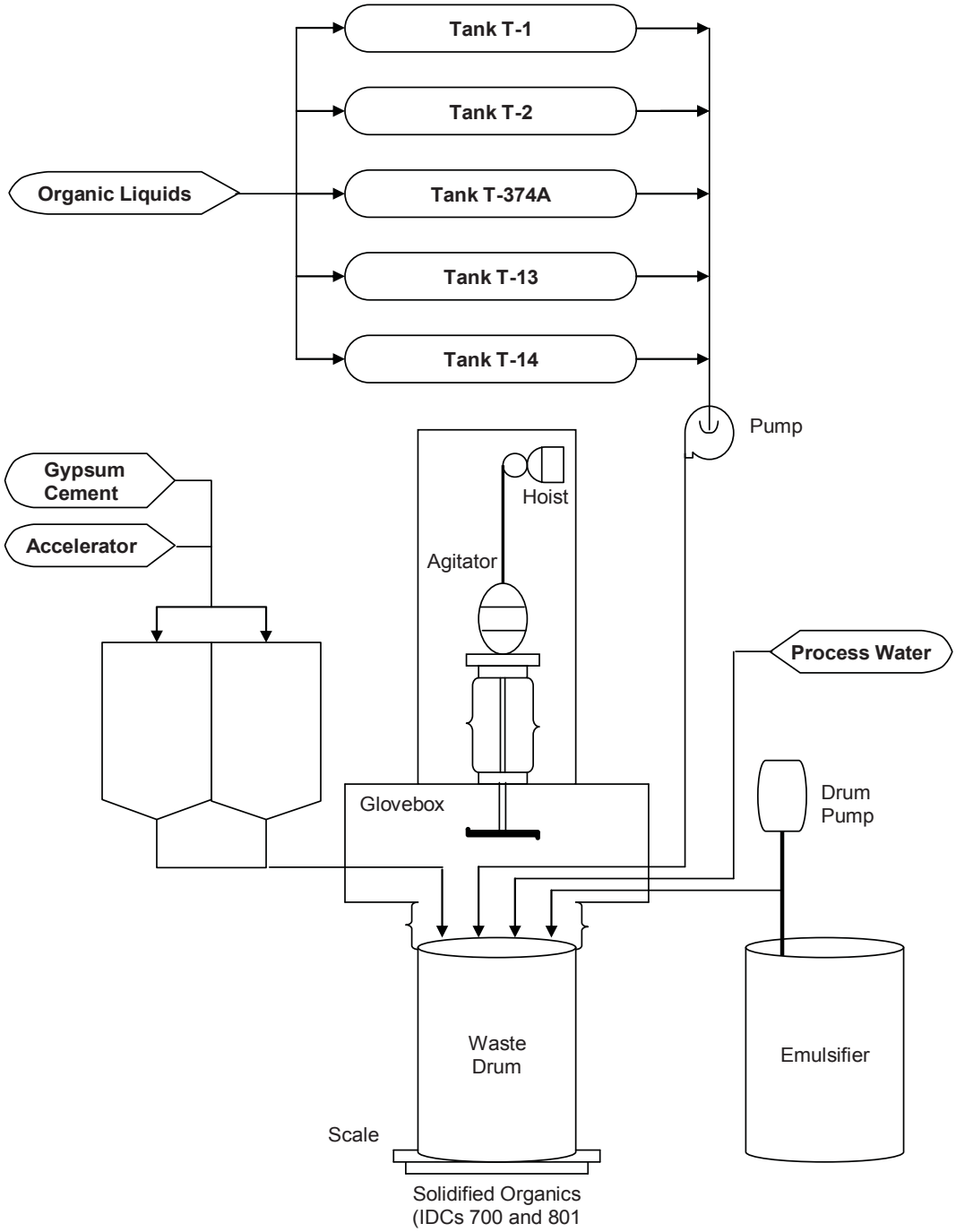
Figure 5. Organic and Sludge Immobilization System



APPENDIX 4

REPORT 228

Project No.: 23927, 25580

MANAGING FREE LIQUID IN NEWLY GENERATED WASTE DRUMS

Document ID: RPT-228
Revision ID: 0
Effective Date: 06/14/07

REPORT

Project No.: 23927, 25580

MANAGING FREE LIQUID IN NEWLY GENERATED WASTE DRUMS

Idaho Cleanup Project

CH2M ◆ WG Idaho, LLC is the Idaho Cleanup Project contractor for the U.S. Department of Energy

RPT-228
Revision 0
Project No. 23927, 25580

Managing Free Liquid in Newly Generated Waste Drums

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June 2007

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Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Management
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14516

ABSTRACT

The presence of free liquid in some drums of targeted sludge from the AR Project was initially discovered in December 2006. Since that time, free liquid has been found in about 40% of the sludge drums. Free liquid must be less than 1% by volume for waste sent to the Waste Isolation Pilot Plant (WIPP). Although the moisture content in the sludge is not known, visual examination ensures that no free liquid exists in the waste when it is placed in drums. The most likely mechanism for release of free liquid is capillary flow by gravity through the unsaturated sludge. This process may be enhanced by the effect of freeze-thaw cycles due to temporary storage in unheated buildings. A comparison was made of several potential absorbents, using a nominal one gal of liquid as a basis. It is recommended that two gal of Oil-Dri® be added to each drum of sludge to absorb free liquid that may form.

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ACRONYMS

AMWTP	Advanced Mixed Waste Treatment Plant
ARP	Accelerated Retrieval Project
DPS	Drum Packaging System
MSE	MSE Technology Applications, Inc. of Butte, Montana
RFP	Rocky Flats Plant
RTR	real-time radiography
SDA	Subsurface Disposal Area

Managing Free Liquid in Newly Generated Waste Drums

1. POTENTIAL FREE LIQUID RELEASE FROM SLUDGE WASTE

About a gallon of free liquid was observed during routine examination of a sample drum at the Advanced Mixed Waste Treatment Plant (AMWTP) in December, 2006. The drum consisted of sludge waste exhumed and repackaged at the Accelerated Retrieval (AR) Project. Since that time about 40% of AR Project sludge waste drums have been found to contain free liquid.

Free liquid has been observed in drums of both inorganic sludge and organic sludge generated at the Rocky Flats Plant (RFP). During the 3,100 m^3 Project, approximately 1,150 drums (6% of the total) had absorbent added to them prior to shipment. Liquid was observed above the sludge.

A study of the organic sludge from RFP indicated that free liquid organic compounds can be separated from the sludge matrix.[1] This observation was made during coring of organic sludge drums for sampling. Additional evidence comes from surrogate testing. The release of free liquid from the calcium silicate matrix is possible because the pore size of the matrix decreases when shear force is applied.

Based on observation of drums of sludge waste from RFP, there is evidence for the formation of free liquids.

1.1 Mechanisms for Liquid Release

Inorganic sludge from RFP consists primarily of metal precipitates (oxides and hydroxides) that were filtered before being packaged and shipped to Idaho. The rotary drum filter used at RFP produced a moist filter cake, at or near saturation. This may explain why free liquid was found on top of inorganic sludge drums during the 3,100 m^3 Project.[2] That waste had not been opened or repackaged since shipment to Idaho, and its moisture content was probably quite high. The exhumed waste that was recently sampled had a somewhat different history. It was buried for decades, not stored in a building. The original drum may have corroded enough to form small holes that would allow free liquid to drain out. Even if holes did not develop while the waste was interred, the original drum was split open during exhumation, and this would have released any free liquid. Even if the waste was not moist to the touch, but had dried somewhat, it would still be expected to retain at least as much moisture as the surrounding soil. This can be as much as 30% by weight. **So the drum with a net weight of 204 lb could contain about 60 lb of water, even if the waste appeared dry when it was packaged.**

There are several possible mechanisms for the formation and movement of free liquid in the drum. The first is evaporation and condensation. The first sludge drum with free liquid was initially packaged in May 2006 and stored in buildings without heat or air conditioning. During the summer months, cycles of evaporation and condensation could have occurred. However, any accumulation of liquid water from this process would be slow. Because of the limited void volume in the drum (probably no more than half of the drum volume), only about 3 grams of condensate could form in a single daily evaporation-condensation cycle. Even if all of the condensate drained to the bottom of the drum and was not subject to further evaporation, this process would require several years to generate a gallon of free liquid. Although evaporation and condensation probably occurred in the drum, that process could be only a minor contributor to the free liquid.

Water can also collect in the pores of the waste and settle by gravity. The inorganic sludge has the general appearance of soil, so a vadose zone flow model can probably be applied to the waste. In this model water flows through small pores. The process can be described by a variation of Darcy's equation[3]:

$$q = K(\theta)\ \mathrm{grad}(H)$$

where

$K(\theta)$ = unsaturated hydraulic conductivity, cm/sec

grad H = gradient of head loss (cm/cm)

q = fluid flux, $cm^3/(sec\text{-}cm^2)$ or cm/sec.

For flow in unsaturated media, the hydraulic conductivity is a function of water content. Hubbell and his co-workers have estimated that vadose zone fluxes at the INL can range from 0.2 to 10,000 cm/yr (roughly 10^{-9} to 10^{-4} cm/sec).[4] For comparison, a flux of 10^{-7} cm/sec over one-fourth of the cross-sectional area of a drum would result in the collection of almost a third of a gallon of liquid in 7 months. Because hydraulic conductivities can vary by many orders of magnitude, it is very difficult to precisely estimate the flow rate of fluid in unsaturated media, particularly without performing experimental work. However, this downward flow of water through the pores of unsaturated sludge has at least the potential to generate the volume of water observed in the drums currently under investigation.

Before being transported to the AMWTP for characterization, drums are stored in the unheated WMF-698 building. While there the drums are subject to freeze-thaw cycles as well as periods of evaporation and condensation. Studies have been conducted on the impact of freezing and thawing on fluid movement in soils. These studies have relevance because the RFP sludge waste materials have properties similar to those of silty soil (inorganic sludge) or clay-like soil (organic sludge). It has been shown that one or two freeze-thaw cycles increase the hydraulic conductivity by one or even two orders of magnitude.[5] It is easy to see from the equation above that such a change in hydraulic conductivity can have a major effect on the rate at which liquid flows through the waste.

1.2 Fluid Flow in Waste

From recent observations using real-time radiography (RTR), more than one third of the sludge drums checked have been found to contain free liquid in the bottoms of the drums, always inside the rigid liners. As long as the liquid can flow by gravity towards a layer of absorbent, the absorbent will be effective in removing free liquid from the drum. Appendix A provides a discussion of the rationale for putting absorbent inside the rigid liners of drums.

1.3 Comparison of Absorbents

It is suggested that inorganic absorbents be used to eliminate the potential for additional gas generation in the waste drums and to alleviate any concerns regarding criticality safety. The commercial product, Oil-Dri® is composed of montmorillonite or attapulgite clay and crushed quartz. These clays are also known as Fuller's Earth. The basic ingredients are very similar to those of the Aquaset and Petroset products frequently used for solidification of radioactive waste. Those two products are also based on montmorillonite clay.

The Oil-Dri® vendor literature indicates that this product is effective for water or organic liquids.[6] The Material Safety Data Sheet (see Appendix B) indicates that heat can be generated if Oil-Dri® is used to absorb unsaturated hydrocarbon liquids. Both tetrachloroethylene and trichloroethylene contain double bonds as do other unsaturated hydrocarbons. Other possible organics in the Subsurface Disposal Area (SDA) are saturated and do not have the potential for heating. Testing of Aquaset and Petroset at MSE Technology Applications in Butte, MT during 2006 showed that these materials did not react at all with these chlorinated solvents.[7] Since Oil-Dri® is composed of the same or a similar type of clay as the Aquaset and Petroset materials tested at MSE, it is highly unlikely that Oil-Dri® will react with the saturated organics. Even if an exothermic reaction were to occur, the contacting of fluid in a waste drum with the absorbent would take place over several days or weeks. This long duration would allow any heat to dissipate.

Oil-Dri® is a relatively inexpensive, multi-purpose product. Its absorptive capacity is not as high as specially engineered absorbents, such as Aquaset and Petroset. The table below shows the expected performance of Oil-Dri® for absorbing free liquid in drums.

As noted above, testing was performed with a mixture of Aquaset and Petroset products on a variety of chemical compounds, including organic chemicals expected to be in the SDA. These products effectively absorbed with the simulated rinse waters or organic liquids tested, but did not otherwise react with them. Unlike the Oil-Dri® product, one material is not suited for both aqueous and organic liquids. As the name implies, Aquaset absorbs aqueous liquids such as rinse water and K-W decontamination solution. Petroset II-G would be used in drums containing oils and chlorinated solvents. The table below shows characteristics and performance of the Aquaset and Petroset products, based on vendor literature.[8] It should be noted that a blend of Aquaset and Petroset II-G could be used as a single-product additive to drums. Table 1 shows the quantities needed for a blended absorbent to deal with either aqueous or organic liquid.

Table 1. Comparison of absorbents.

Comparison of Absorbents Basis: absorption of 1 gal of free liquid				
Parameter	Aquaset (aqueous only)	Petroset II-G (organic only)	Aquaset + Petroset II-G	Oil Dri® (all liquids)
Composition	Montmorillonite clay	Montmorillonite clay	Montmorillonite clay	Montmorillonite/attapulgite clay + quartz
Bulk Density of Absorbent, lb per gal (see Note 2)	9.6	6.4	7.8	4.8
Application Rate, gal of absorbent per gal of free liquid	0.33	0.43	0.76	2.1
Volume of Absorbent Required, gal	0.33	0.43	0.76	2.1
Typical Unit Cost, $/lb	$4.00	$4.00	$4.00	$0.10-$0.20
Cost per Drum	$12.67	$11.01	$23.68	$1.01-$2.02

Notes:
1. Densities and application rates based on vendor literature.
2. Density differences in similar clays due largely to differences in particle size.
3. Unit costs do not include shipping or tax.

Based on RTR observation the volume of liquid is typically about one gallon. Using as a basis one gal of liquid, Table 1 shows the amounts of absorbents needed per drum of waste and the associated cost. Information in the table is based on published vendor literature. Physical testing will be conducted in the future to determine the specific amount of absorbent to be applied when dealing with variable amounts of free liquid.

1.4 Discussion and Recommendations

Clay-based absorbents are expected to be effective in eliminating free liquid formed after waste exhumed from the SDA is repackaged. The engineered absorbents, Aquaset and Petroset, are very efficient. Less than half a gal of either absorbent can absorb one gal of liquid. Even if Aquaset and Petroset were blended together in drums to address both aqueous and organic liquids, the required volume would be less than half that of Oil-Dri®. However, the high unit cost of the materials makes them expensive to use when compared with Oil-Dri®. A disadvantage of Oil-Dri® is that it would increase waste volume by about 4% (2.1 gal in a 55-gal drum), compared to a less than 1.4% increase for the Aquaset and Petroset products (0.4 gal or 0.76 gal in a 55-gal drum).

Because the free liquid is expected to collect between the tray liner and the rigid liner, absorbent can be added to drums at some point before they are attached to the DPS. This can be done in the area where drums are staged before use. Using Aquaset and Petroset would require that care be taken to ensure that drums containing Aquaset were used for inorganic sludge and drums with Petroset were used with organic sludge. If this is not practical, the Aquaset or Petroset may be added from the DPS before the waste is placed in a drum. These operational issues are a disadvantage for Aquaset and Petroset. This disadvantage could be overcome by pre-blending Aquaset and Petroset II-G, then adding the mixture to drums as a single product in the same manner as Oil-Dri®.

It is recommended that Oil-Dri® floor absorbent be used to absorb any free liquids that form in drums of sludge packaged in the SDA. The application rate should be 2 gal per drum, based on an assumed maximum of one gal of free liquid formed. Because Oil-Dri® absorbs both aqueous and organic liquid, it can be added inside the rigid liners of every drum used for targeted waste. The addition can be done at any convenient location before the drums are used.

2. REFERENCES

1. Sondrup, J. Nalla, G. and E. Miller, "Study of the Migration Potential of Hydrocarbons from Series 743 Sludge for the Targeted Waste Removal and Disposition Project", EDF-5598, Revision 0, draft.

2. INEEL/EXT-03-0034, "3,100 m^3 Project Summary Report," Revision 0, August, 2003, Section 3.2.1.

3. Selker, J.S., Keller, C.K. and J.T. McCord, Vadose Zone Processes, Lewis Publishers, Boca Raton, FL, 1999.

4. Hubbell. J.M., Nicholl, M.J., Sisson, J.B. and D.L. McElroy, "Application of a Darcian Approach to Estimate Liquid Flux in a Deep Vadose Zone", Vadose Zone Journal, Volume 3, 2004, pages 560 – 569.

5. Kraus. J.F. and C.H. Benson. "Effect of Freeze-Thaw on the Hydraulic Conductivity of Barrier Materials: Laboratory and Field Evaluation", EPA/600/SR-95/118, Environmental Protection Agency, August, 1995.

6. Web Site, http://www.fastenalmanufacturing.com/web/products/detail.ex?sku=635000-131463, visited January 24 2007.

7. MSE Technology Applications, Inc, "Accelerated Site Cleanup Programs Testing and Demonstration Project Final Report–Sorbent Testing For The Solidification of Unidentified Rocky Flats Laboratory Liquids at the Idaho National Laboratory", MSE-106, September, 2006.

8. Web Site, http://www.fluid-tech-inc.com/Rad%20Waste.htm, visited January 10, 2007.

Appendix A

Free Liquid Flow and Absorption

Appendix A

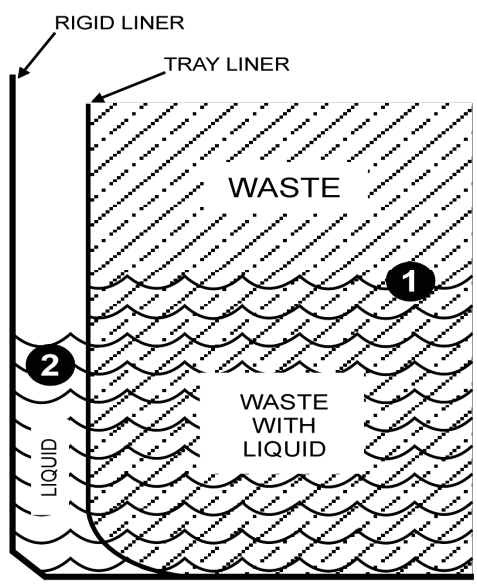
Free Liquid Flow and Absorption

Free liquid has been discovered in the rigid liners of a number of drums of ARP sludge waste. The liquid occupies the space between the tray liner and the rigid liner inside some drums; in other drums the liquid is in this space plus inside the tray liner, in void spaces in the waste. To date, virtually all free liquid has been found in the bottoms of drums, and all pockets of liquid inside the waste matrix have been hydraulically interconnected, with the liquid in the bottom of the drum. The exceptions to this have been very small amounts of liquid, typically less than half a cup, on the tops of drums, in the folds of the transfer bags. In other words, all liquid found inside tray liners has been adjacent to liquid between the tray liners and the rigid liners. No isolated pockets of free liquid have been found inside the waste matrix. This is an important observation. It indicates that all pockets of liquid can be absorbed by putting absorbent inside the rigid liners before placing waste in drums. The following discussion demonstrates why this conclusion is valid.

Figure A-1 represents a hypothetical situation in a sludge drum containing free liquid. Liquid is present on both sides of the tray liner. Actual observation consistently shows that the two fluid levels are the same. However, the figure represents the condition in which some liquid released by the waste has not yet flowed through the tray liner.

FREE LIQUID IN SLUDGE DRUMS

NOTE: Scenario without absorbent



1. Liquid level inside tray liner

2. Liquid level between tray liner and rigid liner.

Figure A-1. Free Liquid in Sludge Drums.

Tray liners have been shown to be liquid-permeable. This was confirmed recently by putting about two gallons of water in a tray liner. Initially the fabric was water tight, but water started leaking from the seams in about one minute. Within twenty-four hours the fabric became saturated with water and was leaking.

Flow from the inside to the outside of the tray liner can be described using the Bernoulli equation[1]:

$$\Delta V^2/2g_c + (g/g_c)*(z_2-z_1) + \Delta P/\rho + fl = 0$$

Where:

ΔV = difference in velocity between points 1 and 2 = $V_2 - V_1$

g_c = gravitational constant, 32.2 ft/sec^2

g = acceleration of gravity, 32.2 ft/sec^2

z_1, z_2 = heights above an arbitrary datum, ft

ΔP = pressure difference between points 1 and 2, lbs/ft^2

ρ = density of fluid, lbs/ft^3

fl = friction loss, ft of fluid flowing

The points 1 and 2 in Figure A-1 were chosen to facilitate analysis. At the tops of the two fluid columns the pressure should be the same, essentially atmospheric pressure. So $\Delta P = 0$. Flow will occur if ΔV^2 is greater than zero. Rearranging Bernoulli's equation and solving for ΔV^2 gives:

$$\Delta V^2 = -2*g*(z_2 - z_1) - 2*g_c*fl$$

Now $z_2 < z_1$, so the first term is positive. The difference in height, called head, between points 1 and 2 provides the motive force for fluid flow. The second term on the right hand side of the equation is subtracted from the first term because the resistance to flow imposed by the tray liner reduces the net motive force. This has the effect of slowing the velocity of liquid flowing out of the tray liner. Liquid will flow out of the tray liner as long as $z_2 < z_1$. Loss of head due to friction is proportional to the flow rate. If there is no flow, friction is zero. As flow increases, friction losses become significant and effectively impose an upper limit on flow rate.

Putting absorbent between the tray liner and the rigid liner will promote the flow of liquid out of the tray liner. As liquid collects in the space between the two liner it will be absorbed. Unless the absorbent becomes totally saturated, there will not be a column of free liquid between the tray liner and the rigid liner. So z_2 will be low relative to z_1. This will have the impact of maximizing the motive force defined by $(z_2 - z_1)$ as free liquid collects in pockets inside the tray liner.

It should be emphasized that this technical argument is only valid if liquid collects adjacent to the tray liner. If free liquid becomes trapped in pockets inside the bulk matrix, there is no connection between the fluid and the absorbent. In such situations absorbent located between the tray liner and the rigid liner would be useless. Real time radiography of drums to date has shown that, when free liquid is present, it is always adjacent to the tray liner in the bottom of the drum and/or at the bottom of the drum in the space between the tray liner and the rigid line. No isolated pockets of free liquid have been found inside the sludge matrix.

REFERENCES

(to Appendix A)

1. Bennett, C.O. and J.E. Myers, Momentum, Heat, and Mass Transfer, McGraw-Hill, New York, NY, 1962, page 164.

Appendix B

Material Safety Data Sheet for Oil-Dri® Floor Absorbent

Appendix B

Material Safety Data Sheet for Oil-Dri® Floor Absorbent

Product Name:	**Floor Absorbent**
Manufacturer MSDS:	1003000
Manufacturer Name:	Oil-Dri Corporation of America
Address:	410 North Michigan Avenue Chicago, IL 60611
	Emergency: (800) 424-9300
Business Phone:	(312) 321-1515
Revision Date:	January 3, 2005
	Chemical Name: Fullers Earth
Product Codes:	

NFPA

0

HMIS

HEALTH	1
FIRE	0
REACTIVITY	0
PPE	

SECTION 2: COMPOSITION, INFORMATION ON INGREDIENTS 1003000

Ingredient Name	CAS#	Ingredient Percent
Quartz (crystalline silica)	14808-60-7	10-20% Bulk
OSHA PEL TWA:	10 mg/m3/% SiO2 + 2	
ACGIH TLV TWA:	0.05 mg/m3 0.000085% in the respirable range	
Fullers Earth	8031-18-3	80-90%
OSHA PEL TWA:	5 mg/m3 (respirable fraction)	
Other Exposure Guidelines:	TLV: 3 mg/m3 TWA (respirable fraction); 10 mg/m3 TWA (inhalable dust)	

NOTE:

PEL: OSHA Permissible Exposure Limit.
TLV: American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value.
TWA: 8 hour Weighted Average.
STEL: Short Term Exposure Limit.

SECTION 3: HAZARDS IDENTIFICATION 1003000

Emergency Overview:	This product is a non-combustible, chemically inert mineral. This mineral sample contains a small amount of naturally occurring crystalline silica as quartz. Prolonged overexposure to respirable crystalline silica may cause lung disease (silicosis). IARC, in Monograph 68, has concluded that crystalline silica inhaled in the form of quartzfrom occupational sources is carcinogenic to humans (Group 1); however, carcinogenicity was not detected in all industrial circumstances studied. Because applications and exposure data indicate that exposure to respirable quartz in this product with normal use is well below the OSHA Permissible Exposure Limit (PEL) and ACGIH ThresholdLimit Value (TLV); and because the company is not aware of any scientific or medical data available indicating that exposure to dust from this product under conditions of normal use will cause silicosis or cancer; adverse affects would not be expected from normal use of this product.

Applies to All Ingredients:

Potential Health Effects:	
Eye Contact:	Contact may cause mechanical irritation and possible injury.
Skin Contact:	No adverse effects expected.
Inhalation:	Inhalation of excessive concentrations of dust may cause irritation of mucous membranes and upper respiratory tract.
Ingestion:	No adverse effects expected with unused material.
Chronic Health Effects:	Inhalation of excessive concentrations of any dust, including this material, may lead to lung injury. This product contains crystalline silica. Excessive inhalation of respirable crystalline silica may cause silicosis, a progressive, disabling and fatal disease of the lung. Symptoms may include cough, shortness of breath, wheezing and reduced pulmonary function.
Carcinogenicity:	The international Agency for Research on Cancer (IARC), in Monograph 68 has concluded that crystalline silica inhaled in the form of quartz or cristobalite, from occupational sources is carcinogenic to humans (Group 1). However, in making the overall evaluation, the Working Group noted that carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs. The National Toxicology Program (NTP) classifies crystalline silica as reasonably anticipated to be a carcinogen. Because applications and exposure data indicate that exposure to respirable quartz in this product, with normal use, is well below the OSHA Permissible Exposure Limit (PEL) and ACGIH Threshold Limit Value (TLV); and because the company is not aware of any scientific or medical data available indicating that exposure to dust from this product under conditions of normal use will cause silicosis or cancer; adverse effects would not be expected from normal use of this product.
Sensitizer Information:	No adverse effects expected.
Aggravation of Pre-Existing Conditions:	None currently known.

SECTION 4: FIRST AID MEASURES 1003000

Eye Contact:	Immediately flush eyes with cool running water, lifting upper and lower lids. If irritation persists or foreign body in the eye, get immediate medical attention.
Skin Contact:	None needed for normal use.
Inhalation:	Remove to fresh air.
Ingestion:	If used material is ingested, get medical attention due to possibility of chemical contamination. If large amount of unused material is swallowed, get immediate medical attention.

SECTION 5: FIRE FIGHTING MEASURES 1003000

Fire:	FLAMMABLE LIMITS: Not applicable
Flash Point:	This product is not combustible.
Extinguishing Media:	Use media that is appropriate for surrounding fire.
Hazardous Combustion Byproducts:	None
Fire Fighting Instructions:	None required.
Unusual Fire Hazards:	This product does not normally present a fire or explosion hazard, however, at concentration exceeding 0.1 oz/ft3 dusts can be ignited by sparks or other ignition sources. Minimize hazard by avoiding the generation of airborne dusts, electrically grounding equipment to prevent static sparks and by eliminating ignition sources in the work area. Combustion products may be hazardous.

SECTION 6: ACCIDENTAL RELEASE MEASURES 1003000

Spill Cleanup Measures:	Sweep up and collect for re-use or disposal

SECTION 7: HANDLING and STORAGE 1003000

Handling:	Avoid breathing dust. If clothing becomes dusty, launder before re-use.
Storage:	Store in a dry area.

SECTION 8: EXPOSURE CONTROLS, PERSONAL PROTECTION 1003000

Engineering Controls:	For operations where the exposure limit may be exceeded, local exhaust ventilation is recommended.
Skin Protection Description:	None required for normal use.
Eye/Face Protection:	Safety glasses or goggles recommended.
Respiratory Protection:	For operations where the exposure limit may be exceeded, a NIOSH/MSHA approvedhigh efficiency particulate respirator is recommended.
Other Protective:	None required for normal use.
Exposure Limits:	Refer to Section 2.

SECTION 9: PHYSICAL and CHEMICAL PROPERTIES 1003000

Physical State/Appearance:	Granules
Color:	Gray to tan
Odor:	No odor
Physical State:	Solid
pH:	Not applicable
Vapor Pressure:	Not applicable
Vapor Density:	Not applicable
Boiling Point:	Not applicable

Melting Point:	Not applicable
Solubility:	IN WATER: Insoluble
Specific Gravity:	2.2
Coefficient of Water/Oil Distribution:	Not available.

SECTION 10: STABILITY and REACTIVITY 1003000

Chemical Stability:	Stable
Incompatibilities with Other Materials:	Contact of dry clay with turpentine, vegetable oil or other unsaturated organic compounds, or with hydrofluoric acid may generate heat and/or fire. Do not use with these compounds.
Hazardous Polymerization:	Will not occur.
Hazardous Decomposition Products:	None

SECTION 11: TOXICOLOGICAL INFORMATION 1003000

Toxicological Paragraph:	No data available.

SECTION 12: ECOLOGICAL INFORMATION 1003000

Ecological Paragraph:	No data available.

SECTION 13: DISPOSAL CONSIDERATIONS 1003000

Waste Disposal:	Dispose in accordance with local, state and federal environmental regulations. Unused material is suitable fordisposal in sanitary landfill. Used material may be subject to regulation, depending on the nature of the materialabsorbed. Check with appropriate regulatory authority for used material containing hazardous waste.

SECTION 14: TRANSPORT INFORMATION 1003000

DOT Shipping Name:	Not regulated
DOT UN Number:	Not applicable
DOT Hazard Class:	Not applicable
DOT Packing Group:	Not applicable
DOT Subpart E Labeling Requirement:	None

SECTION 15: REGULATORY INFORMATION 1003000

Applies to all ingredients:

TSCA 8(b): Inventory Status:	All of the components of this product are listed on the EPA TSCA Inventory or exempt from notification requirements.
Section 304:	None
Section 312 Hazard Category:	
Chronic:	Yes
Section 313 Toxic Release Form:	None
State:	CA PROPOSITION 65: This product contains respirable crystalline silica which is known to the State of California to cause cancer.
Canada WHMIS:	DSL: All of the components of this product are listed on the Canadian Domestic Substance List or exempt from notification requirements.
European Community Chemical Inventory Status:	All of the components of this product are listed on the EINECS Inventory or exempt from notification requirements
Japan MITI:	All of the components of this product are existing chemical substances as defined in the Chemical Substances Control Law.
Australia Chemical Inventory Status:	All of the components of this product are listed on the AICS Inventory or exempt from notification requirements.
Risk Phrases:	EEC: Not Classified as Dangerous under EEC Labeling Regulations
Safety Phrase:	EEC: Not Classified as Dangerous under EEC Labeling Regulations

SECTION 16: ADDITIONAL INFORMATION 1003000

HMIS:	
Health Hazard:	1*
Fire Hazard:	0
Reactivity:	0
NFPA:	
Health:	1
Fire Hazard:	0
Reactivity:	0
MSDS Revision Date:	January 3, 2005

Disclaimer:

The information in this data sheet is believed to be accurate. However, each purchaser should make its own test to determine the suitability of the product for its purposes. OIL-DRI CORPORATION OF AMERICA MAKES NO WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCT and assumes no responsibility for any risk or liability arising from the use of the information or the product. Statements about the product should not be construed as recommendations to use the product in infringement of any patent.

APPENDIX 5

RPT-TRUW-09, Rev. 9
ACCEPTABLE KNOWLEDGE SUMMARY FOR FIRST/SECOND STAGE SLUDGE (BNINW216)
ADVANCED MIXED WASTE TREATMENT PROJECT

Date: 03/27/13

Acceptable Knowledge Summary for First/Second Stage Sludge (BNINW216)

Advanced Mixed Waste Treatment Project

(Signature on file. See DCR-11776.)

03/27/13
Date

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ACRONYMS

AK	acceptable knowledge
AMWTP	Advanced Mixed Waste Treatment Project
ATWIR	Annual Transuranic Waste Inventory Report
CCP	Central Characterization Project
CFR	Code of Federal Regulations
CH	contact-handled
CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
CH-TRUCON	Contact-Handled TRU Waste Content Codes
DOE	Department of Energy
DOT	Department of Transportation
EDMS	Electronic Document Management System
EPA	Environmental Protection Agency
FGE	fissile gram equivalents
FR	Federal Register
HWN	hazardous waste number
IDC	item description code
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory
NACE	National Association of Corrosion Engineer
nCi/g	nanocuries per gram
NDA	non-destructive assay
PCB	polychlorinated biphenyl
ppm	part per million
ppmv	part per million volume
PRQL	program required quantitation limit
PVC	poly vinyl chloride
PWTS	Process Waste Transfer System
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
RFP	Rocky Flats Plant
RMRS	Rocky Mountain Remediation Services
RTR	real-time radiography
SDA	Subsurface Disposal Area
SWB	standard waste box

TIC	tentatively identified compound
TRU	transuranic
TSA-RE	Transuranic Storage Area-Retrieval Enclosure
TSCA	Toxic Substances Control Act
TWBIR	Transuranic Waste Baseline Inventory Report
UCL_{90}	90% upper confidence limit
VE	visual examination
VOCs	volatile organic compounds
WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan (Attachment B of the WIPP Hazardous Waste Permit)
WIPP	Waste Isolation Pilot Plant
WMC	Waste Matrix Code
WMP	Waste Material Parameter
WSPF	Waste Stream Profile Form
WTS	Waste Tracking System

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Acceptable Knowledge Summary for First/Second Stage Sludge

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BNINW216

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

First/Second Stage Sludge

1.2.2 Point of Generation

Rocky Flats Plant (RFP) - Liquid Waste Treatment Area of Building 774

1.2.3 Waste Stream Volume

22,304 containers (4,639 m^3) – current volume[4]

The estimated percentage of the waste greater than 100 nanocuries per gram (nCi/g) is 92%. The estimated percentage of waste equal to or less than 100 nCi/g is 8%.[12]

1.2.4 Generation Dates

AMWTP stored containers of RFP first/second stage sludge waste were generated from 1968 to 1988. Waste stored at AMWTP with generation dates (i.e., pack date) later than 1988 are the result of repackaging (e.g., waste characterization/treatment activities).[2, 49]

1.2.5 Contact-Handled TRU Waste Content Codes (CH-TRUCON)[5, 6]

ID111/ID211, ID132/ID232

1.2.6 Waste Isolation Pilot Plant Waste Stream ID [8, 50]

ATWIR Waste Stream ID: IN-BNINW216 (formerly identified as TWBIR Waste Stream IDs: IN-W216.875, IN-W216.98, IN-W216.99, IN-W228.101, IN-W228.102, IN-W228.103, and IN-W228.883).

1.2.7 Summary Category Group[3, 7]

S3000 Homogeneous Solids

1.2.8 Waste Matrix Codes[3, 7]

S3121 – Waste Water Treatment Sludge (IDC 001, IDC 002, IDC 741, IDC 742)

WMC S3121 consists of >50% by volume secondary sludge, or filtercake from wastewater treatment processes or heavy metal sludges resulting from recovery processes.

S3150 – Solidified Homogeneous Solids (IDC 800)

WMC S3150 consists of >50% by volume solidified forms. An example is sludge waste that is immobilized with cement and cured into a solidified form.

Two WMCs have been assigned to this waste stream because the immobilization process for this waste stream was changed in 1986. Prior to 1986 the first/second stage sludge was placed into a drum with Portland cement. The excess liquid was immobilized, but a solid monolith was not formed. Subsequent to 1986 the sludge was co-fed into a drum with a diatomite and Portland cement mixture, which formed a solid monolith after curing.

1.2.9 Waste Matrix Code Group[7]

S3100 – Inorganic Homogeneous Solids

1.2.10 Description from the Annual Transuranic Waste Inventory Report

ATWIR waste stream description:

IN-BNINW216 (aqueous sludge wastes from Building 774) was generated from a carrier precipitation and immobilization process (sludge mixed with diatomite and Portland cement). The First/Second Stage Sludge waste stream is comprised of IDCs ID-RF-001, ID-RF-002, and ID-RF-800. The First/Second Stage Sludge waste stream consists of >50% by volume secondary sludge or filter cake from wastewater treatment processes or heavy metal sludges from recovery processes. Two waste matrix codes (WMCs) have been assigned to this waste stream because the immobilization process for this waste stream was changed in 1986. Prior to 1986 the first/second stage sludge was placed into a drum with Portland cement. The excess liquid was immobilized, but a solid monolith was not formed. Subsequent to 1986 the sludge was co-fed into a drum with a diatomite and Portland cement mixture, which formed a solid monolith after curing.[8], [b]

TWBIR waste stream descriptions:

IN-W216.875, IN-W216.98, IN-W216.99: Item description code (IDC) 001 waste consists of immobilized materials generated from first-stage treatment operations in RFP Building 774. Aqueous liquids coming into the process originated from Building 771 recovery operations. The liquids were made basic with sodium hydroxide to precipitate iron, magnesium, etc. that also carried down the relatively small precipitate of plutonium and americium hydrated oxides. The precipitate was filtered to produce a sludge (IDC 001), which was placed in a drum with Portland cement. Beginning in 1979, sludge waste from second-stage treatment was combined with first-stage sludge. The combined sludges were also

b. The description in the ATWIR will be revised in the next annual update to include IDCs ID-RF-741 and ID-RF-742.

assigned IDC 001. IDC 001 was discontinued in 1986 when the immobilization process changed and has since been assigned IDC 800.

IN-W228.101, IN-W228.102, IN-W228.103, and IN-W228.883: IDC 002 waste consists of immobilized materials generated from second-stage treatment operations in RFP Building 774. Aqueous liquids to be treated originated from first-stage treatment and from numerous buildings on plant site. The liquids were treated in the same manner as the liquids from the first stage, and the resulting sludge (IDC 002) were placed into a drum with Portland cement. Prior to 1973, second-stage sludge may contain miscellaneous debris.

IN-W216.875, IN-W216.98, IN-W216.99, IN-W228.101, IN-W228.102, IN-W228.103, and IN-W228.883: The process that produced sludge from RFP Building 774 (IDC 800) was the same process as that which generated IDC 001. The difference between the two IDCs was the immobilization process. For IDC 800, the sludge was co-fed into a drum with a diatomite and Portland cement mixture, which formed a solid monolith after curing. IDC 800 is most accurately described by the combination of TWBIR numbers for IDC 001 and IDC 002, therefore all TWBIR numbers associated with IDC 001 or IDC 002 were applied to IDC 800.

1.2.11 Defense-Related Determination

RFP first and second stage sludge waste was generated as a result of treating various radioactive aqueous wastes. The majority of the aqueous waste treated within Building 774 were generated as a result of plutonium production/recovery and support operations associated with weapons activities.[2] While certain aqueous waste that entered Building 774 may not have been generated directly from defense activities, based on the inability to separate non-defense 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.

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 transuranic (TRU) waste streams to be disposed at WIPP meet the definition of TRU “defense” waste. Based on guidance from the Department of Energy (DOE), a TRU waste is eligible for disposal at WIPP if it has been generated in whole or in part by one or more of the activities listed in section 10101(3) of the NWPA of 1982.[60, 61, 64] The term "atomic energy defense activity means any activity of the Secretary [of DOE] performed in whole or in part in carrying out any of the following functions:

- 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 materials security and safeguards and security investigations
- Defense research and development.

In addition, there is no historical record or evidence of spent nuclear fuel or high-level waste ever having been handled at the RF facility. [2,60]

Based on the above information the RFP first and second stage sludge waste is eligible for disposal at WIPP as a defense-related waste.

1.3 Waste Stream Description

1.3.1 Description

The First/Second Stage Sludge waste stream consists of drums containing First Stage Sludge (IDCs 001 and 741), Second Stage Sludge (IDCs 002 and 742), or Solidified Sludge – Bldg 774 (IDC 800).

Table 1-1. Physical waste form descriptions for first/second stage sludge.

IDC	WMC	Description
001 741	S3121	This waste consists of immobilized materials generated from first stage treatment operations in RFP Building 774. Aqueous liquids coming into the process originated from Building 771 recovery operations. The liquids were made basic with sodium hydroxide to precipitate iron, magnesium, etc., that also carried down the relatively small precipitate of plutonium and americium hydrated oxides. The precipitate was filtered to produce sludge, which was placed in a drum with Portland cement (IDCs 001 and 741) and assigned container prefix 741. IDC 001 was assigned to the first stage sludge by RFP. IDC 741 is used to identify first stage sludge drums retrieved from the Subsurface Disposal Area (SDA) Pits 11 and 12. The waste was generated prior to 1972, shipped to Idaho National Laboratory (INL), and buried in the SDA Pits 11 and 12. The waste was subsequently retrieved from the pits and placed into the Transuranic Storage Area-Retrieval Enclosure (TSA-RE) prior to 1979. Because RFP did not assign IDCs to waste until mid-1971, AMWTP assigned IDC 741 to these waste containers.[1, 2, 4] Beginning in 1979, sludge waste from second stage treatment was combined with first stage sludge and assigned container prefix 7412. The combined sludges were also assigned IDC 001. IDC 001 was discontinued in 1986 when the immobilization process changed and has since been assigned IDC 800.[43]
002 742	S3121	This waste consists of immobilized materials generated from second stage treatment operations in RFP Building 774. Aqueous liquids to be treated originated from first stage processing and from numerous buildings on plant site. The liquids were treated in the same manner as the liquids from the first stage, and the resulting sludge were placed in a drum with Portland cement (IDCs 002 and 742) and assigned container prefix 742. IDC 002 was assigned to the second stage sludge by RFP. IDC 742 is used to identify second stage sludge drums retrieved from the SDA Pits 11 and 12. The waste was generated prior to 1972, shipped to INL, and buried in the SDA Pits 11 and 12. The waste was subsequently retrieved from the pits and placed into the TSA-RE prior to 1979. Because RFP did not assign IDCs to waste until mid-1971, AMWTP assigned IDC 742 to these waste containers.[1, 2, 4] Prior to 1973, second stage sludge may contain miscellaneous debris, as identified by visual examination (VE) and Real-Time Radiography (RTR) inspections of second stage waste containers. The following types of debris have been identified: cellulosic debris, plastic debris, leaded rubber gloves, rubber debris,[18] rubber

IDC	WMC	Description
		gloves, and metal debris. AK indicates that up until 1973, other items (e.g., electric motors, bottles containing residual liquid chemical wastes and mercury, and mercury batteries and lithium batteries) may be present in second stage sludge (IDCs 002 and 742) containers. These items have not been confirmed through characterization activities.
800	S3150	The process that produced sludge from RFP Building 774 (IDC 800) was the same process as that which generated combined first and second stage sludge (container prefix 7412). The difference between the two IDCs was the immobilization process. For IDC 800, the sludge was co-fed into a drum with a diatomite and Portland cement mixture, which formed a solid monolith after curing.[43]

In accordance with Attachment C of the Waste Analysis Plan (WAP), a waste stream is defined as waste materials that have common physical form, that contain similar hazardous constituents, and that are generated from a single process or activity. The waste meets the definition of a WIPP waste stream.

1.4 Process Description

1.4.1 Areas of Operation

When Building 774 was built in 1952, its primary purpose was to treat radioactive aqueous waste from Building 771. Later, aqueous wastes from numerous buildings on plant site were treated in Building 774. Production and production support processes in Buildings 371, 444, 447, 559, 707, 771, 776, 777, 779, 865, and 883 generated liquid wastes which were treated in Building 774. Building 774 was a combination batch continuous processing operation with a two-stage carrier precipitation process. Aqueous liquid wastes were treated using neutralization, precipitation, flocculation, and clarification processes. The settled solids were then filtered and immobilized.

1.4.2 Waste Generating Process

Most of the aqueous wastes from Building 771 entered the Building 774 liquid waste processing facility by vacuum transfer through the process waste system. Acid wastes containing large quantities of metal ions that were insoluble in basic solutions, or chloride ions that were corrosive to the process equipment, were neutralized with sodium hydroxide (between 2.5 and 12). The purpose of this process was to remove the metal hydroxide solids prior to the succeeding flocculation and clarification processes. The precipitated solids were sent through vacuum filtration.

Acid waste containing only small quantities of metal ions that were insoluble in basic solutions and caustic wastes containing large quantities of un-dissolved solids were mixed with ferric sulfate and calcium chloride reagents and the pH adjusted as necessary with sodium hydroxide. The solids (mainly ferric hydroxide) settled to the bottom of the tank, and the liquid was decanted into the feed tank for the succeeding precipitation and clarification process. The solids were sent through vacuum filtration.

Liquid waste solutions that were relatively free of solids were mixed with the decanted solution from the previously described batch precipitation processes and the filtrate from the rotary drum vacuum filter. These combined wastes were drained into a flash mixer tank where the decontaminating chemical reagents were introduced. The mixture from the flash mixing vessel flowed into the flocculator where

anionic polyelectrolyte flocculent (PuriFloc A2336,37) was added. The mixture then flowed into the clarifier where the floc was allowed to settle out (see Section 2.3 for list of constituents associated with PuriFloc). The clarifier supernatant liquid was pumped to the second stage treatment process. The precipitate at the bottom of the tank flowed into the slurry tank awaiting vacuum filtration.

Slurry from the first stage treatment was drawn through diatomite filter media by a vacuum inside a rotating filter drum. The filter media and trapped solids were continually scraped off the drum filter and fed into a 55-gallon drum. Portland cement was added to the bottom of the drum prior to placing sludge into the drum. Portland cement may also have been added on top of the sludge (see Section 2.3 for list of constituents associated with Portland cement).

The slurry from second stage was kept separate from the first stage slurry up until 1979 (IDC 002). Even during this time frame, there was commingling of liquids between the two stages. The effluent from the first stage process required further treatment by second stage process, and the filtrate from the rotary drum vacuum filter was fed back to first stage treatment. Beginning in 1979, slurry from the first and second stage treatment was combined prior to filtration. The combined sludge was assigned IDC 001.

Treated effluent from the first stage processes, filtrate from the second stage vacuum filter, liquid from the waste treatment process drains, and other wastes from numerous other buildings were received into second stage treatment. In the batch radioactive decontamination process, ferric sulfate and calcium chloride reagents were added, and a flocculating agent was also added near the end of the mixing cycle. The supernatant liquid was decanted into treated waste holding tanks. The floc that settled to the tank bottom was then sent through vacuum filtration.

The continuous radioactive decontamination process accepted low chemical content process wastes, primarily water and detergent from the laundry facility. This process was identical in process chemistry to first stage treatment. The treated liquid was pumped into holding tanks. The settled solids were sent through vacuum filtration.

In a process identical to first stage sludge, slurry from the second stage treatment was drawn through diatomite filter media by a vacuum inside a rotating filter drum. The filter media and trapped solids were continually scraped off the drum filter and fed into a 55 gallon drum. Portland cement was added to the bottom of the drum prior to placing sludge into the drum. During processing of second stage sludge, several layers of cement may have been added between layers of sludge. Portland cement may have also been added to the top of the sludge.

Beginning in 1979, slurry from first and second stage treatment was combined prior to filtration, and the sludge was assigned IDC 001.

In 1986, the process for immobilizing first and second stage sludges was changed. Sludge waste generated under the new immobilization process was assigned IDC 800. Processing of first and second stage sludges through treatment, precipitation, and filtration did not change. However, as the sludge was scraped off the drum filter, it was co-fed into a drum with a diatomite and Portland cement mixture, which formed a solid monolith after curing. Assignment of IDC 001 was discontinued at this time.

1.4.2.1 Liquid Absorption at AMWTP

Containers of waste that are found to have prohibited liquids will undergo remediation to remove the prohibited liquid status. Liquids may be directly absorbed on the top of the waste or may undergo treatment at the AMWTP using a "drill and drain" technique. [57]

Liquids found on top of the waste will undergo absorption in the container if sufficient head space is available. If insufficient headspace is noted, the liquids will be containerized and then undergo absorption. [57]

Liquids noted elsewhere in the container (other than sitting on top of the waste) may undergo remediation using the drill and drain technique. Containers that are subjected to the drill and drain process will have drill holes placed near the bottom of the drum. Prohibited liquids are removed from the container using a vacuum and subsequently containerized. After the prohibited liquids are remediated the drilled holes are plugged and then taped to ensure that the container is leak free. [57]

Prohibited liquids waste will be absorbed with an approved absorbent as noted in Section 1.4.4.5.

1.4.3 Process Flow Diagram

See Figure 3-1.

1.4.4 Material Inputs

1.4.4.1 Material Inputs – RF IDCs 001 and 741

The most common wastes that entered first stage treatment were:

- Plutonium ion column effluent
- Americium ion column effluent
- Thiocyanate waste solution
- Caustic scrubber solution
- Part V waste solutions (nitric, sulfuric, and hydrofluoric acids)
- Nitric acid distillate from feed evaporator
- Water distillate from peroxide precipitation filtrate evaporator
- Steam condensate.

The following compounds were used during recovery operations in Building 771 and may be present in IDC 001.

- Nitric acid
- Aluminum nitrate
- Calcium fluoride
- Potassium hydroxide
- Ferrous sulfamate
- Sulfuric acid
- Hydrogen peroxide
- Calcium
- Magnesium oxide
- Magnesium
- Sodium peroxide
- Potassium iodate
- Hydrogen fluoride
- Sodium nitrate
- Hydrochloric acid
- Hydrofluoric acid
- Sodium hypochlorite
- Potassium fluoride

Aqueous wastes containing complexing agents were handled separately and were not mixed with these aqueous waste streams.

1.4.4.2 Material Inputs – RF IDCs 002 and 742

Second stage treatment handled liquids that were treated by first stage treatment, decanted liquids from Tank 40 (slurry holding tank), and low-level or nonradioactive aqueous process wastes from numerous buildings on plant site. Most of the wastes transferred to second stage treatment by the process waste system were only accepted until August 1984 when the precipitation process in Building 374 went on line. After that time, the wastes from Buildings 771 and 774 given below continued to be transferred to Building 774 second stage treatment through the process waste system. Wastes from the remaining buildings also continued to be sent to Building 774 by tanker after August 1984.

Table 1-2. Wastes feeding second stage sludge treatment.

Source Building	Materials
111	Process liquid waste
122	Medical decontamination wash down
123	Acidic solutions, process waste water, and standards and sample waste
331	Filter sludge and antifreeze solution
334	Ammonium persulfate, copper sulfate, etchants, and cleaners
371	Ammonia hydroxide, potassium hydroxide, and process waste water
443	Lithium chloride solution and water treatment additives
444	Process waste water (acidic), waste plating acid
447	Process waste water
460	Process waste water
551	35% hydrogen peroxide, high in tin content

Table 1-2. (Continued).

Source Building	Materials
553	Sulfuric acid, baking soda, calcium chloride
559	Standards, caustic scrubber solution, acid wastes, and process waste water
690	Acid solutions
705	Ox Out 536 (water, ammonium bifluoride, and nitric acid)[a, (35)]
707	Calcium fluoride solution and acid solutions
750	Hydrochloric acid and trisodium phosphate
771	Process waste water (residual chemicals, blow down water, decon
774	Floor wash down and silver recovery effluent
776	Ammonia hydroxide, ethanol, hexane, acid solutions, and process waste water
778	Laundry waste water, suma cleaner (acid bath/nitric acid),[(31)] and rinse water/battery acid
779	Acidic and basic solutions and process waste water
865	Acid solutions, scrubber effluent, polishing solution, and process waste water
881	Acid solutions, standards, samples, ammonium chloride, and process waste water
883	Acid solutions, Ox Out 536 (water, ammonium bifluoride, and nitric acid)[(35)], and process waste water[a]
886	Ferric chloride, detergents, and process waste water
889	Equipment decontamination water
991	Acidic and basic solutions and water samples

a. See Section 2.3 for constituents and Ox Out.

1.4.4.3 Material Inputs – RF IDC 800

Inputs for solidified sludge are the same as those for first stage sludge and second stage sludge described above.

1.4.4.4 Miscellaneous Items

Miscellaneous items are those items that have been identified during characterization activities that are not consistent with expectations based on process descriptions. They appear in a small percentage of the waste stream containers and constitute a small percentage of the waste within the container and summary category group and other determinations are not impacted.

Visual examination and RTR inspections of IDC RF 001 containers have identified the following items:

- Cellulosic debris
- Plastic debris
- Leaded rubber gloves and aprons
- Rubber debris,[18] rubber gloves
- Metal Debris
- Filters (metal alloy and cellulosic)
- Inorganic liquid (see Section 1.5).

Visual examination and RTR inspections of IDC RF 002 containers have identified the following items:

- Cellulosic debris
- Plastic debris
- Leaded rubber gloves
- Rubber debris,[18] rubber gloves
- Metal debris
- Inorganic liquid (see Section 1.5).

AK indicates that up until 1973 items such as the following may have been present in second stage sludge (IDC RF 002). These items have not been confirmed through characterization activities.

- Electric motors
- Bottles containing residual liquid chemical wastes and mercury
- Mercury batteries
- Lithium batteries
- Radioactive sources (until 1979).

Visual examination and RTR inspections of IDC RF 800 containers have identified the following items:

- Cellulosic debris
- Plastic debris
- Leaded rubber gloves
- Lead tape
- Rubber debris,[18] rubber gloves
- Metal bolt
- Inorganic liquid (see Section 1.5).

1.4.4.5 Absorbent Addition

Non-hazardous immobilization/solidification agents (e.g., Aquaset®, Aquaset II-G®, SP-400®,or Micro Cel® E may be added to waste containers by AMWTP to treat prohibited liquids. [32, 48, 58] Aquaset is a sodium montmorillonite clay material, Aquaset II-G® is a sepiolite clay (granular), and Micro-Cel®E is a synthetic calcium silicate.[32, 48, 58] The decontamination agent ReACT® may be used as required. ReACT is a non-toxic, non-flammable, non-corrosive, and bio-degradable mixture.[62, 63]

1.4.5 Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for BNINW216, WMP data from 100% of the completed RTR and VE of first/second stage sludge drums were obtained from the AMWTP Waste Tracking System (WTS) database on October 11, 2006. This represents 41% of the estimated number of drums for this waste stream. Drums evaluated were generated from 1972 through 1988 and are representative of the waste stream. WTS is AMWTP's comprehensive, DOE-audited waste tracking database in which all waste containers are tracked cradle-to-grave and all related characterization data are stored. A statistical analysis of the RTR and VE data was performed to estimate WMP weights (by percent) for first/second stage sludge, excluding packaging, in accordance with the requirements of MP-TRUW-8.13, Collection, Review and Management of Acceptable Knowledge Documentation and are summarized in Table 1-3.[40, 41]

Table 1-3. Estimated waste material parameter weights per unit waste for First/Second Stage Sludge (BNINW216).

Waste Material Parameters	Weight per Unit Waste by Percent
Iron-based Metals/Alloys	<1
Aluminum-based Metals/Alloys	<1
Inorganic matrix	98
Other Inorganic Materials	1
Cellulosics	<1
Plastics (waste materials)	<1
Rubber	<1

Although individual drums in this waste stream may contain greater than 10% by volume other homogenous solid waste and debris materials, the waste stream as a whole will be greater than 50%, by volume, inorganic solidified homogeneous solids.[40]

1.5 Acceptable Knowledge Sufficiency Determination

No AK sufficiency determinations apply to this waste stream.

1.6 Prohibited Items

The following items are prohibited in waste containers shipped to Waste Isolation Pilot Plant (WIPP) as documented in MP-TRUW-8.1, Certification Plan for INL Transuranic Waste and MP-TRUW-8.2, Quality Assurance Project Plan.[46, 47]

- Liquid waste or prohibited observable liquids (Observable liquid shall be less than 1 percent by volume of the outermost container at the time of radiography or visual examination. Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited).
- Non-radionuclide pyrophoric materials, such as elemental potassium
- Hazardous wastes not occurring as co-contaminants with transuranic (TRU) mixed wastes (non-mixed hazardous wastes)
- Wastes incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Wastes containing explosives or compressed gases
- Wastes with polychlorinated biphenyls (PCBs) not authorized under an Environmental Protection Agency (EPA) PCB waste disposal authorization
- Wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA hazardous waste numbers [HWNs] of D001, D002, or D003)
- Waste that has ever been managed as high-level waste and waste from tanks specified in Table B-8 of MP-TRUW-8.2 unless specifically approved through a Class 3 permit modification[46]
- Any waste container from a waste stream (or waste stream lot) which has not undergone either radiographic or VE of a statistically representative subpopulation of the waste stream in each shipment, as described in Attachment B7 of MP-TRUW-8.2.[46]
- Sealed containers greater than four (4) liters.

Prohibited items associated with the IDCs within this waste stream are identified in RPT-TRUW-05.[45] Excess liquid is a common prohibited item identified during RTR and VE in this waste stream. Other prohibited items are expected to be very rare.[1, 2] Drums with excess liquid may be treated by adding or mixing with non-hazardous absorbent (e.g., Aquaset®, Aquaset II-G®, SP-400®, or Micro Cel® E).[32, 48, 58] Drums with other prohibited items will be treated or rejected as appropriate. Drums with prohibited items will not be part of the waste stream shipped to the WIPP.

1.7 Resource Conservation and Recovery Act (RCRA) Determination

1.7.1 EPA Hazardous Waste Numbers

Toxicity codes: D004, D005, D006, D007, D008, D009, D010, D011, D022

Listed codes: F001, F002, F003, F005, F006, F007, and F009

1.7.2 Hazardous Determination

1.7.2.1 Historical management

The wastes that comprise this waste stream originated at the RFP and have been historically managed as mixed waste since the late 1980's.[2, 3, 52, 54]

EPA provided an initial federal register notice of intent to regulate radioactive mixed waste in 1986. EPA's legal authority over radioactive mixed waste was subsequently challenged by the Department of Energy (DOE). EPA published an additional federal register notice in 1988 notifying facilities that treat, store, or dispose of radioactive mixed waste to obtain interim status. Continued DOE and EPA interactions and the extent of EPA's authority over mixed waste were not resolved until the late 80's. DOE clarified its position on by-product and RCRA regulatory authority in 1987 and 1989. [51]

Wastes received at the INL/RWMC (i.e., AMWTP) prior to 1980 were not required to be characterized in accordance with RCRA requirements.[52] The shipping facility did not assign hazardous waste numbers (HWNs) to these wastes. Waste received after 1980 may or may not have been characterized in accordance with RCRA at the time of receipt. Solidified resin wastes were shipped to the INL/RWMC under bills of laden. Assignment of potential HWNs to INL waste began during the late 1980's. [53, 54, 55]

Previous Idaho National Engineering Laboratory (INEL)/Idaho National Engineering and Environmental Laboratory (INEEL) characterization was conducted by using INEL/INEEL AK and INEL/INEEL HSG results. [1, 43 54, 56] The result reflects that waste materials within this WSPF were potentially classified as both hazardous and non-hazardous.

The wastes that comprise this waste stream have been characterized by AMWTP and are being managed as mixed waste.[3] The mixed waste classification is based on an evaluation of historical INEL/INEEL characterization and WIPP RCRA characterization requirements.

1.7.2.2 Characteristic Waste

1.7.2.2.1 Ignitability

The waste is a solid and does not meet the definition of *ignitability* (D001) as defined in 40 Code of Federal Regulations (CFR) 261.21. Originally the generator (RF) assigned the F003 code for the non halogenated, non-toxic F003 constituents (acetone, methanol, and xylene). These compounds are listed for their ignitability. The source wastes containing the F003 constituents were not mixed with any other listed (F001, F002, F004, or F005) constituents or wastes at the point of generation in the laboratory. None of the F003 compounds had a 90% confidence level in either the headspace gas samples or the solid samples greater than the program required quantitation limit (PRQL), but all of the compounds except for methanol were detected in one or more of the headspace gas samples for these drums. Methanol and xylene were both detected in one or more solid samples.[5] The F003 waste streams also were discarded into the Process Waste Transfer System (PWTS) as non-hazardous wastewaters, i.e., diluted with water and flushed at the point of generation. Therefore, it was determined during the 3,100 m^3 Project that the F003 waste was rendered non ignitable prior to subsequent discharge and aggregation within the liquid waste stream destined for sludge generation.[13] Containers identified with liquid in excess of WIPP waste

acceptance criteria (WAC) limits may be treated using non-hazardous solidification agents to render the waste acceptable prior to shipment (e.g., Aquaset, Aquaset II-G®, SP-400®, or Micro Cel® E).[32, 48, 58]

The waste materials in this waste stream are not compressed gas and do not contain compressed gas and the waste does not meet the United States Department of Transportation (DOT) definition of an oxidizer as defined in 49 CFR 173 and is not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change. This waste stream does not exhibit the characteristic of ignitability (D001).

1.7.2.2.2 Corrosivity

Under 40 CFR 261[22] a solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

- It is aqueous with a pH less than or equal to 2, or greater than or equal to 12.5, as determined by a pH meter using Method 9040 in "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, EPA Publications SW-846.

- It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.240 inch) per year at a test temperature of 55ºC (130ºF) as determined by its test method specified in National Association of Corrosion Engineer (NACE) Standard TM-01-69 as standardized in SW-846.

The waste stream does not meet the characteristic of corrosivity (D002) as defined.[13] The waste is not an aqueous liquid. As has been determined by radiography and VE, none of the drums to be shipped contain 20% by volume aqueous waste. Since 20% by volume is required in order to measure pH, the corrosive characteristic does not apply. The First/Second Stage Sludge waste stream does not meet the definition of liquid in making a determination of corrosivity toward steel because the waste is not a liquid. A knowledge-based determination is allowable when determining whether or not the waste stream is a liquid relative to corrosivity under the Federal Register (FR), 50 FR 18372, dated April 30, 1985. It is stated in the FR, "EPA believes that, for the purposes of the characteristic of ignitability and corrosivity, it will generally be obvious whether or not the waste is a liquid." Residual liquid may be present in some drums, but only drums with liquids below the WIPP WAC ceiling will be shipped to WIPP. Containers identified with liquid in excess of WIPP WAC limits may be treated using non-hazardous solidification agents to render the waste acceptable prior to shipment (e.g., Aquaset®, Aquaset II-G®, SP-400®, or Micro Cel® E).[32, 48, 58] This waste stream does not exhibit the characteristic of corrosivity (D002).

1.7.2.2.3 Reactivity

The waste stream does not meet the characteristic of reactivity (D003) as defined under RCRA 40 CFR 261.23. The waste materials are stable and will not react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors or fumes when mixed with water. The materials do not contain sulfides and are not capable of detonation or explosive reaction. The waste is not capable of detonation or explosive reaction if subjected to a strong initiating source or 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 Part 173.[13]

The waste may contain trace quantities of cyanide derived from electroplating wastes, and containers with residual amounts of liquid chemical wastes added to the process waste stream (as opposed to piped waste water).[10] Only trace amounts of cyanide are expected in the waste stream feed and would not cause the resulting waste to be reactive. Based on the levels of concentration of cyanide in the feed waste, the alkalinity of the sludges (9 to 11 pH) and the presence of metals (e.g., Fe^{+3}, Cu^{+2}, Al^{+3}), cyanide is not available for release because all free cyanide exists as stable metal complexes.

Second stage sludge generated before 1973 may contain lithium batteries. However, the batteries are spent/used and therefore not reactive. The following rationale supports the decision to not assign EPA hazardous waste codes D003 (reactivity) or D001 (ignitability) to this waste stream due to the potential presence of lithium batteries.[25]

- Lithium metal, which is highly reactive with water, was used as an anode in lithium alkaline batteries. As the battery discharges, the lithium metal is converted to lithium oxide, which is not reactive. The materials in this waste group are therefore neither ignitable (D001) nor reactive wastes (D003) due to the potential presence of batteries.
- Considering the cost of lithium batteries in this time frame (pre-1973), there is no reason a user would replace and discard a lithium battery until the voltage dropped. One of the important features of lithium batteries is the constant voltage (i.e., flat discharge curve), which lasts until all of the lithium has been converted into a non-reactive lithium compound. At that time, virtually none of the lithium is present in the reactive metallic state and there is a sharp voltage drop.
- The lithium contained in batteries present in the 1969–1973 generated second stage sludge waste is no longer reactive or ignitable. According to battery manufacturer information, current lithium batteries have shelf lives of approximately 10 to 20 years (early lithium batteries did not have shelf lives of this length). This is the period of time that it takes for a battery to lose its charge (discharge) due to the electrochemical reaction over time. As the result of discharge, the lithium metal is converted to lithium oxide. By design, lithium batteries are constructed with an excess of positive electrode material to assure that there is enough positive material to react with all of the metallic lithium present. Spent (discharged) lithium batteries do not contain lithium metal and are not toxic, not ignitable, nor reactive. Any battery in the pre-1973 drums is currently 32 years old or older. Based on shelf life, any batteries present have completely discharged.

Containers identified with compressed gases or aerosol cans will have the prohibited items treated/removed prior to shipment. Containers with liquid in excess of WIPP WAC limits may be treated with non-hazardous solidification agents to render the waste acceptable prior to shipment (e.g., Aquaset®, Aquaset II-G®, SP-400®, or Micro Cel® E).[32, 48, 58] The materials in the waste stream do not meet the definition of reactivity and will not be assigned the D003 waste code.

1.7.2.2.4 Toxicity

Acceptable knowledge indicates the potential presence of metals, arsenic, barium, cadmium, chromium, lead, mercury (including mercury batteries), selenium, and silver in this waste stream. Results from sampling and analysis of the sludge (See Table 2 of the Characterization Information Summary) confirm that cadmium, chromium, lead, and silver are present in the waste stream in quantities that exceed the toxicity limit and that arsenic, barium, mercury and selenium also are present, but at levels less

than the toxicity limit. Based on AK, the waste stream will be assigned all of the EPA codes for the metals including those metals with concentrations that did not exceed regulatory limits. EPA HWNs for these metals are D004 through D011.[13]

Toxicity characteristic organic constituents, tetrachloroethylene, trichloroethylene, carbon tetrachloride, chlorobenzene, chloroform, and benzene were identified in RPT-TRUW-56 as potential hazardous constituents present in first/second stage sludge waste. [2] Tetrachloroethylene, trichloroethylene, and carbon tetrachloride were used primarily for cleaning and degreasing. Although chlorobenzene and chloroform were not identified as being used at the RF site in AK source documents, both were detected in characterization samples from the waste as reported in RPT-TRUW-56: chlorobenzene was detected in volatile organic compound (VOC) analysis of a single sample of sludge with a totals concentration significantly less than the regulatory level; and chloroform was detected in headspace gas samples collected at the Idaho National Engineering and Environmental Laboratory (INEEL) with a 90% upper confidence limit (UCL_{90}) greater than the PRQL. Benzene was used as a solvent in laboratory operations.

First and Second Stage Sludge waste was generated from an aqueous waste treatment process and only trace amounts of the solvents listed above are present as shown by the waste stream data. Because these constituents were used as solvents and degreasers and all except chloroform are identified as F-listed, the waste is regulated as listed hazardous waste and not characteristic waste. Therefore, the toxicity characteristic waste codes associated with the F-listed constituents were not assigned to the waste.

Chloroform was the only toxicity characteristic organic compound with a UCL_{90} that exceeded the PRQL in headspace gas sampling done in support of the previous characterization activities for Waste Stream Profile Form (WSPF) INW216.001. Other AK and solid sampling data did not indicate that chloroform was an expected constituent of the waste. The toxicity characteristic HWN D022 for chloroform is assigned to the waste as a conservative measure, although solids data does not exceed the PRQL for chloroform.

Based on AK and sampling data, D004–D011 and D022 have been assigned to this waste stream.

A portion of two Rocky Flats Environmental Technology Site (RFETS) waste streams, RF107.01 and RF139.01, was sent to the INEEL for storage and subsequent characterization and treatment by the AMWTP.[37, 39] The AMWTP waste stream BNINW216 includes the IDCs from both of the waste streams (i.e., RF107.01 and RF139.01) and consequently incorporates the HWNs from the two RFETS waste streams. The AMWTP has applied EPA HWN D022 (chloroform), as a conservative measure because chloroform was the only toxicity characteristic compound with a UCL_{90} that exceeded the PRQL in headspace gas sampling during characterization of WSPF INW216.001. In addition, even though this waste is not ignitable, F003 has been conservatively applied because F003 listed constituents were detected in headspace gases.

1.7.2.3 Listed Waste

1.7.2.3.1 F Listed Codes

Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, chlorobenzene, and 1,1,2-trichloro-1,2,2-trifluoroethane were commonly used for cleaning, degreasing or paint removal, and the sludges may contain residual amounts of these spent solvents.

Headspace gas sampling (Table 1A of the Characterization Information Summary) supports the evaluation with the UCL_{90} for 1,1,1-trichloroethane above the PRQL. Sampling and analysis results for solids did not indicate the presence of any organic compounds above regulatory or program-required limits at the UCL_{90}. Carbon tetrachloride, 1,1,1-trichloroethane, methylene chloride and tetrachloroethylene were all detected (above the minimum detection level) in solid samples taken from one or more of the drums (Table 3A of the Characterization Information Summary). The applicable EPA listed waste codes, F001 and F002, have been assigned to the waste stream based on AK as confirmed by sampling and analysis.[13]

Acetone, benzene, butanol, ethyl benzene, ethyl ether, methanol, toluene, and xylene were used as solvents in laboratory operations. The aqueous waste transferred to Building 774 second stage treatment may have contained small quantities of these spent solvents. Headspace gas samples did not have detections of these compounds with UCL_{90}s in either the headspace gas samples or the solid samples greater than the PRQL. Both methanol and xylene were detected in one or more of the solid samples.[13]

Originally, the generator (RF) assigned the F003 code for the non-halogenated, non-toxic F003 constituents (acetone, methanol, and xylene). These compounds are listed for their ignitability. The source wastes containing the F003 constituents were not mixed with any other listed (F001, F002, F004, or F005) constituents or wastes at the point of generation in the laboratory. The F003 waste streams also were discarded into the PWTS as non-hazardous wastewaters, i.e., diluted with water and flushed at the point of generation. Therefore, it was determined that the F003 waste was rendered non-ignitable prior to subsequent discharge and aggregation within the liquid waste stream destined for sludge generation, and the F003 code was not assigned to the waste. However, the 2,639 drums with analytical results from 3,100 m^3 Project do indicate that some drums have headspace gas results with detections of F003 constituents. Acetone was the most common of the F003 constituents with 2,271 drums with levels above the detection level. However the mean concentration was 4.24 part per million volume (ppmv) and the UCL_{90} was 5.00, which is well below the PRQL of 100. After evaluation of the data and the AK for the waste stream and the containers, it was determined that detections of the F003 constituents in containers do not indicate a different waste population. The data confirms the presence of the F003 listed constituents predicted by AK. The concentrations detected do not render the waste ignitable; however, the F003 HWN will be applied to the waste as a conservative measure and to comply with the WAP requirement that if an F-listed waste constituent is detected, the appropriate HWN shall be applied.[13]

The presence of the F005 solvent benzene was confirmed by detects in headspace gas sampling. Toluene was also routinely detected in historical data for the 3,100 m^3 Project. Assignment of the F005 code is appropriate for this waste stream. EPA code assignments applicable to each analyte are included in Table 1A of the Characterization Information Summary.[13]

Spent stripping, cleaning, and plating solutions from electroplating operations in which cyanides were used were treated in Building 774 up until 1982. The solidified aqueous wastes from this building were derived from the treatment of the hazardous electroplating wastes and are assigned EPA hazardous waste codes F006, F007, and F009.[13] Wastes generated after 1982 continue to carry the F006, F007, and F009 codes because the Building 774 treatment process was a RCRA permitted system that never went through closure.[11]

Based on the above discussion first/second stage sludge will be assigned F001, F002, F003, F005, F006, F007, and F009.

1.7.2.3.2 K Listed Codes

The materials in this waste stream do not meet the definition for K-listed EPA codes. K listed EPA codes only apply to hazardous waste from specific sources. The waste is not and does not contain any hazardous waste from specific sources paragraphs (a) of 40 CFR 261.32.

1.7.2.3.3 P- and U-Listed Codes

The materials in this waste stream do not meet the definition for any P- or U-listed codes. P- and U-listed EPA codes only apply to discarded commercial chemical products, and residues of commercial chemical or off-specification products. The waste is not and does not contain any commercial product, or manufacturing chemical intermediate listed under paragraphs (e) or (f) of 40 CFR 261.33 that when they were discarded were mixed with waste oil or used oil or other material that was applied to the land, or used as a fuel, in lieu of their original intended use as described in detail in 40 CFR 261.33. Sludge waste containers may contain small amounts of mercury in internal containers. However, the related P- and U-listed codes are not applicable based on the rationale presented in the following paragraphs.

Acceptable knowledge and solid sampling and analysis data indicate the potential presence of trace amounts of beryllium (less than 1% by weight) in IDC 001 and IDC 002 containers of first/second stage sludge. This characterization is consistent with RFETS WSPF RF139.01 that also identifies beryllium as less that 1% by weight for IDCs 001 and 002.[37]

Acceptable knowledge and solid sampling data from RFETS WSPF RF107.01 suggest that beryllium may exceed 1% by weight for containers of IDC 800.[39] Therefore, in accordance with the WIPP transportation requirements, shipments of IDC 800 containers from this waste stream will be limited to 100 Fissile Gram Equivalents (FGE) per payload container and 100 FGE per payload package.

Beryllium contamination is an integral part of the sludge and is not in powder form. It is not a commercial chemical product, an off-specification species, a container residue, or a spill residue thereof. Therefore, the P-listed waste code (P015) for beryllium as defined in 40 CFR 261.33 was not assigned to the waste.

Acceptable knowledge indicates the presence of residual amounts of contaminated mercury in pint bottles in Second Stage Sludge containers generated prior to 1973. The mercury is described as "contaminated," which denotes that it was used and discarded as waste. According to the Backlog Waste Reassessment Baseline Book, the liquid chemical wastes were compatible wastes, not commercially pure grade chemicals.[9] Therefore, the U-listed code for mercury does not apply.

The U-listed code (U134) for hydrofluoric acid is not applicable to this waste stream. Hydrofluoric acid may have been used during recovery operations in Building 771, but was not disposed of as unused product within the waste stream. As established previously, this waste does not exhibit the characteristic for corrosivity.

The U-listed code (U079) for trans-1,2-dichloroethylene also is not applicable to this waste stream. It is not an expected constituent of this waste and the waste does not meet the definition of a U-listed waste per 40 CFR 261.33. Although trans 1,2 dichloroethylene is currently a WAP target analyte, it was not included as such in the solids sampling analytical results used to characterize this waste. As stated earlier, the solids samples were collected and analyzed under a WAP compliant program, but prior to the

time that trans-1,2-dichloroethylene was added to the target analyte list. It was not detected (as a Tentatively Identified Compound [TIC]) in any of the solid samples analyzed under the 3,100 m^3 Project WIPP compliant program and has not been detected as a TIC in any of the RFP wastes headspace gas samples in 25% or more of samples, including first/second stage sludge.

In addition to the pipeline-transferred waste, wastes in containers that were compatible with the first and second stage treatment processes were treated in Building 774. Some of the wastes in containers exhibited hazardous characteristics. However, the EPA codes applicable to these wastes did not include additional codes that were different from those cited for pipeline-transferred wastes. Therefore, no additional listed waste codes apply.

No discarded chemical products, off-specification compounds chemical residues, spill residues, or hazardous waste from specific sources (40 CFR 261.32) were included in this waste stream. Therefore no K, U, or P listings have been applied to the First/Second Stage Sludge waste stream.

1.7.2.4 TSCA Regulated Contaminants

Acceptable knowledge indicates that the first/second stage sludge waste does not contain PCBs as regulated by the Toxic Substances Control Act (TSCA), 15 U.S.C. 2601 et seq.

1.8 Radionuclides

The two most prevalent radioisotopes in waste stream BNINW216 can be any two of the following: ^{239}Pu, ^{240}Pu, ^{235}U, and ^{238}U, depending on the relative mixture of weapons grade plutonium, enriched uranium, and depleted uranium in the waste. [12, 47]

As a minimum, to confirm existing AK data, the ratios of the two most prevalent radionuclides in the isotopic mix are compared.[22] The two most prevalent radionuclides expected in the Building 774 sludge waste drums are ^{239}Pu and ^{240}Pu.

The recommended default mass fraction values of the plutonium isotopes to be used as the AK based values and confirmed during non-destructive assay (NDA) are listed in RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge.[12]

Table 1-4 provides a breakdown of the radionuclides present so that the general isotopic content of the waste is established.

Table 1-4. Nominal compositions of radionuclide mixtures at RFETS (wt %).

Weapons-Grade Plutonium		Enriched Uranium		Depleted Uranium	
^{238}Pu	0.01 – 0.05%	^{231}Th	negligible	^{231}Th	negligible
^{239}Pu	92.8 – 94.4%	^{234}Th	negligible	^{234}Th	negligible
^{240}Pu	4.85 – 6.5%	^{234}U	~0.1%	^{234}U	~0.0006%
^{241}Pu[a]	0.3 – 1.0%	^{235}U	~90 – 93%	^{235}U	~0.2%
^{242}Pu	0.005 – 0.60%	^{236}U	~0.4%	^{238}U	~99.8%
		^{238}U	~5.3%		

a. Includes ^{241}Am daughter product

Mass fraction values for ^{241}Am, ^{233}U, ^{235}U, and ^{238}U previously determined for RFP at the INEEL were based on individual gamma spectrometric measurements. The ^{234}U activities were calculated based on ratios with depleted uranium isotopes. The criteria used for selection and the formulas for determining the ^{234}U mass are presented in RPT-TRUW-07.[12]

Radionuclides such as ^{244}Cm, ^{232}Th, and ^{236}U may be found in RFP wastes.[12] Americium-241, ^{234}U, and ^{237}Np are expected in most of the RFP TRU waste containers due to radioactive decay and ingrowth.[14] Americium-243 and ^{245}Cm, other isotopes resulting from radioactive decay, have also been detected during AMWTP NDA.[15, 20, 21, 38] Potassium-40 may be detected when other radionuclides in a container are significantly lower in concentration. In some cases, ^{40}K has been detected in higher concentrations than ^{239}Pu and contributes to 95% of the radionuclide hazard.[16]

AMWTP will employ payload management practices in accordance with the WAC for waste stream BNINW216. The estimated total waste volume for BNINW216 is 4,431 m^3. The estimated percentage of the waste greater than 100 nCi/g is 92%. The estimated percentage of waste equal to or less than 100 nCi/g is 8%.

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

Depending on waste packaging requirements at the time, several combinations of bags and liners were used to prepare 55-gallon drums for shipment. From 1970 to 1972, waste drums were lined with one or two polyethylene drum bags.[26] Use of the 90 mil rigid polyethylene liner began in 1972. The rigid liner was placed in each drum and lined with a polyethylene round bottom drum liner, a polyethylene drum bag and poly vinyl chloride (PVC) O-ring bag, or a single round bottom polyethylene liner placed between the rigid liner and O-ring bag.[27] Some drums packaged after 1972 may not have rigid liners.[19]

When a drum was full, the drum liners were twisted and taped closed, the lid was secured with a bolted ring, and a tamper-indicating device was attached to the drum.[42]

Typically sludge was placed directly and treated (i.e., monolith) directly in drum bags within the drum and have no inner packaging. Approximately 20 to 60 pounds of Portland cement were added to IDC 001 and 002 First/Second Stage Sludge and can be found layered throughout the drum and packaging. During maintenance cleanout operations, First Stage Sludge was removed from tanks and equipment and placed into smaller containers (poly bottles, metal cans, or poly bags, etc.). These smaller containers may have been single or double bagged prior to placement into the drum.[29, 30]

The typical bag closure method was “twisted and taped”. Drum stub bags may be identified in containers that were visually examined or cored at WMF-634.[23] A “Filtered bag” method was used for bag closure in drums visually examined at Argonne-West as part of the 3,100 m^3 Project.[17] Lead sheeting may be found within IDC 001 and 002 First/Second Stage Sludge waste containers. Lead tape may have been used to wrap the outside of the rigid liner.

After drums were inspected, one to two quarts of absorbent material (Oil-Dri®) was placed on the top of the outer, sealed polyethylene drum bag (see Section 2.3 for list of constituents associated with Oil-Dri®). This procedure changed in February 1982 when vermiculite was used to fill the void space.

The quantity of vermiculite varied from 3 to 12 pounds according to the amount of waste contained in each drum.[42] The type, amount, and expected time-frame of absorbent use may vary.[24, 28] Aquaset® or vermiculite in varying amounts was added to drums of waste during the 3,100 m^3 Project recovery operations (see Section 2.3 for list of constituents associated with Aquaset).[32–36]

Any combination of plastic bags that does not exceed five layers of confinement (of which no more than three are inner bags) is acceptable for shipment to WIPP. Containers with excess layers of confinement or packaging configurations not addressed by an approved TRUCON code for this waste stream will be segregated and vented or rejected as appropriate.[45]

Some of the 55-gallon drums may be overpacked into 83- or 85-gallon drums. Either four 55-gallon drums or two 83- or 85-gallon drums, with either the drum lid filters or the drum lids removed, may be direct loaded into a standard waste box (SWB) equipped with approved filters.

Liquids removed from Building 774 Sludge drums at AMWTP may be absorbed in unlined collector drums. These drums may also contain small quantities of bagged debris such as PPE or tools used in the process. [57] Aquaset II-G®, SP-400®, or Micro Cel® E may be used to absorb this liquid and the decontamination agent ReACT® may be used as required. [32, 48, 58, 62, 63]

2.2 Flammability Considerations

The payload containers in the waste stream must comply with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with the flammable gas limits will be performed for VOCs, hydrogen, and methane. Headspace gas sampling and analysis is performed when required by the WAP and/or CH-TRAMPAC. At a minimum, the headspace gas analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with headspace gas results exceeding 500 part per million (ppm) 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, Central Characterization Project (CCP) Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC).[44]

2.3 Tradename Index

Tradename	Chemical Constituents
Aquaset	Sodium montmorillonite clay[32]
Aquaset II-G®	Granular sepiolite clay (granular)[48]
Micro-Cel®E	Synthetic calcium silicate[48]
Oil-Dri	Crystalline silica and clay minerals, e.g., montmorillinite, bentonite[33]
Ox Out 536	Water, ammonium bifluoride, and nitric acid[35]

Tradename	Chemical Constituents
Portland Cement	Tricalcium silicate, dicalcium silicate, tricalcium aluminate, calcium alumino ferrite, gypsum, calcium oxide, magnesium oxide, sodium sulfate, potassium sulfate, crystalline quartz silica, trace chromium[35]
PuriFloc A23 Flocculant	Hydrolyzed polyacrylamide, sodium carbonate, sodium sulfite, sodium sulfate, proprietary ingredients, water[36]
SP-400®	Acrylic acrylate resin [58]
ReACT®	Non-toxic, non-flammable, non-corrosive, and bio-degradable mixture used for general decontamination [62, 63]

3.0 PROCESS FLOW DIAGRAMS

This section contains process flow diagrams available for the First/Second Stage Sludge waste stream.

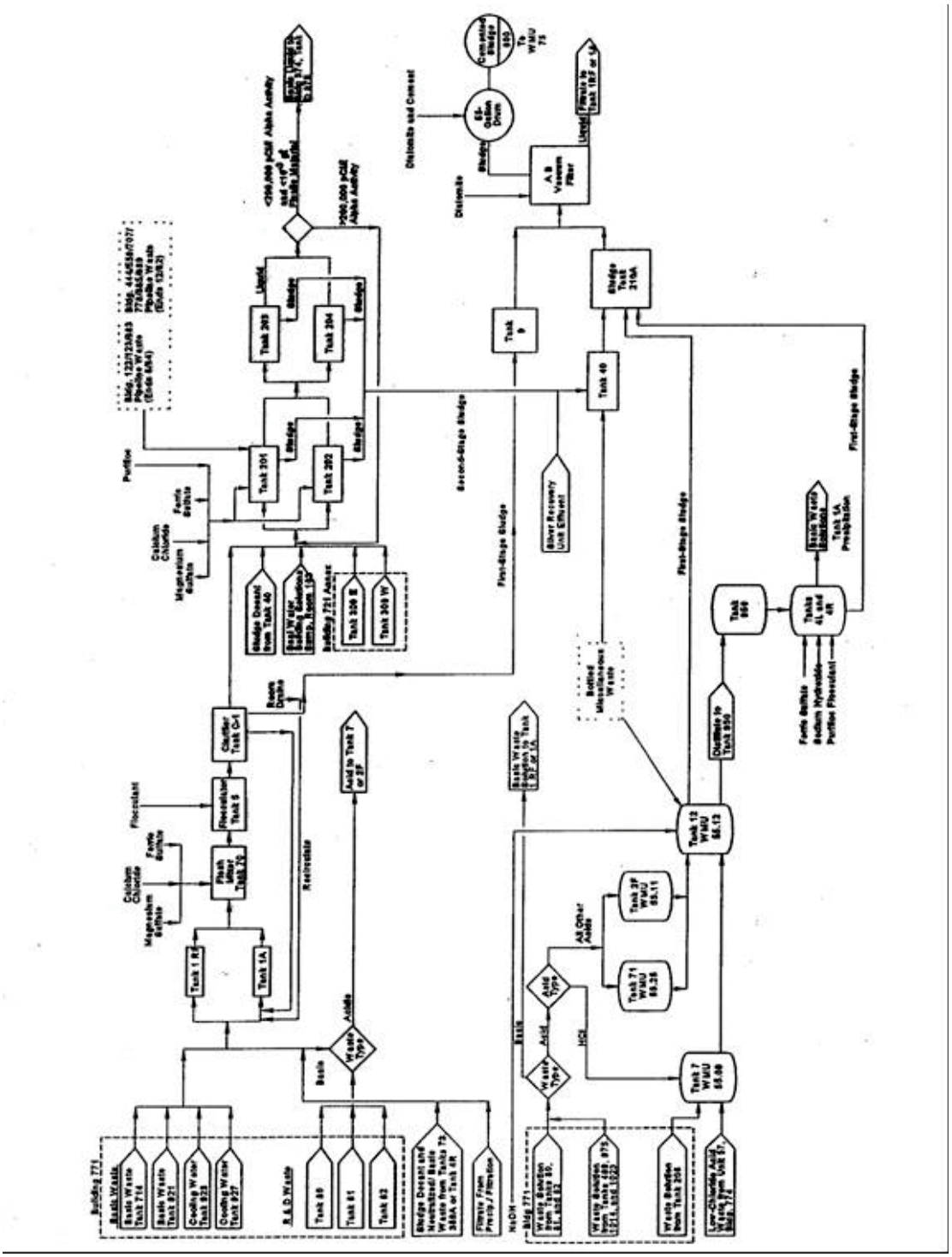

Figure 3-1. Building 774 aqueous waste treatment process.

APPENDIX 6

RPT-TRUW-15, Rev. 11
ACCEPTABLE KNOWLEDGE SUMMARY FOR BUILDING 374 SLUDGE (BNINW218) ADVANCED MIXED WASTE TREATMENT PROJECT

Date: 06/27/12

Acceptable Knowledge Summary for Building 374 Sludge (BNINW218)

Advanced Mixed Waste Treatment Project

(Signature on file. See DCR-11330.) 06/27/12

Susan Peterman Date

TRU Programs Manager

REVISION LOG

Revision Number	Date Approved	Pages Affected	Description of Revision
0	03/22/04	All	DCR-2627. Initial Issue.
1	08/19/04	All	DCR-3048. Updated to add TRUCON code 11D/211D; Oil-Dri® added as potential absorbent.
2	10/07/04	All	DCR-3296. Incorporate changes per CBFO comments.
3	04/15/05	All	DCR-4152. Incorporate changes per CBFO comments.
4	08/03/05	All	DCR-4462. Add references 41-47. Add new Section 1.2.2 to include EPA Hazardous Waste Numbers.
5	04/04/06	All	DCR-4833. Change reference 44; Add (BNINW218) to end of title.
6		Page 16	DCR-5366. Change RF filter debris to Building 374 Sludge.
7	07/28/07	All	DCR-5991. Change document based on Change Notice Approval (Change Notice #2).
8	10/30/07	References	DCR-6312. Update references as a result of the periodic review.
9	06/30/08	All	DCR-6966. Update per change notice #3.
10	07/14/09	References	DCR-8322. Minor Change. Remove references to close MAR 40045 action item 40099.
11	06/27/12	Various	DCR-11330. Incorporated ITG-Bluehseet-077, DOC-BLUESHEET-06, and updated references.

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ACRONYMS AND ABBREVIATIONS

AK	acceptable knowledge
AMWTP	Advanced Mixed Waste Treatment Project
BBWI	Bechtel BWXT Idaho, LLC
CCP	Central Characterization Project
CPR	combustibles, plastics, rubber
DCP	Direct Cementation Process
DOT	Department of Transportation
EDL	Economic discard limit
EPA	Environmental Protection Agency
HWN	hazardous waste number
IDC	item description code
INEEL	Idaho National Engineering and Environmental Laboratory
N/A	not applicable
NDA	non-destructive assay
pCi/l	Picocuries per liter
PVC	polyvinyl chloride
RFETS	Rocky Flats Environmental Technology Site
RTR	real-time radiography
SWB	standard waste box
TDOP	ten-drum overpack
TRUCON	TRUPACT-II Content Code
TWBIR	Transuranic Waste Baseline Inventory Report
WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan (Attachment B of the WIPP Hazardous Waste Permit)
WIPP	Waste Isolation Pilot Plant
WMC	Waste Matrix Code
WSPF	Waste Stream Profile Form
WTS	Waste Tracking System
WDS/WWIS	Waste Data System/WIPP Waste Information System

REFERENCES

NOTE: References are cited per the style guide provided by AMWTP Document Control. AMWTP documents that are often repeatedly revised, such as procedures, AK reports, and operating instructions, they are cited without revision numbers or dates. The most recent revisions of these documents are available through the AMWTP Electronic Data Management System. Previous revisions are available upon request through Document Services.

1. INEL-96/0280, Acceptable Knowledge Document for INEEL Stored Transuranic Waste – Rocky Flats Plant Waste [P368A]

2. EDF-2657, INEEL Acceptable Knowledge Waste Stream Summary Sheet – Building 374 Sludge [P238A]

3. RPT-TRUW-12, AMWTP Waste Stream Designations

4. RPT-TRUW-06, Acceptable Knowledge Baseline Document for AMWTP Waste

5. Waste Stream Profile Form (WSPF) INW218.001-Building 374 Sludge, including WSPF Update for WIPP Operating Record, 2003 [P218A]

6. DOE/WIPP-01-3194, CH-TRU Waste Content Codes (CH-TRUCON), February 2008

7. DOE/LLW-217, DOE Waste Treatability Group Guidance, 1995

8. DOE/TRU-2006-3344, Transuranic Waste Baseline Inventory Report -2004, U.S. Department of Energy, Carlsbad, New Mexico

9. RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge

10. Radionuclide (Np-237) inconsistent with AK documentation [AKR-03-8]

11. Radionuclide (K-40) inconsistent with AK documentation [AKR-03-10]

12. INEEL/EXT-01-00517, Characterization of Rocky Flats Plant Building 374 Sludge Waste Stream (IDCs 007, 803, 807) [P220A]

13. Not used

14. Oil-Dri® is an absorbent not identified with IDC 007, Building 374, Dry Sludge [AKR-03-26]

15. Vermiculite not expected in RF-IDC 007 & 803 waste containers [AKR-03-36]

16. Unspecified absorbent material may be present in RF-IDC 007 Containers [AKR-03-37]

17. Unexpected packaging configuration – Absence of Drum Bagging [AKR-03-35]

18. Unexpected packaging configuration – Absence of Drum Bagging [AKR-03-39]

19. Unexpected packaging configuration, Drum Stub Bag [AKR-04-41]

20. NM4890139088-TSDF, Waste Isolation Pilot Plant Hazardous Waste Facility Permit, New Mexico Environment Department, current revision

21. DOE/WIPP 02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, U.S. Department of Energy, Carlsbad Field Office, Rev. 6.1, October 29, 2007

22. Radionuclide (Am-243) inconsistent with AK documentation [AKR-03-30]

23. Radionuclide (Cm-245) inconsistent with AK documentation [AKR-03-33]

24. Filtered bag identified as method of closure [AKR-03-22]

25. Absorbent material (Oil Dri®) not expected in RF-IDC 807 waste Containers [AKR-04-48]

26. Material Safety Data Sheet for TRIM SOL, Master Chemical Corporation, February 27, 1992 [P130A]

27. Material Safety Data Sheet for Oakite Aluminum Cleaner 164; Oakite Products Inc., January 4, 1990 [P425A]

28. Material Safety Data Sheet for Mariko, Huntington Laboratories, Inc., September 11, 1986 [P128A]

29. Material Safety Data Sheet for Oil-Dri®, Oil-Dri® Corporation of America, March 15, 1993 [P426A]

30. Material Safety Data Sheet for Portland Cement, Lone Star Industries Inc., June 5, 1992 [P429A]

31. Not used.

32. Acceptable Knowledge TRU/TRM Waste Stream Summaries, TRM Solidified Inorganic Waste (F001, F002, F005, F006, F007, F009) Section 7.28, Revision 3, August 25, 2004 [P435S]

33. Material Safety Data Sheet for Aquaset, Fluid Tech Inc., August 1, 2001 [P401A]

34. Material Safety Data Sheet for Oakite Super Ruststripper; Oakite Products Inc., October 1, 1999 [P425A]

35. Material Safety Data Sheet for Oakite Dynadet; Oakite Products Inc., March 27, 1992 [P425A]

36. Material Safety Data Sheet for Oakite 360L; Oakite Products Inc., May 18, 1992 [P425A]

37. Material Safety Data Sheet for Ox Out 536; ChemClean Corporation, March 5, 1986 [P129A]

38. Material Safety Data Sheet for Polymer 1192; Betz Laboratories, Inc., August 1985 [P428A]

39. John A. Ciucci to Joseph A. Legare, Revision 2 For Resolution of Cesium-137 (Cs-137) Acceptable Knowledge (AK) Discrepancy Between Rocky Flats Environmental Technology Site (Site) and Idaho National Engineering and Environmental Laboratory (INEEL) [C281A]

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

41. MP-TRUW-8.1, Certification Plan for INL Transuranic Waste

42. Absorbent Material (Vermiculite) Not Expected in RF-IDC 807 Waste Containers [AKR-04-83]

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

44. RPT-TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant [P649A]

45. CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC) [P672A]

46. Memorandum from Tim Venneman to file, Waste Material Parameter Weight Calculations and Supporting Data to Determine Waste Material Parameter Weight per Unit of Waste, January 19, 2007 [C534A]

47. MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation

48. BBWI-Generated Drum Data, including Data from the Transuranic Waste Management Information System (TWMIS) [U127A]

NOTICE TO READER

Source documents (e.g., C037, P052, etc.) referenced in the *Acceptable Knowledge Document for INEEL Stored Transuranic Waste – Rocky Flats Plant Waste*, Revision 3, INEL-96/0280, are included in the AK record for the INEEL 3,100 m^3 Project. The same source documents have been added to the AMWTP AK record under a new reference number.
INEEL reference numbers used in the *Acceptable Knowledge Document for INEEL Stored Transuranic Waste – Rocky Flats Plant Waste*, Revision 3, INEL-96/0280, Section 22.0, Solidified Aqueous Waste – Building 374, are listed in the table below. The AMWTP reference numbers corresponding to the INEEL reference numbers provide a crosswalk for the reader to the applicable AMWTP source document.

INEEL Ref No.	AMWTP Ref No.	INEEL Ref No.	AMWTP Ref No.	INEEL Ref No.	AMWTP Ref No.
C010	C010A	P068	P068A	P322	P322A
C013	C013A	P076	P076A	P323	P358A
C015	C015A	P078	P078A	P324	P359A
C031	C031A	P079	P079A	U029	U029A
C063	C063A	P080	P080A	U030	U030A
C087	C087A	P091	P091A	U043	U043A
C111	C111A	P106	P106A	U045	U045A
C112	C112A	P113	P113A	U049	U049A
C113	C113A	P128	P128A	U050	U050A
C114	C114A	P129	P129A	U051	U051A
C121	C121A	P130	P130A	U053	U053A
C122	C122A	P141	P141A	U059	U059A
C154	C154A	P143	P143A	U060	U060A
C175	C175A	P144	P144A	U092	U092A
C184	C184A	P145	P145A		
C242	C242A	P146	P146A		
C243	C243A	P147	P147A		
P001	P001A	P148	P148A		
P004	P004A	P149	P149A		
P012	P012A	P150	P150A		
P013	P013A	P153	P153A		
P014	P014A	P164	P164A		
P015	P015A	P189	P189A		
P016	P016A	P194	P194A		
P022	P022A	P198	P198A		
P024	P024A	P200	P200A		
P026	P026A	P218	P218A		
P033	P033A	P220	P220A		
P043	P043A	P227	P227A		
P047	P047A	P228	P228A		
P052	P052A	P240	P240A		
P053	P053A	P280	P280A		
P062	P062A	P303	P303A		
P067	P067A	P321	P321A		

Acceptable Knowledge Summary Building 374 Sludge

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BNINW218

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

Building 374 Sludge

1.2.2 EPA Hazardous Waste Numbers

A. Toxicity Characteristic Codes: D006, D007, D008, D009, D010, D011, D032

B. Listed Waste Codes: F001, F002, F005, F006, F007, and F009

1.2.3 Point of Generation

Rocky Flats Plant - Liquid Waste Treatment Area of Building 374

1.2.4 Waste Stream Volume

2,000 Containers (416 m^3) [(4)]

IDC 007: 1,668 containers (347 m^3)

IDC 803: 64 containers (13 m^3)

IDC 807: 268 containers (56 m^3)

1.2.5 Generation Dates

1982 – 1988: Rocky Flats generated the waste up through 1991, but the AMWTP only has inventory through 1988. [(4)]

1988 – Present: Package dates later than 1988 will be associated with some containers. Waste stored at AMWTP with generation dates (i.e., pack date) later than 1988 are the result of repackaging (e.g., waste characterization/treatment activities). There is no additional Building 374 Sludge generation occurring at INEEL. [(4)]

IDC 007: 1982 – 1987 [4]

IDC 803: 1986 – 1987 [4]

IDC 807: 1987 – 1988 [4]

1.2.6 TRUCON Codes

ID111, ID211 [3, 5, 6]

1.2.7 TWBIR Information

IN-W218.909 [3, 8]

IN-W220.114 [3, 8]

1.2.8 Summary Category Group

S3000 Homogenous Solids [3, 7]

1.2.9 Waste Matrix Codes

S3121 – Waste Water Treatment Sludge (IDC 007, IDC 807) [3, 7]

Waste Matrix Code (WMC) S3121 consists of >50% by volume secondary sludge, or filtercake from wastewater treatment processes or heavy metal sludges resulting from recovery processes.

S3150 – Solidified Homogeneous Solids (IDC 803) [3, 7]

WMC S3150 consists of >50% by volume solidified forms. An example is sludge waste that is immobilized with cement and cured into a solidified form.

Two waste matrix codes have been assigned to this waste stream because the cementation immobilization process for this waste stream changed in the 1986 – 1987 timeframe. The immobilization process at other times involved mixing the sludge with Portland cement or a Portland cement and diatomite mixture. The feed streams to the process did not change over time.

1.2.10 Waste Matrix Code Group

S3100 – Solidified Inorganics

1.3 Physical Waste Form

1.3.1 Description

The Building 374 Sludge waste stream consists of drums containing Building 374 Dry Sludge (IDC 007), Solidified Direct Cementation Process (DCP) Sludge (IDC 803), or Building 374 Solidified By-pass Sludge (IDC 807). The aqueous sludge wastes from Building 374 were generated from a carrier precipitation and immobilization process.

Table 1-1. Physical Waste Form Descriptions for Bldg. 374 Sludge.

1995 TWBIR Number(s)	2004 TWBIR Number(s)	IDC	WMC	Description
IN-W218.109 IN-W218.900	IN-W218.909	007	S3121	This waste consists of moist sludge mixed with Portland cement or a diatomite and Portland cement mixture. The moist sludge was produced from 1982 to 1987.
IN-W220.114 IN-W220.925	IN-W220.114	803[a]	S3150	This waste consists of sludge dried in a dryer, and mixed with Portland cement and water, which cured to form a solid monolith. IDC 803 was generated for about one year (1986-1987). ANL-E waste described in IN-W220 is excluded from this waste stream.
IN-W220.114 IN-W220.925	IN-W220.114	807 [a, b]	S3121	This waste consists of sludge that bypassed the dryer and was mixed with diatomite and Portland cement. IDC 807 sludge is the same as the IDC 007 sludge generated using the bypass system. IDC 807 was generated from March 1987 to 1991. ANL-E waste described in IN-W220 is excluded from this waste stream.

a. IDCs 803 and 807 are not specifically identified in the TWBIR; however, the containers of IDCs 803 and 807 wastes were originally shipped from Rocky Flats to INL using 111 for the content code which is included in IN-W220.

b. Prior to March 1987, IDC 807 was assigned to cemented incinerator sludge generated in Building 771, After March 1987, IDC 807 was assigned to the sludge previously identified under IDC 007. Letters a and b are used to distinguish between the IDC 807 sludges in some AK documents, with a denoting Building 374 sludge after 3/87 and b for incinerator sludge generated before 3/87. IDC 807 is assigned only to Building 374 by-pass sludge in the Waste Tracking System (WTS).

1.4 Process Description

1.4.1 Areas of Operation

Building 374 was built in 1980, and was an integral part of the new plutonium (Pu) recovery facility, Building 371. Building 374s primary purpose was to treat radioactive aqueous waste from Building 371, and, on an as needed basis, from Building 774. Only waste that contained plutonium below the economic discard limit (EDL) was processed in Building 374. The treatment process involved three separate stages of precipitation, flocculation, and clarification, followed by evaporation, neutralization (if necessary), and immobilization.

1.4.2 Waste Generating Processes

1.4.2.1 Radioactive Decontamination

Aqueous wastes containing greater than 13,500 picocuries per liter (pCi/l) alpha contamination were treated in the radioactive decontamination process. Wastes were received by pipeline from Buildings 371, 444, 559, 707, 774, 776, 779, 865, 881, 883, and 889. The treatment process involved three separate stages of precipitation, flocculation, and clarification.

The first stage feed tank, D-812, received supernatant from the sludge solidification process and basic waste solutions from Building 371. If needed, the pH of the solutions was adjusted to 10.5 or greater with potassium hydroxide. The basic solutions were pumped to a reactor tank where reagents, including magnesium sulfate, calcium chloride, and ferric sulfate, were added, which attracted and combined with the radioactive isotopes. The reactor contents were mixed with an agitator and flowed continuously by gravity to a flocculator tank. A flocculent (Polymer 1192) was added to aid in agglomeration of the precipitate. [32, 38] The contents were mixed with an agitator and continuously overflowed to a clarifier. A rake at the bottom of the clarifier slowly moved the solids to the center, where they were drawn off the bottom of the tank into the feed tanks, D824 A and B, for the sludge solidification process.

The first-stage clarifier liquids flowed over a weir and were pumped to the second-stage feed tank. The second-stage feed tank also received third-stage clarifier effluent, steam

condensate, and decontamination wastewater from Building 371, wastes from Building 444, and from the 500, 700, and 800 areas. The second- and third-stage reactors, flocculators, and clarifiers functioned exactly as the first stage. Figure 3-1 shows the radioactive decontamination process.

1.4.2.2 Evaporation

The evaporation process concentrated soluble materials from low-level desaltable aqueous wastes. Aqueous wastes were received from Buildings 122, 123, 443, 444, 447, 460, 559, 561, and 566. Clarifier effluent from the radioactive decontamination process, solar pond water, and aqueous wastes from buildings in the 700 and 800 areas were also sent to the evaporator. The aqueous wastes were pumped to the evaporator where they were continuously circulated and heated by steam producing concentrated salt brine and steam. The steam was condensed for use by the boiler plant and cooling tower. The salt brine was dried, using a spray drier, and immobilized with cement. Periodically, a nitric and phosphoric acid descaling solution was used to flush the evaporator heat exchangers. This solution was then sent to the sludge immobilization process. The evaporation process is shown in Figure 3-1.

1.4.2.3 Acid Neutralization

Nitric acid wastes from plutonium recovery operations in Building 371 were received in Building 374 by pipeline. Acid wastes were also received as packaged materials in 55-gallon drums from Buildings 123, 444, 460, 559, 774, 865, 881, and 883. The acid wastes were continuously mixed by an agitator in Tank D-808, and by circulation through a heat exchanger. The heat exchanger removed heat generated during the process. As the liquid circulated, a pH analyzer regulated the amount of neutralization solution containing 46% potassium hydroxide that was fed to the tank to maintain a pH of 12.5. Neutralized acid waste was piped to Tanks D-824 A and B for eventual treatment by the sludge solidification process. The acid neutralization process is shown in Figure 3-2.

1.4.2.4 Sludge Solidification

Liquid wastes treated by the acid neutralization, radioactive decontamination, and evaporation processes were transferred to the sludge solidification process.

The slurry from radioactive decontamination, spent descaling solution from the evaporator, and wastes from acid neutralization were fed into the filter feed tanks, D-824 A and B. Supernatant from the filter feed tanks was decanted to the radioactive decontamination process. The slurry from the feed tanks was pumped to the radioactively contaminated solids on the surface of the filter media. The filter drum was coated with a mixture of diatomite and water or the filtrate. The slurry was fed into the filter pan. The filtrate was drawn through the pre-coat by a vacuum process, leaving the radioactively contaminated solids on the surface of the filter media. An advancing blade continuously removed the sludge and a thin layer of pre-coat. The filtrate from the rotary drum filter was transferred back to the radioactive decontamination process. From here, sludge from the rotary drum filter was immobilized using either the sludge dryer system or the bypass system (Figure 3-2). It is here where final treatment rendered the sludge, either IDC 007, IDC 803, or IDC 807.

(IDC 007): The sludge from the rotary drum filter was immobilized using either the sludge dryer system or the bypass system. In the sludge dryer system, the sludge from the vacuum filters was fed to the dryer feed hopper then conveyed through the dryer in heated flights. The dried sludge was transferred directly into a 55-gallon drum. The resulting waste was assigned IDC 007 and consisted of dispersible fines.

(IDC 803): The process for receiving and treating aqueous feed streams in Building 374 was the same as that for IDC 007. However, the method for solidifying sludge generated from aqueous treatment operations was modified from a bypass system to a dryer system in 1985. The sludge from the vacuum filter was dried in the same manner as the sludge generated prior to October 1982. However, the dried sludge was cemented in the direct cementation process (DCP). The dried sludge overflowed directly into the DCP sludge hopper, and cement and water were mixed in using a

paddle mixer. The sludge, cement, and water mixture was deposited into a 55-gallon drum and allowed to solidify. DCP sludge was assigned IDC 803. Due to mechanical problems, the DCP was only in operation for about a year.

(IDC 807): The process for receiving and treating aqueous feed streams in Building 374 was the same as that for IDC 007. At the time IDC 007 was discontinued in 1987 and replaced by IDC 807, the solidification process in use bypassed the sludge dryer system. The bypass system used a series of two conveyor belts to transfer the moist sludge exiting the vacuum filter directly into the 55-gallon drum. Diatomite and Portland cement in a 1:1 ratio were metered into the drum with the sludge. A 7:1 ratio of sludge to cement/diatomite mixture was used. As the drum was filled, the waste was periodically tamped down using a tamping tool. Oil Dri® and vermiculite have also been noted in IDC RF 807 wastes. IDC RF 807 drums containing Oil Dri® have been identified during real-time radiography (RTR) examination at the AMWTP. The estimated volumes of Oil Dri® and vermiculite did not exceed 50% of the overall volume within the waste containers. [42]

1.4.3 Material Inputs

Material inputs for IDC 007, IDC 803, and IDC 807 are common for this waste stream. Liquid wastes treated by the acid neutralization, radioactive decontamination, and evaporation processes were transferred to the sludge solidification process. The waste streams that were treated in the sludge solidification process are presented in Table 1-2.

Table 1-2. Wastes Treated in the Sludge Solidification Process.

Waste Streams	Source Buildings	Contaminants
Tank D-808: Packaged Acid Wastes and Building 371 Nitric Acid Wastes	Buildings 123, 371, 444, 460, 559, 774, 865, 881, and 883	Acid Wastes.
Tanks D-815, D-819, D-823: Radioactive Decontamination Process Effluent	Buildings 371 and 559, and 700 and 800 Areas	Acids, bases, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, selenium, silver, Trim Sol[a], Oakite Cleaner[a], Ox Out 536[a], acetone, ethyl alcohol, hexane, methanol, methyl ethyl ketone, methylene chloride, eutectic salts, photo developer, and photo stop bath.
Tank D-845: Evaporation Process Descaling Solution (nitric and phosphoric acid)	Buildings 122, 123, 443, 444, 447, 460, 559, 561, 566, 700 and 800 Areas, and Solar Ponds	Radioactive decontamination process effluent contaminants, solar pond water constituents, demineralization salts, water softeners, chemical indicators, 1,1,2-trichloro-1,2,2-trifluoroethane, toluene, penetrant oils, isopropanol, ethylene glycol, Mariko[a] [(28)], diamond paste, spent emulsifier, spent developer.

[a] See Table 2-1 for chemical description of Trademark Names.

In addition to the contaminants described in Table 1-2, liquid wastes set to Tanks D-824A and B can be contaminated with the following spent solvents:

- Tetrachloroethylene
- Trichloroethylene
- 1,1,1-Trichloroethane
- Carbon tetrachloride
- 1,1,2-Trichloro-1,2,2-trifluoroethane
- Acetone
- Methanol
- Xylene
- Benzene
- Toluene.

1.4.3.1 Miscellaneous Items

Miscellaneous items are those items that have been identified during characterization activities that are not consistent with expectations based on process descriptions. They appear in a small percentage of the waste stream containers and constitute a small percentage of the waste within the container and summary category group and other determinations are not impacted.

Visual examination (VE) and RTR inspections of IDC 007 containers have identified the following items:

- Inorganic liquids (see Section 1.5)
- Lead-containing items
- Miscellaneous metal debris
- Miscellaneous plastic debris.

Visual examination and RTR inspections of IDC 803 containers have identified the following item:

- Inorganic liquid (See Section 1.5)

Visual examination and RTR inspections of IDC 807 containers have identified the following item:

- Inorganic liquid (See Section 1.5)
- Lead-containing items
- D-cell battery
- Miscellaneous plastics

1.4.4 Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for BNINW218, waste material parameter data from 100% of the completed RTR and VE of Building 374 Sludge waste drums were obtained from the AMWTP Waste Tracking System (WTS) database on October 11, 2006. This represents 95% of the estimated number of drums for this waste stream. The Building 374 Sludge waste was generated at RF from 1982 through 1988. Drums evaluated to estimate the WMP weights per unit of waste were generated from 1982 to 1988; therefore, the WTS data is representative of the waste stream. WTS is AMWTP's comprehensive, DOE-audited waste tracking database in which all waste containers are tracked cradle-to-grave and all related characterization data are stored. A statistical analysis of the RTR and VE data was performed to estimate WMP weights (by percent) for Building 374 Sludge, excluding packaging, in accordance with the requirements of MP-TRUW-8.13, Collection, Review and Management of Acceptable Knowledge Documentation and are summarized in Table 1-3. [44, 46, 47, 48]

Table 1-3. Estimated Waste Material Parameter Weights per Unit of Waste for Building 374 Sludge (BNINW218).

Waste Material Parameters	Weight per Unit Waste by Percent
Iron-based Metals/Alloys	<1
Aluminum-based Metals/Alloys	<1
Other Metals	<1
Other Inorganic Materials	6
Cellulosics	<1
Rubber	<1
Plastics (waste materials)	1
Inorganic matrix	93

Although individual drums in this waste stream may contain other homogenous solid waste and debris materials, the waste stream as a whole will be greater than 50%, by volume, inorganic solidified homogeneous solids. [2, 44, 46]

1.5 Prohibited Items

The absence of prohibited items is determined and documented through acceptable knowledge and historical confirmation activities. The following item is expected in this waste based upon the above review.

- Liquid waste (waste shall contain as little residual liquid as is reasonably achievable by pouring, pumping and/or aspirating, and internal containers shall contain less than 1 inch or 2.5 centimeters of liquid in the bottom of the container. Total residual liquid in any payload container [e.g., 55-gallon drum or standard waste box] may not exceed 1% volume of that container)

The following items have been determined as not present in this waste through review of the AK record.

- Non-radionuclide pyrophoric materials, such as elemental potassium
- Hazardous waste not occurring as co-contaminants with TRU mixed wastes (non-mixed hazardous waste)
- Wastes incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Wastes containing explosives or compressed gases
- Wastes with polychlorinated biphenyls (PCBs) not authorized under an EPA PCB waste disposal authorization
- Wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers (HWN) of D001, D002, or D003)

Excess residual liquid is a common prohibited item identified during RTR and VE in this waste stream. Other prohibited items are expected to be very rare. [1, 44] Drums with excess residual liquid will be treated by adding absorbent prior to shipment. Drums with prohibited items will be treated or rejected as appropriate. Drums with prohibited items will not be part of the waste stream shipped to WIPP.

- Waste that has ever been managed as high-level waste and waste from tanks specified in Table B-8 of MP-TRUW-8.2, Quality Assurance Project Plan, unless specifically approved through a Class 3 permit modification. [20, 40]
- Any waste container from a waste stream (or waste stream lot) that has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment, as described in Attachment B7 of MP-TRUW-8.2, Quality Assurance Project Plan. [40]

1.6 RCRA Determination

1.6.1 EPA Hazardous Waste Numbers

Toxicity Characteristic Codes: D006, D007, D008, D009, D010, D011, D032

Listed Waste Codes: F001, F002, F005, F006, F007, and F009

Rocky Flats Environmental Technology Site (RFETS) has also prepared a waste stream profile form for the Building 374 Sludge waste stream. The following paragraph is from the Rocky Flats submittal.

A portion of this waste stream, generated at RFETS, was sent to INEEL for storage; however, the INEEL waste stream (BNINW218) is also assigned EPA HWN D006, D007, D008, D009, D010, D011 and D032 in addition to F001, F002, F005, F006, F007, and F009. RFETS acceptable knowledge indicates that cadmium, chromium, lead, mercury, selenium and silver are present in this waste stream but that only chromium (D007) is present in concentrations above the RTL. There is no RFETS acceptable knowledge that hexachlorobenzene (D032) is present in this waste stream. Confirmatory solid sampling performed at RFETS detected chromium (D007) and silver (D011) in concentrations above the RTL; whereas, confirmatory solid sampling performed by INEEL detected chromium (D007) and mercury (D009). Because solid and/or headspace sampling performed at RFETS did not detect cadmium, lead, mercury, and hexachlorobenzene at concentrations above their RTLs, EPA HWNs D006, D008, D009, D010 and D032 were not applied to the RFETS waste stream. Per RFETS policy not to assign characteristic EPA HWNs to a listed waste, where the treatment standards for the listed waste addresses the characteristic, D007 (chromium) and D011 (silver) were not applied. [32]

The following sections discuss the application of HWNs by AMWTP.

1.6.2 Hazardous Determination

Ignitability:

The materials in this waste group do not meet the definition of *ignitability* as defined in 40 CFR 261.21. These materials are not liquid, are not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change. These materials are not compressed gases, nor do the containers contain compressed gases. These materials are not DOT oxidizers as defined in 49 CFR 173. The materials in this waste group are therefore not ignitable wastes (D001).

Corrosivity:

The materials in this waste do not meet the definition of *corrosivity* as defined in 40 CFR 261.22. Under 40 CFR 261.22, a solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

- It is aqueous with a pH less than or equal to 2, or greater than or equal to 12.5, as determined by a pH meter using Method 9040 in "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods," EPA Publications SW-846.
- It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.240 inch) per year at a test temperature of 55 degrees Celsius (130 degrees Fahrenheit) as determined by its test method specified in National Association of Corrosion Engineer (NACE) Standard TM-01-69 as standardized in SW-846.

The waste is not a liquid and does not meet the criteria for a corrosive hazardous waste as noted above. As determined by radioscopy and VE, none of the drums shipped contained 20% by volume, liquid waste (20% by volume is required in order to measure pH per the prescribed method in 40 CFR 261.22). Results of measurement of pH of residual liquids as reported in INEEL/EXT-01-00517 [(12)] ranged from 8.6 to 11.9, which supports this determination. Therefore, the corrosive characteristic (D002) does not apply.

Reactivity:

The materials in this waste group do not meet the definition of *reactivity* as defined in 40 CFR 261.23. The materials are stable and will not undergo violent chemical change. The materials will not react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors, or fumes when mixed with water. The materials do not contain sulfides, and are not capable of detonation or explosive reaction. The materials are not forbidden explosives or Division 1.1, 1.2, or 1.3 (Class A or B) explosives as defined in 49 CFR 173, nor do the drums contain explosive materials. Explosives were not handled or used around radioactive material. The waste may contain cyanide from treatment of electroplating wastes. Analysis of bypass sludge indicates a maximum total cyanide concentration of 8.2 mg/kg, and a maximum reactive cyanide concentration of 5.36 mg/kg. These cyanide levels will not cause the waste to be reactive. The materials in this waste group are not reactive wastes (i.e., D003).

The materials in the waste stream do not meet the definition of reactivity and will not be assigned the D003 waste code.

Toxicity:

Acceptable knowledge indicates the presence of metals, cadmium, chromium, lead, mercury, selenium, and silver in this waste stream. Results from solid sampling and analysis of the sludge (see Table 2 of the Characterization Information Summary associated with WSPF BNINW218) confirm that chromium and mercury are present in concentrations above the RTL. The results also indicate that cadmium, lead, selenium, and silver are present in the sludge, but at levels less than the toxicity limit. However, as a conservative measure, the D codes indicated by AK will be retained. The EPA hazardous waste codes (D006 through D011) for these metals have been applied to this waste stream.

Analytical results for semi-volatile organic compounds of solid samples collected in two samples from 1997 and 1998 indicated the potential presence of hexachlorobenzene. [(12)] These are part of the data set that was used by 3,100 m^3 to establish the required size of the final sample set. See Table 4 in INEEL/EXT-01-00517. [(12)] No other semi-volatile organic compounds were detected. The INEEL assigned the toxicity code (D032) for hexachlorobenzene as a conservative measure. The AMWTP will maintain this code assignment based on the AK as a conservative measure.

Spent halogenated organic compounds commonly used for their solvent properties for cleaning and degreasing were included in the feed waste. Results from solid sampling and analysis indicate that none of the toxicity volatile organic compounds were detected above the RTL. The appropriate F-listed codes for the halogenated solvents used have been applied to this waste; therefore, the toxicity characteristic waste codes associated with these compounds will not be assigned.

There is no documentation indicating the presence or use of pesticides or herbicides in the areas or processes that generated the aqueous waste from which Building 374 solidified aqueous waste was derived. Therefore, this waste group does not exhibit the characteristic of toxicity due to pesticides or herbicides (D012-D017).

Based on AK and sampling data, D006, D007, D008, D009, D010, D011, and D032 have been assigned to the Building 374 waste stream.

Listed Waste:

F Codes:

Tetrachloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, and 1,1,2-trichloro-1,2,2-trifluoroethane were commonly used for cleaning and degreasing. Methylene chloride was used primarily for paint removal. The aqueous waste transferred to Building 374 for treatment may have contained small amounts of these spent solvents. Solid sampling organic data (Table 3A and 4A of the Characterization Information Summary associated with BNINW218) and headspace gas sampling results (Table 1A Characterization Information Summary associated with BNINW218) of the Waste Stream Profile Form BNINW218 indicate the presence of F001 and F002 organic compounds, although only the UCL_{90} for 1,1,1-trichloroethane approaches the PRQL. None of the UCL_{90}s exceeded the PRQL. However, because Building 374 solidified aqueous waste was derived from the treatment of a listed hazardous waste the EPA HWNs F001 and F002 are applied.

Acetone, methanol, and xylene were used primarily as solvents in laboratory operations. The aqueous waste transferred to Building 374 for treatment may have contained small amounts of these spent solvents. However, F-listed solvents were not mixed before being discharged into the process waste line. Solvents were also diluted with water and washed into the process waste line at the point of generation. Therefore, the ignitability characteristic was removed at the time of dilution and discharge. Since the F003-listed wastes were rendered non-ignitable prior to subsequent discharge and aggregation within the liquid waste stream destined for sludge generation, the F003 code, which is listed solely for ignitability, does not have to be applied. Neither solid nor headspace gas sampling have indicated UCL_{90} levels of these compounds. Therefore, this waste is not assigned EPA HWN F003.

There is no documentation indicating the presence or use of F004-listed solvents in the areas or processes that generated the aqueous waste from which Building 374 solidified aqueous waste was derived. Therefore, this waste group is not an F004-listed hazardous waste.

F005-listed solvents, benzene and toluene, were used in laboratory operations, and methyl ethyl ketone is identified as a contaminant by AK. The aqueous waste transferred to Building 374 for treatment may have contained small amounts of these spent solvents. Headspace gas sampling results from the 3,100 m^3 Project indicated the presence of benzene, methyl ethyl ketone, and toluene, although the calculated UCL_{90}s were all below the respective PRQLS. The headspace gas data

set presented in Table 1A does not indicate the presence of benzene, toluene, or methyl ethyl ketone. However, because Building 374 solidified aqueous waste was derived from the treatment of a listed hazardous waste, the EPA HWN F005 is applied.

In late 1984 and early 1985, the evaporator in Building 374 began treating spent stripping, cleaning, and plating solutions from electroplating operations in Building 444. The Building 444 electroplating operations utilized cyanide and therefore the Buildings 374 wastewater treatment operations received F007 and F009 wastes, and generated F006 wastewater treatment sludge. The Building 374 sludges were derived from the treatment of spent descaling solution from the evaporator, and were assigned EPA HWNs F006, F007, and F009.

Based on the above discussion Building 374 Sludge will be assigned F001, F002, F005, F006, F007, and F009.

K-Listed Codes:

The materials in this waste stream do not meet the definition for K-listed EPA codes. K-listed EPA codes only apply to hazardous waste from specific sources. The waste is not and does not contain any hazardous waste from specific sources paragraphs (a) of 40 261.32.

P- and U-Listed Codes:

The materials in this waste stream do not meet the definition for any P- or U-listed codes. P- and U-listed EPA codes only apply to discarded commercial chemical products, and residues of commercial chemical or off-specification products. The waste is not and does not contain any commercial product, or manufacturing chemical intermediate listed under paragraphs (e) or (f) of 40 CFR 261.33 that when they were discarded were mixed with waste oil or used oil or other material that was applied to the land, or used as a fuel, in lieu of their original intended use as described in detail in 40 CFR 261.33. The following paragraphs contain detailed justification that P- and U-listed codes are not applicable.

Waste generated from non-restricted operations (or buildings) or after 1974, may be contaminated with trace quantities of beryllium (e.g., less than one percent (1%) of the waste by weight). This beryllium contamination is an integral part of the sludge and is not in powder form. It is not a commercial chemical product, an off-specification species, a container residue, or a spill residue thereof. Therefore, the P-listed waste code (P015) for beryllium as defined in 40 CFR 261.33 was not assigned to the waste.

The U-listed code (U134) for hydrofluoric acid is not applicable to this waste stream. Hydrofluoric acid may have been used during recovery operations in Building 771, but was not disposed of as unused product within the waste stream. As established previously, this waste does not exhibit the characteristic for corrosivity.

The U-listed code (U079) for trans-1,2-dichloroethylene also is not applicable to this waste stream. It is not an expected constituent of this waste and the waste does not meet the definition of a U-listed waste per 40 CFR 261.33. Although trans-1,2-dichloroethylene is currently a WAP target analyte, it was not included as such in the solids sampling analytical results used to characterize this waste. The solids samples were collected and analyzed under a WAP compliant program, but prior to the time that trans-1,2-dichloroethylene was added to the target analyte list. It was not detected (as a TIC) in any of the solid samples analyzed under the 3,100 m^3 Project WIPP compliant program and has not been detected as a TIC in any of the RF wastes headspace gas samples in 25% or more of samples, including Building 374 Sludge.

TSCA Regulated Contaminants

Acceptable knowledge indicates that Building 374 Sludge waste does not contain polychlorinated biphenyls (PCBs) as regulated by the Toxic Substances Control Act (TSCA), 15 U.S.C. 2601 et seq.

1.7 Radionuclides

The WIPP-tracked radionuclides of concern for this waste are: ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, and ^{241}Am. [1, 44] The remaining WIPP-tracked radionuclides, ^{137}Cs, and ^{90}Sr, are not expected to be present in measurable quantities in this waste. [39] The Building 374 sludge waste stream does not contain concentrations of plutonium in excess of 20% by weight for the aggregate of any material category. [9, 41]

As a minimum, to confirm existing AK data, the ratios of the two most prevalent radionuclides in the isotopic mix are compared. [21] The two most prevalent radionuclides by weight expected in the Building 374 sludge waste drums are ^{239}Pu and ^{240}Pu. [9]

The recommended default mass fraction values of the plutonium isotopes to be used as the AK based values and confirmed at the AMWTP during non-destructive assay (NDA) are listed in RPT-TRUW-07, *Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge*. [9]

Mass fraction values for ^{241}Am, ^{233}U, ^{235}U, and ^{238}U previously determined for Rocky Flats at the Idaho National Engineering and Environmental Laboratory

(INEEL) were based on individual gamma spectrometric measurements. The ^{234}U activities were calculated based on ratios with depleted uranium isotopes. The criteria used for selection and the formulas for determining the ^{234}U mass is presented in RPT-TRUW-07. [9]

Radionuclides such as ^{244}Cm, ^{232}Th, and ^{236}U may be found in Rocky Flats wastes. [9] Americium-241, ^{234}U, and ^{237}Np are expected in most of the Rocky Flats TRU waste containers due to radioactive decay and ingrowth. [10] ^{243}Am and ^{245}Cm, other isotopes resulting from radioactive decay, have also been detected during AMWTP NDA. [22, 23] Potassium-40 may be detected when other radionuclides in a container are significantly lower in concentration. In some cases ^{40}K has been detected in higher concentrations than ^{239}Pu and contributes to 95% of the radionuclide hazard. [11]

AMWTP will employ payload management practices in accordance with the WIPP-WAC Appendix E, for waste stream BNINW218. The estimated total waste volume for BNINW218 is 416 m^3. The estimated percentage of the waste greater than 100 nCi/g is 66%. The estimated percentage of waste less than or equal to 100 nCi/g is 34%. [9]

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

Depending on waste packaging requirements at the time, several combinations of bags and liners were used to prepare 55-gallon drums for shipment. Use of the 90-mil rigid polyethylene liner began in 1972. The rigid liner was placed in each drum and lined with a polyethylene round bottom drum liner, a polyethylene drum bag and PVC O-ring bag, or a single round bottom polyethylene liner placed between the rigid liner and O-ring bag. Some drums packaged after 1972 may not have rigid liners.

When a drum was full, the drum liners were twisted and taped closed, the lid was secured with a bolted ring, and a tamper-indicating device was attached to the drum. Approximately one liter of Oil Dri® was placed in the bottom of the O-ring bag. One liter of Oil Dri® was placed on top of the O-ring bag inside the polyethylene drum bag (See Table 2.1 for list for constituents associated with Oil Dri®).

Typically sludge was placed directly and treated (i.e., monolith) directly in drum bags within the drum and have no inner packaging or may be layered. [17, 18] Diatomite and cement were added to the waste in various amounts. [25] Approximately 20 to 50 pounds of Portland cement were typically added to IDC 007 and 807 Sludge and can be found layered throughout the drum and packaging. After April, 1986, a 1:1 ratio of diatomite and Portland cement was

used in a 7:1 sludge/absorbent ratio. (See Table 2-1 for list of constituents associated with Portland cement).

The typical bag closure method was "twisted and taped." Drum stub bags may be identified in containers that were visually examined or cored at WMF-634. [19]
A "Filtered bag" method was used for bag closure in drums visually examined at Argonne-West as part of the 3,100 m^3 Project. [24]
After drums were inspected, one to two quarts of absorbent material (Oil-Dri®) was placed on the top of the outer, sealed polyethylene drum bag. [2, 14, 15, 16] This procedure changed in February 1982 when vermiculite was used to fill the void space. The quantity of vermiculite varied from 3-12 pounds according to the amount of waste contained in each drum. The type, amount, and expected time-frame of absorbent use may vary. Aquaset® or vermiculite in varying amounts was added to drums of waste during the 3,100 m^3 Project recovery operations (See Table 2-1 for list of constituents associated with Aquaset®).

Any combination of plastic bags that does not exceed five layers of confinement (of which no more than three are inner bags) is acceptable for shipment to WIPP. Containers with excess layers of confinement or packaging configurations not addressed by an approved TRUCON code for this waste stream will be segregated and vented or rejected as appropriate. [43]

2.2 Flammability Consideration

The payload containers in the waste stream must comply with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with the flammable gas limits will be performed for volatile organic compounds (VOCs), hydrogen, and methane. Headspace gas sampling and analysis is performed when required by the WAP and/or CH-TRAMPAC. At a minimum, the headspace gas analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with headspace gas results exceeding 500 ppm flammable VOCs, are evaluated for compliance with applicable CH TRAMPAC requirements prior to shipment. Payloads containing flammable gases are managed in accordance with CCP-CH-TRAMPAC, CCP-PO-003. [45]

Table 2-1. Tradename Index

Tradename	Chemical Constituents
Aquaset	Sodium montmorillonite [33]
Mariko	Nonhazardous mixture [28]
Oakite Cleaners	
Oakite Aluminum Cleaner	Sodium carbonate; sodium phosphate, tribasic; tetrasodium pyrophosphate, sodium metasilicate, sodium silicate [27]
Super Ruststripper	Sodium hydroxide, sodium hydroxyethylene diamine triacetate, Trade secret registry (735517), Non-hazardous ingredients [34]
Oakite Dynadet	Sodium hydroxide, tetrasodium pyrophosphate, nonylphenoxy polyethoxy ethanol, dipentene, non-hazardous ingredients [35]
Oakite 360 L	Sodium hydroxide, non-hazardous ingredients [36]
Oil-Dri	Crystalline silica and clay minerals, e.g., montmorillonite, bentonite [29]
Ox Out 536	Water, ammonium bifluoride, and nitric acid [37]
Polymer 1192	Material Safety Data Sheet Section 1, Hazardous Ingredients, states; "This product contains no hazardous ingredients by OSHA regulations or any state Right-To-Know regulations." [38]
Portland Cement	Tricalcium silicate, dicalcium silicate, tricalcium aluminate, calcium alumino ferrite, gypsum, calcium oxide, magnesium oxide, sodium sulfate, potassium sulfate, crystalline quartz silica, trace chromium [30]
TRIM SOL	Water miscible cutting and grinding fluid concentrate, not hazardous per Environmental Protection Agency (EPA) or Department of Transportation (DOT) guidelines [26]

PROCESS FLOW DIAGRAMS

This section contains process flow diagrams available for the Building 374 waste stream.

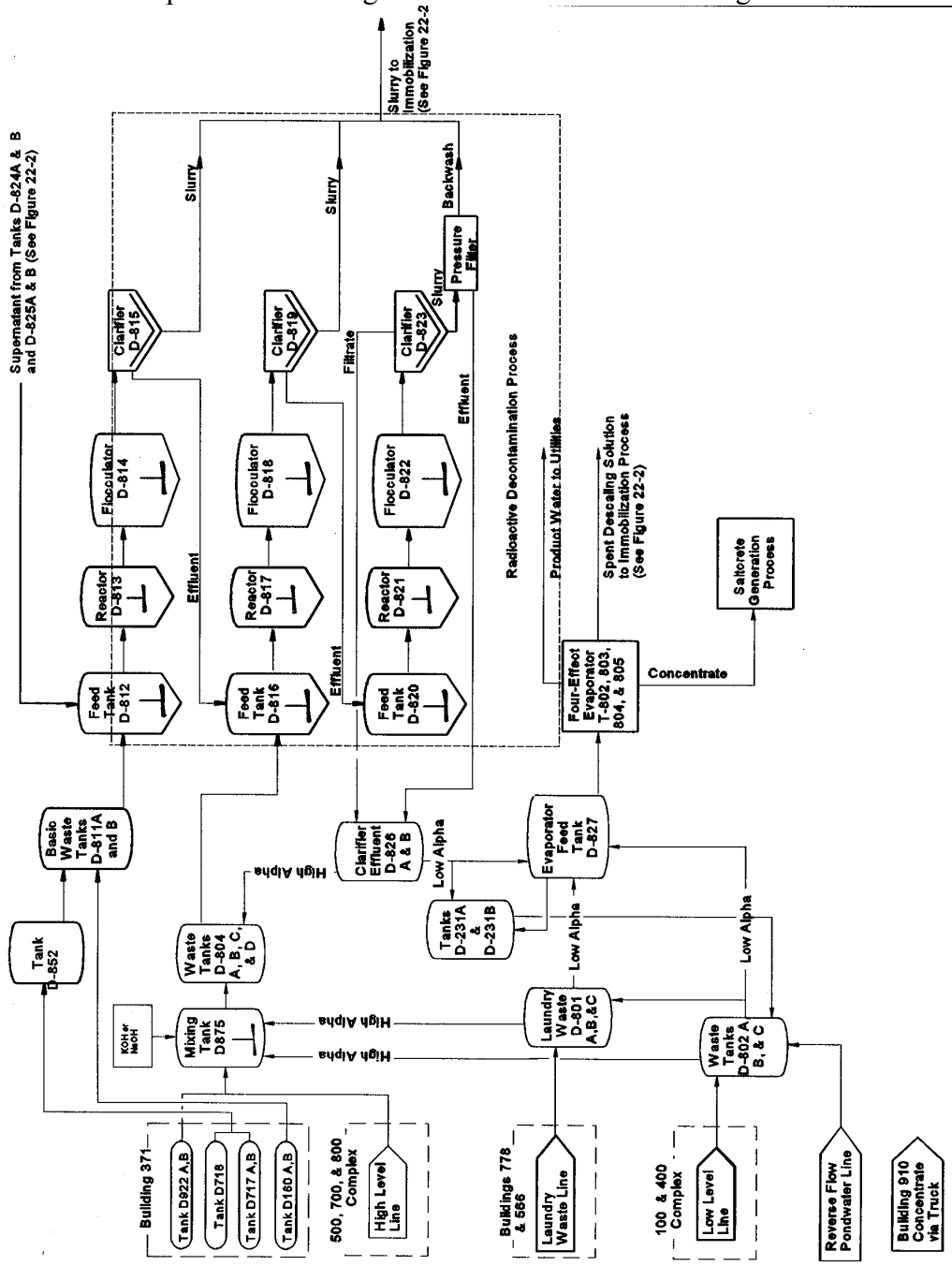

Figure 3-1. Building 374 radioactive decontamination and evaporation processes.

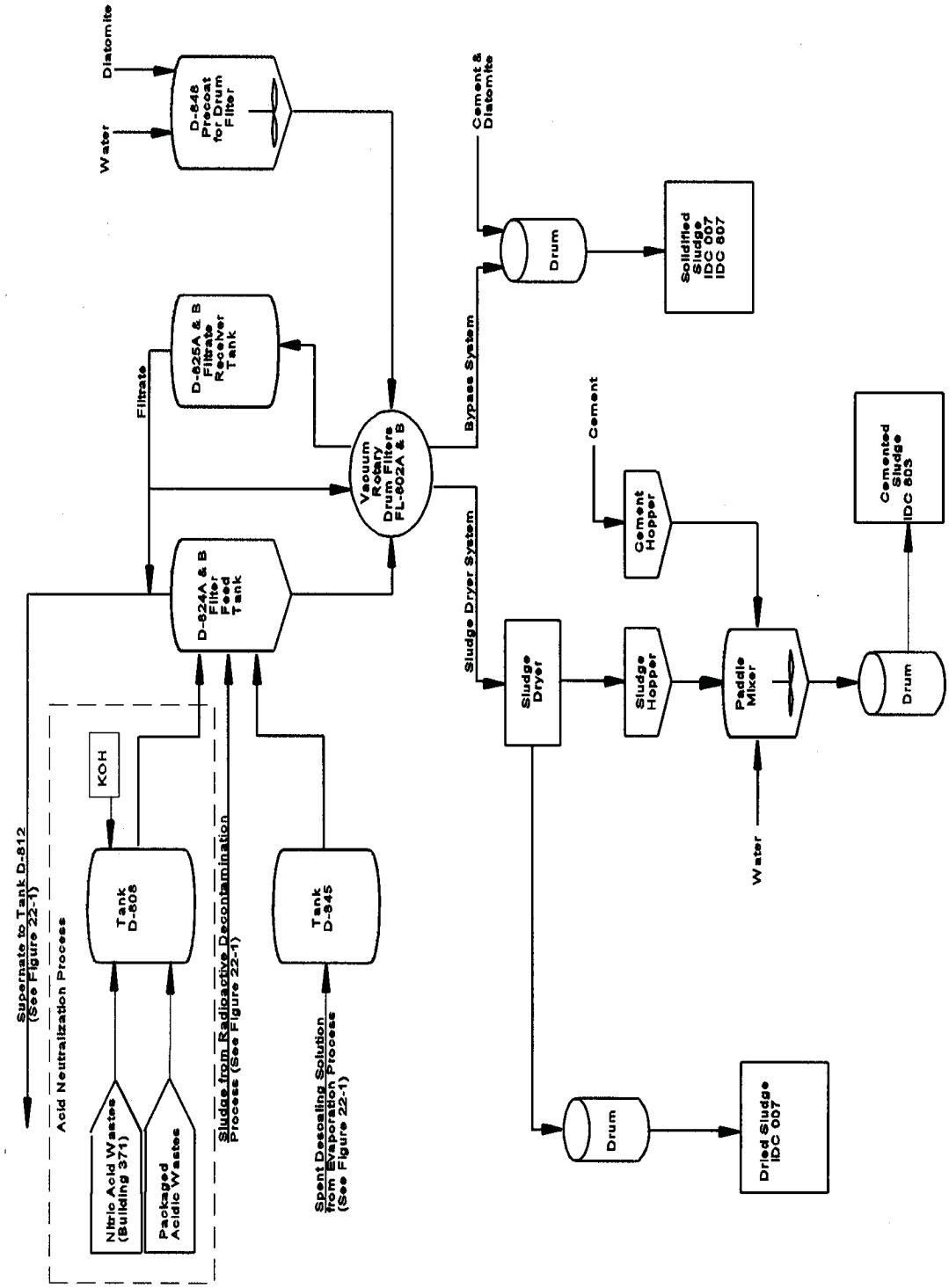

Figure 3-2. Building 374 acid neutralization and sludge immobilization processes.

APPENDIX 7

BN004 SPECIAL SETUPS
WASTE STREAM PROFILE PACKAGE

Date: 10/02/12

B-2012-0203
RECORD
JMC 10/02/12

AMWTP Advanced Mixed Waste Treatment Project	AK Source Document Review Summary	Form-1068, Rev. 4 Effective: 01/08/09 Page 1 of 2

Implementing Document: MP-TRUW-8.13

1. **Source Document Tracking Number:** P609A	2. **Revision:** 7

3. **Category**

- [x] Published Documentation
- [ ] Unpublished Documentation
- [ ] Correspondence
- [ ] Discrepancy

4. **Title/Description Information:** BN004 Special Setups Waste Stream Profile Package, December 28, 2005; Change Notice #1, February 15, 2007; Change Notice #2, April 2, 2008; and Change Notice #3, August 5, 2010.

Document Number: N/A

Revision: N/A

Author: AMWTP CBFO

Date: 12/28/05

5. AK Element	6. Generator Or Waste Type(s)	7. Location in Source Doc.	8. AK Information Summary:
WM3, WM4, WM5, WM6, WM7	RF	all	The WSPF package addresses all of the Waste Management Program (WM) elements by providing either a summary of the information or by identifying references to the documents (e.g. AK baseline and certification procedures) that contain the information; however, only the WM elements that are actually addressed in the package are identified on the Form-1068.
WS1, WS2, WS3, WS4, WS5, WS6, WS7, WS8	RF-004, RF-744, RF-802	AK Summary	AK summary addresses all of the waste stream elements.

9. **Document Summary:**

Characterization information for the waste stream BN004 (special setups generated at Rocky Flats) submitted to and approved by CBFO. This package includes the following documentation:

- CBFO Approval letter of CN #3 for WSPF BN004, 8/5/10
- Change Notice # 3 for WSPF BN004, 7/27/10
- CBFO Approval letter of CN #2 for WSPF BN004, 4/2/08
- Change Notice # 2 for WSPF BN004, 3/27/08
- CBFO Approval letter of CN #1 for WSPF BN004, 2/15/07
- Change Notice # 1 for WSPF BN004, 2/12/07
- CBFO Approval letter for WSP BN004, 12/28/05
- Waste Stream Profile Form-1195, DQO Form-1597, and CIS Form-1598 for BN004, Rev. 0, 12/28/05
- Acceptable Knowledge Summary, RPT-TRUW-59, Rev. 4, 06/27/12
- Waste Stream Profile Form HWN Assignment Worksheet Form-1187 for BN004, 3/30/06
- TRU Waste Management AK Documentation Checklist Form-1067 for BN004, 9/16/10
- LDR Notification – IDCs RF-004, RF-744 and RF-802, Waste Stream BN004
- AMWTP transmittal letter WSP BN004, SPC-087-2005, 12/21/05

Revision 2 reorganized profile package to only contain the latest version of the above documents.
Revision 3 updated record to include Change Notice #1 and revised AK Summary Report (RPT-TRUW-59).
Revision 4 updated record to include revised Form-1067.
Revision 5 updated record to include Change Notice #2 and revised AK Summary Report (RPT-TRUW-59).
Revision 6 updated record to include Change Notice #3 and revised AK Summary Report (RPT-TRUW-59).
Revision 7 updated record to include revised AK Summary Report (RPT-TRUW-59, Rev. 4).

The above documents address all of the Waste Management Program (WM) elements by providing either a summary of the information or by identifying a reference to the document(s) that contain the information. Therefore, the WM elements identified above are for those elements that are actually addressed in the package.

Previous versions are archived in EDMS.

10. Source Document Data Limitations (if any):

None

11. AK Expert:	Julie Collins	Julie Collins	10/2/2012
	Print	Sign	Date

P609A R7

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

AUG - 5

Mr. James Cooper, Acting Deputy Manager
U.S. Department of Energy
Idaho Clean-Up Project
Idaho Operations Office (NE-ID)
1955 Fremont Avenue
Idaho Falls, ID 83401-1222

Subject: Review of Update for the WIPP Operating Record (Change Notice #3) Special Setups Waste (BN004, Rev. 0)

Dear Mr. Cooper:

The Carlsbad Field Office (CBFO) has reviewed the Change Notice Number 3 for Special Setups Waste (BN004, Rev. 0) and concluded that the Change Notice is complete and the waste stream determinations were made in accordance with the applicable procedures and guidance.

The CBFO therefore approves the Change Notice as submitted. Using the methods approved by the Advanced Mixed Waste Treatment Project (AMWTP), AMWTP may enter the data into the certification and shipping modules of the WIPP Waste Information System.

If you have questions on this matter, please contact me at (575) 234-7372.

Sincerely,

Donald C. Gadbury, Director
Office of the National TRU Program

cc:

G. Basabilvazo, CBFO	*ED
C. Gadbury, CBFO	ED
S. McCauslin, CBFO	ED
D. Miehls, CBFO	ED
M. Navarrete, CBFO	ED
K. Watson, CBFO	ED
P. Gilbert, LANL	ED
S. Lott, LANL	ED
G. Lyshik, LANL	ED
CBFO, M&RC	

*ED denotes electronic distribution

CBFO:NTP:NC:GS:10-1468:UFC 5900.00

Update for WIPP Operating Record (Change Notice #3)

Special Setups Waste (BN004, Rev. 0)

Please add the following information to the WIPP Operating Record for Waste Stream Profile Form (WSPF) BN004, Revision 0. This waste stream is Special Setups Waste and was approved by DOE/CBFO on December 28, 2005. Change Notice #1 was approved on February 15, 2007 and Change Notice #2 was approved on April 2, 2008.

This WSPF is being revised. The WSPF Form-1195 and AK Summary components are bolded. The updates are:

1. **WSPF Form-1195, Date of audit report approval by NMED**

   Revise NMED audit dates to include 7/2/2004, 1/9/2009 and 1/8/2010

2. **WSPF Form-1195, Title, version, number, and date of documents use for WAP Certification**

   Update the following procedures:

   Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Rev. 19, 6/30/2010

   Quality Assurance Project Plan, MP-TRUW-8.2, Rev. 13, 6/30/2010

   CCP Transuranic Authorized Methods For Payload Control (CCP CH-TRAMPAC), CCP-PO-003, Rev. 11, 6/4/2009

3. **WSPF Form-1195, Waste Stream Information, WIPP ID**

   Add IN-BN004

4. **WSPF Form-1195, Waste Stream Information, Description from the WTWBIR**

   Change description to:

   See Section 1.2.10 of AK Summary

5. **WSPF Form-1195, Waste Stream Information, Number of Drums**

   Change Number of Drums to 2,302 (55 gallon drums)

6. **AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Acronyms**

Add the following acronyms:

ATWIR	Annual Transuranic Waste Inventory Report
CH-TRAMPAC	Contact Handled Transuranic Waste Authorized Methods for Payload Control
CFR	Code of Federal Regulations
DOE	Department of Energy
EDMS	Electronic Document Management System
HF	hydrofluoric acid
nCi/g	nanocuries per gram
ppm	parts per million
PRQL	program required quantitation limit
RFETS	Rocky Flats Environmental Technology Site
SDA	Subsurface Disposal Area
TSA-RE	Transuranic Storage Area-Retrieval Enclosure
UCL_{90}	90% upper confidence limit
VE	Visual Examination
VOCs	Volatile Organic Compounds
WTS	Waste Tracking System

Also spell out the above acronyms in their first use in the AK Summary, as required.

7. **AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 1.2.3, Waste Stream Volume**

Replace first line with the following:

2,302 55-gallon containers (480 m^3) – current volume [(3)]

8. **AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 1.2.4, Generation Dates**

Change first sentence as follows:

AMWTP stored containers of Rocky Flats Special Setups waste generated from 1968 to 1988. [(66)]

9. **AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 1.2.6, Transuranic Waste Baseline Inventory Report (TWBIR) Information**

Change title to:

Waste Isolation Pilot Plant (WIPP) Waste Stream ID

Change Section 1.2.6 as follows:

Annual Transuranic Waste Inventory Report (ATWIR) Waste Stream ID: IN-BN004 [formerly identified as Transuranic Waste Baseline Inventory Report (TWBIR) Waste Stream ID: IN-W157] [5, 67]

10. AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 1.2.10, Description from the TWBIR

Change title to:

Descriptions from the TWBIR and ATWIR

Replace Section 1.2.10 as follows:

TWBIR waste stream description:

This waste, generated at RF, consists of liquids absorbed on a cement mixture. The liquid wastes were not compatible with aqueous treatment processes and are handled separately due to their plutonium complexing nature. [5]

ATWIR waste stream description:

IN-BN004 (Special Setups) waste was generated from a waste treatment process (predominately laboratory waste) generated in support of plutonium operations at RFETS. Resins and electrochemical milling sludges were also solidified with the liquid waste. This waste stream is comprised of solidified waste assigned IDC ID-RF-004 and ID-RF-802. Special Setups consists of waste >50% by volume inorganic solidified waste. Specifically, small quantities of liquids solidified in large quantities of cement. [a (67)]

a. The description in the Annual Transuranic Waste Inventory Report (ATWIR) will be revised in the next annual update to add IDC RF 744 and revise the waste stream description to "IN-BN004 (Special Setups) waste was generated from treating wastes (predominately laboratory waste) generated in support of plutonium operations at Rocky Flats. Resins and electrochemical milling sludges were also solidified with the liquid waste. This waste stream is comprised of solidified waste assigned IDC ID-RF-004, ID-RF-744 and ID-RF-802."

11. AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 1.3.1, Description

Replace third sentence of first paragraph as follows:

This waste stream is comprised of solidified waste assigned Item Description Codes (IDCs) RF 004, RF 744, and RF 802.

Update for WIPP Operating Record (Change Notice #3)

Special Setups Waste (BN004, Rev. 0)

Replace Table 1-1 as follows:

IDC	WMC	Description
RF 004	S3150	Special Setups Waste – Building 774
RF 744	S3150	Pits 11 and 12 Special Setups
RF 802	S3150	Solidified Laboratory Waste – Building 774

Change second sentence in second paragraph as follows:

A mixture of Portland cement and insulation cement (magnesia cement) was placed in a lined 55-gallon drum and identified with container prefix 744.

Insert following as 3rd paragraph:

Pits 11 and 12 Special Setups (RF 744). RF 744 was assigned by AMWTP to Special Setups containers retrieved from Subsurface Disposal Area (SDA) Pits 11 and 12 and identified with container prefix 744. The process and inputs were the same as waste containers identified as RF 004. The retrieved waste containers were originally generated prior to 1972, shipped to INL and buried in Pits 11 and 12. The waste containers were subsequently retrieved from the pits prior to 1979 and placed in the Transuranic Storage Area-Retrieval Enclosure (TSA-RE).[3]

12. AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 1.5, Prohibited Items

Revise first paragraph as follows:

The following items are prohibited at the WIPP in accordance with Section B-1c of MP-TRUW-8.2, Quality Assurance Project Plan, and Section 3 of MP-TRUW-8.1, Certification Plan for INL Transuranic Waste. [9, 63]

Add the following as the last bullet:

- Sealed containers greater than four liters.

Add the following sentence to the end of the last paragraph:

Non-hazardous solidification agents Aquaset®, Aquaset II-G®, and Micro-Cel® E may be added to the waste by AMWTP to treat liquid in excess of WIPP-WAC limits. [64, 65]

13. AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 1.6.2, Hazardous Determination

Add the following as the third sentence under Ignitability:

Furthermore non-hazardous absorbents (i.e., cement, vermiculite, and Oil-Dri®) were added during packaging for purposes of absorbing liquids. Containers identified with liquid in excess of WIPP-WAC limits may be treated using non-hazardous solidification agents (e.g., Aquaset®, Aquaset II-G®, or Micro-Cel® E) to render the waste acceptable prior to shipment. [64, 65]

Replace the third sentence under Corrosivity with the following:

Furthermore, absorbents (i.e., cement, vermiculite, and Oil-Dri®) were added during packaging for purposes of absorbing liquids. [7, 18, 19, 20, 21] Containers identified with liquid in excess of WIPP-WAC limits may be treated using non-hazardous solidification agents to render the waste acceptable prior to shipment (e.g., Aquaset®, Aquaset II-G®,or Micro-Cel® E). [64, 65]

Add the following sentence under Reactivity, before the last sentence:

Containers identified with compressed gases or aerosol cans will have the prohibited items treated/removed prior to shipment. Containers with liquid in excess of WIPP-WAC limits may be treated with non-hazardous solidification agents to render the waste acceptable prior to shipment (e.g., Aquaset®, Aquaset II-G®, or Micro-Cel® E). [64, 65]

14. AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 1.7, Radionuclides

Delete reference 3 from first sentence.

15. AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 2.1, Waste Packaging

Add the following paragraph to the end of Section 2.1:

Some of the 55-gallon drums may be overpacked into 83- or 85-gallon drums. Either four 55-gallon drums or two 83- or 85-gallon drums, with either the drum lid filters or the drum lids removed, may be direct loaded into an SWB equipped with approved filters.

16. AK Summary for Special Setups Waste (BN004) (RPT-TRUW-59), Section 3, References

Revise the Note as follows:

AMWTP documents such as procedures, AK reports, and operating instructions, are cited without revision numbers or dates. The most recent revisions of these documents are available through the AMWTP Electronic Document Management System. Previous revisions are available on EDMS.

Update for WIPP Operating Record (Change Notice #3)

Special Setups Waste (BN004, Rev. 0)

Revise references as follows:

7. DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, Rev. 6.5, June 30, 2010

61. CCP-PO-003, CCP Transuranic Authorized Methods For Payload Control (CCP CH-TRAMPAC), Central Characterization Project, Rev 11, June 4, 2009

Replace the following references:

3. NDK-001-10, Memo to file, Estimation of Number of Drums for BN004 Waste Stream, July 5, 2010 [C876A]

9. MP-TRUW-8.1, Certification Plan for INL Transuranic Waste

52. INST-OI-34, Non-Facility Visual Examination Operations [P387A]

Add the following references:

64. Material Safety Data Sheets, Aquaset® (sodium montmorillonite)and Aquaset II-G® (sepiolite), Fluid Tech, January 1, 2005 and November 1, 2008 [P881S]

65. Material Safety Data Sheet, Micro-Cel®E, Celite Corporation, January 17, 2007 [P808S]

66. RCM-001-10, Memo to file, Earliest Pack Date for Rocky Flats Waste Retrieved from Pits 11 and 12, July 5, 2010 [C875S]

67. DOE/TRU-2008-3425, Annual Transuranic Waste Inventory Report – 2009 [P838A]

Reason/Justification for the Changes

Item 1. WSPF Form-1195, the audit report approval dates were updated to reflect all audit dates.

Item 2. WSPF Form-1195, the documents used for WAP certification were revised to reflect the most recent revisions.

Items 3, 4, 9, and 10. WSPF Form-1195, TWBIR information was updated to reflect the WIPP ID and description from the most recent annual update of the TWBIR.

Items 5 and 7. WSPF Form-1195 and AK Summary Report Section 1.2.3, Volume was changed to waste stream due to the addition of Special Setups containers retrieved from the SDA Pits 11 and12 and identified with container prefix 744. The retrieved waste containers were originally generated prior to 1972, shipped to INL and buried in Pits 11 and 12. The waste containers were subsequently retrieved from the pits prior to 1979 and placed in the TSA-RE. The Special Setups waste containers retrieved from Pits 11 and 12

were generated from the same process as the waste containers already included in BN004. Therefore, there is no impact on the EPA hazardous waste numbers assigned to waste stream BN004.

Item 6. AK Summary Report Acronym and Abbreviation list was updated to reflect all acronyms and abbreviations used in the report. The text of the AK Summary was also updated to spell out the first use of each acronym.

Item 8. AK Summary Report Section 1.2.4 was changed to reflect an earlier waste generation date due to the addition of the Special Setups waste containers retrieved from Pits 11 and 12.

Item 11. AK Summary Report Section 1.3.1, Section revised to include a description of Special Setups waste containers retrieved from Pits 11 and 12 and assigned RF-744.

Item 12. AK Summary Report Section 1.5, Prohibited Items was changed to address all prohibited WIPP waste in accordance with MP-TRUW-8.1, Certification Plan for INL Transuranic Waste and MP-TRUW-8.2, Quality Assurance Project Plan. The last paragraph was modified to clarify disposition of containers identified as containing prohibited liquid with non-hazardous absorbents.

Item 13. AK Summary Report Section 1.6.2, Language under Ignitability, Corrosivity and Reactivity was changed to support the recent WIPP Permit Modification concerning prohibited liquids.

Item 14. AK Summary Report Section 1.7, Reference 3 no longer applies.

Item 15. AK Summary Report Section 2.1 was changed to add a paragraph describing potential direct loading of containers into SWBs.

Item 16. AK Summary Section 3, References, was changed to update the note to reflect current practices of Document Control and to identify references that support the information revised or updated in the AK Summary.

Update for the WIPP Operating Record (BN004) certification:

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

Signature of Site Project Manager	Printed Name and Title	Date
	Eric P. Schweinsberg, SPM	7/27/10

Washington
TRU Solutions LLC

WRES:08:143
UFC:5822.00

April 2, 2008

Mr. Richard Provencher, Deputy Manager
U.S. Department of Energy
Idaho Clean-up Project
Idaho Operations Office (NE.ID)
1955 Fremont Avenue
Idaho Falls, ID 83401-1222

Subject: UPDATE FOR WIPP OPERATING RECORD (CHANGE NOTICE #2) SPECIAL SETUPS WASTE (BN004, REV. 0)

Dear Mr. Provencher:

Washington TRU Solutions LLC, on behalf of the Permittees, has approved the Change Notice Number 2 for Advanced Mixed Waste Treatment Project (AMWTP) Waste Stream Profile Form (WSPF) BN004, Rev. 0, Special Setups Waste. We have concluded that the WSPF is complete and that the waste stream determination was made in accordance with applicable procedures and guidance.

We therefore approve the Change Notice as submitted. Using the methods approved at AMWTP, AMWTP may enter the data into the certification and shipping modules of the WIPP Waste Information System.

If you have any questions on this matter, please contact me at (505) 234-7545.

Sincerely,

W. M. Wierzbicki, Manager
Regulatory Compliance

KSG:ks

Enclosure

P.O. Box 2078 • Carlsbad, New Mexico USA 88221-2078
Phone: (575) 234-7200 • Fax: (575) 234-7083

Update for WIPP Operating Record (Change Notice # 2)

Special Setups Waste (BN004, Rev. 0)

Please add the following information to the WIPP Operating Record for Waste Stream Profile Form (WSPF) BN004, Revision 0. This waste stream is Special Setups Waste and was approved by DOE/CBFO on December 28, 2005. Change Notice #1 was approved on February 15, 2007.

This WSPF is being revised. The WSPF Form-1195 and AK Summary components are bolded. The updates are:

1. **WSPF Form-1195, Date of audit report approval by NMED**

   Add additional audit approval date January 18, 2008.

2. **WSPF Form-1195, Title, version, number, and date of documents use for WAP Certification**

   Update the following procedures:

   Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Rev. 14, 12/27/07.

   Quality Assurance Project Plan, MP-TRUW-8.2, Rev. 10, 10/25/07.

   Delete the following procedure:

   Contact-Handled Transuranic Waste Authorized Methods for Payload Control, MP-TRUW-8.3, Rev. 6, 07/01/06

   Add the following procedure:

   CCP Transuranic Authorized Methods For Payload Control (CCP CH-TRAMPAC), CCP-PO-003, Rev. 10, 11/16/06.

3. **AK Summary, Special Setups Waste (RPT-TRUW-59), Report Number**

   Revise report number from AMWTP-RPT-TRUW-59 to RPT-TRUW-59.

4. **AK Summary, Special Setups waste (RPT-TRUW-59), Section 1.2.6, Transuranic Waste Baseline Inventory Report (TWBIR) Information**

   Revise the TWBIR number to IN-W157.144

5. **AK Summary, Special Setups waste (RPT-TRUW-59), Section 1.3.1, Description**

   Revise the TWBIR number in Table 1-1 to IN-W157.144

6. AK Summary, Special Setups waste (RPT-TRUW-59), Section 1.5, Prohibited Items

Add the following bullets to the first paragraph:

- Waste that has ever been managed as high-level waste and waste from tanks specified in Table B-8 of MP-TRUW-8.2, Quality Assurance Plan, unless specifically approved through a Class 3 permit modification. [63]

- Any waste container from a waste stream (or waste stream lot) that has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment, as describe in Attachment B7 of MP-TRUW-8.2, Quality Assurance Project Plan. [63]

Revise the first paragraph after the bullets to read:

The absence of prohibited items is determined and documented through acceptable knowledge (AK) and characterization activities. Real-time radiography (RTR) or visual examination (VE) is performed on each container in this waste stream to verify the absence of prohibited items. [51, 52] Containers that are identified as containing prohibited items during RTR or Visual Examination (VE) are treated or rejected, as appropriate. Drums containing prohibited items will not be shipped to WIPP.

7. AK Summary, Special Setups Waste (RPT-TRUW-59), Section 2.2, Flammability Considerations

Revise last sentence as follows:

Payloads containing flammable VOCs are managed in accordance with CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC). [61]

8. AK Summary, Special Setups Waste (RPT-TRUW-59), Section 3, References

Revise the following references:

5. DOE/TRU-2006-3344, Transuranic Waste Baseline Inventory Report 2004, U. S. Department of Energy

7. DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, October 29, 2007

Add the following references:

60. Interim Guidance on Ensuring that Waste Qualifies for Disposal at the Waste Isolation Pilot Plant [P203A]

61. CCP-PO-003, CCP Transuranic Authorized Methods For Payload Control (CCP CH-TRAMPAC), Central Characterization Project, Rev. 10, November 16, 2006

Update for WIPP Operating Record (Change Notice # 2)

Special Setups Waste (BN004, Rev. 0)

62. RPT-TRUW-05, Waste Matrix Code Reference Manual [P399A]

63. MP-TRUW-8.2, Quality Assurance Project Plan (QAPjP)

Reason/Justification for the Changes

The audit report approval dates were updated to reflect the most recent approval date.

The documents used for WAP certification were revised to reflect the most recent revisions and to identify new TRAMPAC procedure required to support change in shipping contractor at AMWTP.

The AK Summary report number was changed to reflect changes in document control protocols.

AK Summary Section 1.2.6, Transuranic Waste Baseline Inventory Report (TWBIR) Information, was changed to update the TWBIR number to reflect the current TWBIR.

AK Summary, Special Setups waste (RPT-TRUW-59), Section 1.3.1, Description, was changed to update the TWBIR number to reflect the current TWBIR.

AK Summary Section 1.5, Prohibited Items, was changed to add two prohibited items to reflect the requirements of the updated Quality Assurance Project Plan, MP-TRUW-8.2, Section B-1c and to incorporate a variety of approved treatment methods.

AK Summary Section 2.2, Flammability Consideration, was updated to reflect new TRAMPAC procedure.

AK Summary Section 3, References, was updated to identify references that support the information revised or updated in the AK Summary.

Update for the WIPP Operating Record (BN004) certification:
I hereby certify that I have reviewed this Update for WIPP Operating Record, and it is complete and accurate to the best of my knowledge. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature of Site Project Manager	Printed Name and Title	Date
	Eric P. Schweinsberg, SPM	3/27/08

Washington
TRU Solutions LLC

WRES:07:032
UFC:5822.00

February 15, 2007

Mr. Richard Provencher, Deputy Manager
U.S. Department of Energy
Idaho Clean-up Project
Idaho Operations Office (NE.ID)
1955 Fremont Avenue
Idaho Falls, ID 83401-1222

Subject: UPDATE FOR WIPP OPERATING RECORD (CHANGE NOTICE #1) SPECIAL SETUPS WASTE (BN004, REV. 0)

Dear Mr. Provencher:

Washington TRU Solutions, on behalf of the Permittees, has approved the Change Notice Number 1 for Advanced Mixed Waste Treatment Project (AMWTP) Waste Stream Profile Form (WSPF) BN004, Rev. 0, Special Setups Waste. We have concluded that the WSPF is complete and that the waste stream determination was made in accordance with applicable procedures and guidance.

We therefore approve the Change Notice as submitted. Using the methods approved at AMWTP, AMWTP may enter the data into the certification and shipping modules of the WIPP Waste Information System.

If you have any questions on this matter, please contact me at (505) 234-7545.

Sincerely,

W. M. Wierzbicki, Manager
Regulatory Compliance

WMW:ks

Enclosure

P.O. Box 2078 • Carlsbad, New Mexico USA 88221-2078
Phone: (505) 234-7200 • Fax: (505) 234-7083

Update for WIPP Operating Record (Change Notice # 1)

Special Setups Waste (BN004, Rev. 0)

Please add the following information to the WIPP Operating Record for Waste Stream Profile Form (WSPF) BN004, Revision, 0. This waste stream is Special Setups Waste and was approved by DOE/CBFO on December 28, 2005.

This WSPF is being revised. The WSPF Form-1195 and AK Summary components are bolded. The updates are:

1. **WSPF Form-1195, Date of audit report approval by NMED**

   Delete audit approval dates 7/03/04 and 10/25/05 and add additional audit approval dates 4/1/05, 12/9/05, and 1/23/07.

2. **WSPF Form-1195, Title, version, number, and date of documents use for WAP Certification**

   Update the following procedures:

   Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Rev. 12, 1/24/07

   MP-TRUW-8.3, Contact-Handled Transuranic Waste Authorized Methods for Payload Control, Rev. 6, 7/01/06

   MP-TRUW-8.2, Quality Assurance Project Plan, Rev. 8, 1/24/07

3. **WSPF Form-1195, Required Waste Stream Information, new item entitled Waste material parameter weight estimates per unit of waste**

   Add the new item: See Section 1.4.5, Table 1-3 of the AK summary. This is listed as Item 5 in the Change Notice.

4. **AK Summary, Special Setups Waste (AMWTP-RPT-TRUW-59), TABLES**

   Revise Table of Contents per the following:

   Delete Table 1-3 Estimated percentage of various materials in BN004

   Change Table 1-4 Waste material parameters for Special Setups waste (BN004) to Table 1-3 Estimated waste material parameter weights per unit of waste for Special Setups waste (BN004)

5. **AK Summary, Special Setups waste (AMWTP-RPT-TRUW-59), Section 1.4, Process Description**

   Section 1.4.4, Material Inputs; delete last paragraph and delete Table 1-3

   Delete Section 1.4.5 and Table 1-4.

Update for WIPP Operating Record (Change Notice # 1)

Special Setups Waste (BN004, Rev. 0)

Add Section 1.4.5 Waste Material Parameters:

1.4.5 Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for BN004, waste material parameter data from 100% of the completed RTR and VE of Special Setups waste drums were obtained from the AMWTP Waste Tracking System (WTS) database on October 11, 2006. This represents 49% of the estimated number of drums for this waste stream. The Special Setups waste was generated at RF from 1971 through 1988. Drums evaluated to estimate the WMP weights per unit of waste were generated from 1972 through 1988. Approximately 3% of the waste was generated prior to 1972. AK indicates that the waste generated in 1971 is similar to the wastes that have undergone RTR and VE. Therefore, the WTS data is representative of the waste stream. WTS is AMWTP's comprehensive, DOE-audited waste tracking database in which all waste containers are tracked cradle-to-grave and all related characterization data are stored. A statistical analysis of the RTR and VE data was performed to estimate WMP weights (by percent) for Special Setups waste, excluding packaging, in accordance with the requirements of MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation, and are summarized in Table 1-3. [50, 57, 58, 59]

Table 1-3. Estimated waste material parameter weights per unit of waste for Special Setups waste (BN004).

Waste Material Parameters	Weight per Unit Waste by Percent
Iron-based Metals/Alloys	<1
Aluminum-based Metals/Alloys	<1
Inorganic matrix	99
Other Inorganic Materials	<1
Cellulosics	<1
Plastics (waste materials)	<1
Rubber	<1

Although individual drums in this waste stream may contain other homogenous solid waste and debris materials, the waste stream as a whole will be greater than 50%, by volume, inorganic solidified homogeneous solids [2, 50]

6. **AK Summary, Special Setups Waste (AMWTP-RPT-TRUW-59), Section 2, Shipping Considerations**

Section 2.2 Flammability Considerations, change to read as follows:

The payload containers in the waste stream must comply with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with

the flammable gas limits will be performed for volatile organic compounds (VOCs), hydrogen, and methane. Headspace gas sampling and analysis is performed when required by the WAP and/or CH-TRAMPAC. At a minimum, the headspace gas analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with headspace gas results exceeding 500 ppm flammable VOCs, are evaluated for compliance with applicable CH-TRAMPAC requirements prior to shipment. Payloads containing flammable gases are managed in accordance with MP-TRUW-8.3, Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC).

7. **AK Summary, Special Setups Waste (AMWTP-RPT-TRUW-59), Section 3, References**

Update reference number 50 to Memorandum to File from Tim Venneman, "Waste Material Parameter Weight Calculations and Supporting Data to Determine Waste Material Parameter Weight per Unit of Waste." TV-001-07, January 19, 2007. (C534A)

Add the following as reference number 57: MP-TRUW-8.13, Collection, Review and Management of Acceptable Knowledge Documentation, Rev. 15, January 2007.

Add the following as reference number 58: BBWI-Generated Drum Data, including Data from the Transuranic Waste Management Information System (TWMIS). (U127A)

Add the following as reference number 59: AMWTP-RPT-TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant, Rev. 0, August 2006. (P469A)

Reason/Justification for the Change

The NMED audit report approval dates were revised and updated to reflect the approval dates for audits conducted subsequent to the WSPF submittal and to delete the approval dates for non-S3000 audits or recertification (i.e., 7/2/04 was the approval date for the HSG system and 10/25/05 is a recertification date for S3000).

Documents used for WAP certification were revised to reflect the most recent revisions.

New item entitled waste material parameter weight estimates per unit of waste was added to WSPF Form 1195 as required by MP-TRUW-8.2, Quality Assurance Project Plan, Section B3-12b.

Table of Contents for the AK Summary was revised to accommodate changes required by the revised WIPP Hazardous Waste Facility Permit requirements as described in MP-TRUW-8.2, Quality Assurance Project Plan, Section B3-12b.

Table 1-3 and last paragraph were deleted from Section 1.4.4 of the AK Summary because cellulosic, plastic, and rubber information was incorporated into Section 1.4.5, Waste Material Parameters.

Update for WIPP Operating Record (Change Notice # 1)

Special Setups Waste (BN004, Rev. 0)

Waste material parameter weight estimates per unit of waste and method for determining those estimates have been incorporated into Section 1.4.5 and Table 1-3 of the AK Summary to meet the revised WIPP Hazardous Waste Facility Permit requirements as described in MP-TRUW-8.2, Quality Assurance Project Plan, Section B3-12b.

Flammability consideration was changed to clarify the method used for determining flammability as described in MP-TRUW-8.2, Quality Assurance Project Plan, Section B3-11a.

Special Setups Waste (BN004) AK Summary reference list was updated to identify references that support the information revised or updated in the AK Summary.

Update for the WIPP Operating Record (BN004) certification:
I hereby certify that I have reviewed this Update for WIPP Operating Record, and it is complete and accurate to the best of my knowledge. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature of Site Project Manager	Printed Name and Title	Date
Eric P. Schweinsberg	Eric P Schweinsberg, SPM	2/12/07

Washington
TRU Solutions LLC

WRES:05:183
UFC:5822.00

December 28, 2005

Mr. Richard Provencher, Deputy Manager
U.S. Department of Energy
Idaho Clean-up Project
Idaho Operations Office (NE.ID)
1955 Fremont Avenue
Idaho Falls, ID 83401-1222

Subject: TRANSMITTAL OF APPROVED ADVANCED MIXED WASTE TREATMENT PROJECT WASTE STREAM PROFILE FORM NUMBER BN004, SPECIAL SETUPS WASTE

Dear Mr. Provencher:

Washington TRU Solutions LLC, on behalf of the Permittees, has evaluated the Advanced Mixed Waste Treatment Project (AMWTP) Waste Stream Profile Form (WSPF) BN004, Special Setups Waste. We have concluded that the WSPF is complete and that the waste stream determination was made in accordance with applicable procedures and guidance.

The Permittees therefore approve the WSPF as submitted. Using the methods approved at AMWTP, the AMWTP may enter the data into the certification and shipping modules of the WIPP Waste Information System.

If you have any questions, please contact me at (505) 234-7545 or (505) 706-0055.

Sincerely,

Rick Chug for

D. T. Bignell, Manager
Regulatory Compliance

DTB:rdr

P.O. Box 2078 • Carlsbad, New Mexico USA 88221-2078
Phone: (505) 234-7200 • Fax: (505) 234-7083

cc:	F. Marcinowski, DOE HQ	*ED
	A. Holland, CBFO	ED
	R. McCallister, CBFO	ED
	M. Navarrete, CBFO	ED
	K. Watson, CBFO	ED
	G. Girard, DOE-ID	ED
	J. Ziemianski, DOE-ID	ED
	B. Edgerton, DOE-ID	ED
	T. Jenkins, DOE-ID	ED
	C. Maggart, DOE-ID	ED
	J. Medema, DOE-ID	ED
	J. Wells, DOE-ID	ED
	E. Schweinsberg, BNG	ED
	S. Carpenter, AMWTP	ED
	R. Chatfield, WTS	ED
	D. Hofer, WTS	ED
	G. Johnson, WTS	ED
	D Kump, WTS	ED
	D. Speed, WTS	ED
	D. Standiford, WTS	ED
	M. Strum, WTS	ED
	R. Chavez, WRES	ED
	R. Kehrman, WRES	ED
	R. Reeves, WRES	ED
	V. Waldram, LANL	ED
	P. Gilbert, LANL	ED
	CBFO M&RC	

*ED denotes Electronic Distribution

WASTE STREAM PROFILE FORM

Waste Stream Profile Number: BN004, Rev. 0

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 of Audit report approval by NMED: 12/23/03, 7/03/04, 10/25/05

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

Certification Plan for INEEL Contact-Handled (CH-TRU) Transuranic Waste, MP-TRUW-8.1, Rev. 9, 6/15/05
Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC), MP-TRUW-8.3, Rev. 4, 7/13/05
Quality Assurance Project Plan (QAPjP), MP-TRUW-8.2, Rev. 5, 6/15/05

Did your facility generate this waste? ☐Yes ☒No If no, provide the name and EPA ID of the original generator:
Rocky Flats Environmental Technology Site, CO7890010526

Waste Stream Information[1]

WIPP ID: IN-W157

Summary Category Group: S3000

Waste Matrix Code Group: Solidified Inorganics

Waste Stream Name: Special Setups Waste

Description from the WTWBIR: This waste, generated at Rocky Flats Plant, consists of liquids absorbed on a cement mixture. The liquid wastes were not compatible with the aqueous treatment processes and were handled separately due to their plutonium complexing nature.

Defense TRU Waste: (Ref. 1) ☒Yes ☐No Check One: ☒CH ☐RH

Number of SWBs 0 Number of Drums 2,102 (55 gallon drums) Number of Canisters 0

Batch Data report numbers supporting this waste stream characterization: See Characterization Information Summary, Table 5

List applicable EPA Hazardous Waste Codes:[2] D006, D007, D008, D011, D029, F001, F002, F005, F006, F007 and F009

Applicable TRUCON Content Codes: ID111/ID211

Acceptable Knowledge Information[1]

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

Required Program Information

Map of site: See Reference List, No. 1, Section 3, Figure 3-1; No. 2

Facility mission description: See Reference List No. 1, Section 3.1, and No. 3

Description of operations that generate waste: See Reference List, No. 1 Sections 24, and No. 9

Waste identification/categorization schemes: See Reference List, No. 4

Types and quantities of waste generated: See Reference List, No. 1 Section 24, Nos. 3, 5, and 6

Correlation of waste streams generated from the same building and process, as appropriate: See Reference List, No. 1

Waste certification procedures: See Reference List, Nos. 7 and No. 8

Required Waste Stream Information

Area(s) and building(s) from which the waste stream was generated: See Reference List, Nos. 1 Section 24 and 9

Waste stream volume and time period of generation: See Reference List, No.s. 1 Section 24 and 9

Waste generating process description for each building: See Reference List, Nos. 1 Section 24 and 9

Process flow diagrams: See Reference List, No. 9 Section 1.4.2 for list of references for the process flow diagrams

Material inputs or other information identifying chemical/radionuclide content and physical waste form: See Reference List, No. 9

AMWTP Advanced Mixed Waste Treatment Project	Waste Stream Profile Form HWN Assignment Worksheet	AMWTP Form-1195 Rev. 2 Effective Date: 11/30/04 MP-TRUW-8.14 Page 2 of 4

Which Defense Activity generated the waste: (check one)

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

Supplemental Documentation See Reference List, No. 1

Process design documents: See Reference List, No. 1

Standard operating procedures: See Reference List, No. 1

Safety Analysis Reports: See Reference List, No. 1

Waste packaging logs: See Reference List, No. 1

Test plans/research project reports: See Reference List, No. 1

Site databases: See Reference List, No. 1

Information from site personnel: See Reference List, No. 1

Standard industry documents: See Reference List, No. 1

Previous analytical data: See Reference List, No. 1

Material safety data sheets: See Reference List, No. 1

Sampling and analysis data from comparable/surrogate Waste: See Reference List, No. 1

Laboratory notebooks: See Reference List, No. 1

Sampling and Analysis Information

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

Radiography: See Reference List, No. 10

Visual Examination: See Reference List, No. 11

Headspace Gas Analysis

VOCs: See Reference List, Nos. 12 and 21

Flammable: See Reference List, Nos. 12 and 21

Other gases (specify): N/A

Homogeneous Solids/Soils/Gravel Sample Analysis *(See Reference List for Dates)*

Total metals: See Reference List, Nos. 13, 14, 15, and 20

PCBs: N/A

VOCs: See Reference List, Nos. 16 and 20

Nonhalogenated VOCs: See Reference List, Nos. 17 and 20

Semi-VOCs: See Reference List, Nos. 18, 19 and 20

Other (specify): N/A

Waste Stream Profile Form Certification:

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

R A Eschenbaum for EPS per telefax	12/28/05 Eric P Scheweitsberg	12/28/05
Signature of Site Project Manager	Printed Name and Title	Date

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

(2) If radiography, visual examination, headspace gas analysis, and/or homogeneous solids/soils/gravel sample analysis were used to determine EPA Hazardous Waste Codes, attach signed Characterization Information Summary documenting this determination.

Waste Stream Profile Continuation Sheet

Reference List

1. Acceptable Knowledge Document for INEEL Stored Transuranic Waste – Rocky Flats Plant Waste, INEL-96/0280, Rev. 3, February 28, 2003. (P368A)
2. Site Plan of the Advanced Mixed Waste Treatment Facility, DWG-5232-52-0101, Rev. 0, April 1999.
3. AMWTP TRU Waste Management Acceptable Knowledge Elements, AMWTP-RPT-TRUW-06, Rev. 4, August 2005.
4. AMWTP Waste Stream Designations, AMWTP-RPT-TRUW-12, Rev. 5, November 2005.
5. Estimated Earthen and Geofabric Covered TRU Waste Inventory in the TSA at Radioactive Waste Management Complex (RWMC), RWMC EDF-837, August 1995.
6. Container Inventory Report for WMF-629 thru WMF-633 (TRIPS query), December 2002.
7. Certification Plan for INEEL Contact-Handled Transuranic Waste, MP-TRUW-8.1, Rev. 9, June 2005.
8. Advanced Mixed Waste Treatment Project TRU Waste Certification, MP-TRUW-8.5, Rev. 16, December 2005.
9. Acceptable Knowledge Summary for Special Setups Waste, AMWTP-RPT-TRUW-59, Rev. 0, December 2005.
10. Real Time Radiography Operations, INST-OI-12, Rev. 23, August 2005.
11. Visual Examination Operating Procedures and Data Reporting, INST-OI-34, Rev. 12, October 2005.
12. Drum Vent/Headspace Gas Sample Operations, INST-OI-13, Rev. 20, March 2005.
13. Microwave Assisted Digestion of Homogeneous Solids, Soil and Gravel, INEEL Analytical Laboratories Department, Analytical Chemistry Methods Manual, ACMM-8909, Rev. 9, January 2005
14. Determination of Mercury by CVAA for TRU Waste Characterization, INEEL Analytical Laboratories Department, Analytical Chemistry Methods Manual, ACNMM-2810, Rev. 3, January 2005
15. Determination of Metals by ICP-AES for TRU Waste Characterization, INEEL Analytical Laboratories Department, Analytical Chemistry Methods Manual, ACNMM-2901, Rev. 3, January 2005
16. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, INEEL Analytical Laboratories Department, Analytical Chemistry Methods Manual, ACNMM-9260, Rev. 14, December 2005
17. Determination of Nonhalogenated Volatile Organics by Gas Chromatography, INEEL Analytical Laboratories Department, Analytical Chemistry Methods Manual, ACNMM-9441, Rev. 11, December 2004
18. Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, INEEL Analytical Laboratories Department, Analytical Chemistry Methods Manual, ACNMM-9270, Rev. 8, January 2005

Waste Stream Profile Continuation Sheet

19. Sample Preparation for Semi-Volatile Organic Compounds and Polychlorinated Biphenyls, INEEL Analytical Laboratories Department, Analytical Chemistry Methods Manual, ACNMM-9500, Rev. 11, December 2004

20. RCRA Statistical Sampling, MP-TRUW-8.25, Rev. 11, October 2005.

21. HGAS Sampling and Analysis Operations, INST-OI-43, Rev. 12, September 2005.

22. Waste Isolation Pilot Plant Hazardous Waste Facility Permit, New Mexico Environment Department, NM4890139088-TSDF, October 2005.

23. Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, U. S. Department of Energy, Carlsbad Field Office, Waste Isolation Pilot Plant, DOE/WIPP 02-3122, Rev. 3, April 2005.

24. AMWTP Memorandum, Sampling Plan for BN004 – Lot 1-SPC-069-2005, October 2005.

25. Drum Coring Operations, INST-OI-16, Rev. 20, October 2005.

Characterization Information Summary

Introduction

Advanced Mixed Waste Treatment Project (AMWTP) has compiled Acceptable Knowledge (AK) information for waste stream BN004 as required by the Waste Isolation Pilot Plant (WIPP) Waste Analysis Plan (WAP) and the Contact-Handled Transuranic Waste Acceptance Criteria (CH-WAC).[22, 23] In addition, AMWTP has conducted confirmatory testing and analysis using real time radiography (RTR) or visual examination (VE), headspace gas sampling and analysis, solid sampling and analysis, and radioassay.

This Characterization Information Summary (CIS) presents the analytical data from five containers for the total solids analysis and 18 other containers for headspace gas analysis. The headspace analytical data associated with the five containers that were solid sampled were not included in the headspace gas analysis. These data meet the necessary requirements for confirmatory characterization. Headspace gas analysis from the 18 containers is presented in Tables 1A and 1B. Solid sampling data from five containers is summarized in Tables 2, 3A, 3B, 4A, and 4B. Table 5 lists the correlation of container numbers to characterization data packages. Table 6 presents the RTR/VE summary of prohibited items and AK confirmation. Table 7 presents the correlation between the container number, the headspace gas sample number, and the solid sample numbers.

Solid sampling was performed on randomly selected containers obtained from BN004–Lot 1, Special Setups Waste from the Rocky Flats Plant. BN004–Lot 1 consists of 870 drums of mixed-transuranic waste.

Data Results

The data in this CIS are obtained from the required ("n") samples from solid sampling and analysis. The data is used to determine the mean concentrations and the 90% upper confidence level (UCL_{90}) for toxicity characteristic compounds and to assign and/or confirm hazardous waste numbers (HWNs) for the BN004 waste stream.

The statistical evaluation of the analytical data collected for BN004-Lot 1 is presented in Tables 1A, 2A, 3A, and 4A. Table 5 lists the correlation of container number to solids analysis data packages.

HWNs assigned by AK are applied to the waste stream even if headspace gas analytical results and solid sampling analytical results for the assigned compounds are not above the program required quantitation limit (PRQL). There were no solids sampling UCL_{90} results above the PRQLs for toxicity characteristic metals. The solid sampling results and HSG sampling results for VOCs reflected the UCL_{90} for methanol above the PRQL. However, the waste stream was determined not to be ignitable; therefore, the D001 and F003 HWNs were not applied. There were no other VOC analytes with UCL_{90} values above the PRQL for either the HSG or solid sampling results. AK data indicate that there are no semi-volatile organic compounds (SVOCs)

Characterization Information Summary

present in the waste, and there were no solid sampling results above the PRQL for SVOCs. The HWN assignment for this waste stream includes:

- Toxicity characteristic metals – D006 (cadmium), D007 (chromium), D008 (lead), and D011 (silver)
- Toxicity characteristic organics – D029 (1,1-dichloroethylene)
- Listed codes for organics – F001 and F002 (1,1,1- trichloroethane, trichloroethylene, tetrachloroethylene, and 1,1,2-trichloro-1,2,2-trifluoroethane), F001 (carbon tetrachloride), F002 (methylene chloride), F005 (benzene, methyl ethyl ketone and toluene)
- Listed codes from electroplating operations – F006, F007, and F009 (spent cyanide electroplating wastes)

Solid sampling results and headspace gas results confirm AK. No additional EPA HWNs are required. One constituent (ethanol, CAS No. 64-17-05) was detected as VOC tentatively identified compounds (TICs) in over 25 percent of the headspace confirmatory samples collected; however, this constituent is not listed in 40 CFR 261, Appendix VIII and thus will not be added as a target analyte for this waste stream.

AMWTP Advanced Mixed Waste Treatment Project	Reconciliation with Data Quality Objectives	AMWTP Form-1597 Rev. 0 MP-TRUW-8.11 Effective Date: 12/06/04 Page 1 of 1

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

WSPF# BN004-Lot 1 Reconciliation

Data Quality Objective	Yes	No	N/A	Comment
1. Have all containers in the lot been assigned an appropriate Waste Matrix Code?	✓			
2. Have waste material parameter weights been established for each container in the lot?	✓			
3. Does each container of waste contain TRU radioactive waste?	✓			
4. Have mean concentrations, UCL_{90} values for the mean concentration, standard deviations, and the number of samples collected for each VOC in the headspace gas of waste containers in the waste stream lot been evaluated against the constituent hazardous waste number assignments?	✓			
5. Has the potential flammability of TRU waste headspace gases been evaluated for the lot?	✓			Containers will be evaluated on an individual basis using headspace gas analysis and WWIS.
6. Have mean concentrations, UCL_{90} for the mean concentrations, standard deviations, and number of samples collected for VOCs, SVOCs, and metals in the waste stream (if applicable) lot been evaluated against the constituent hazardous waste number assignments?	✓			
7. Does the waste stream exhibit a toxicity characteristic (TC) under 40 CFR Part 261, Subpart C?	✓			
8. Can the waste stream be classified as hazardous or nonhazardous at the 90-percent confidence level?	✓			
9. Have a sufficient number of waste containers been visually examined (as a QC check on radiography) to determine with a reasonable level of certainty that the UCL_{90} for the miscertification rate is less than 14 percent for the summary category group?	✓			
10. Was an appropriate packaging configuration and Drum Age Criteria (DAC) applied and documented in the headspace gas sampling documentation and was the drum age criteria met prior to sampling?	✓			
11. Have all TICs been appropriately identified and reported in accordance with the requirements of Section B3-1 for the lot?	✓			
12. Have the overall completeness, comparability, and representativeness QAOs been met for each of the analytical and testing procedures as specified in Sections B3-2 through B3-9 for the lot?	✓			
13. Have the PRQLs for all analyses been met for the lot?	✓			

12/28/05

Signature of Site Project Manager — Printed Name: Eric P Schweinsberg — Date: 12/28/05

for EPS per telecon

AMWTP Advanced Mixed Waste Treatment Project	Characterization Information Summary Report	AMWTP Form-1598 Rev. 0 MP-TRUW-8.14 Effective Date: 11/30/04 Page 1 of 17

WSPF Number: BN004, Rev. 0, (Lot 1)

SQAO [signature] Date: 12/28/05

SQAO signature indicates that the information presented in this package is consistent with analytical batch reports.

SPM RAEschenbach for EPS for [signature] Date: 12/28/05 12/28/05

SPM signature indicates concurrence with all information presented in this report.

telecon

Characterization Description:

Drum selection and quantity of drums for Totals Analysis, Reduced Headspace Gas Sampling, and/or Newly Generated Soils/Gravel have been evaluated and meet the requirements established in MP-TRUW-8.25, *RCRA Statistical Sampling*.[20]

Y ☒ N☐ NA ☐

R Eschenbaum for EPS per telecon — 12/28/05

SPM Signature — Date

For "N" or "NA" provide rationale.

Table 1A. Headspace Gas Summary Data. BN004-Lot 1

ANALYTE	Number of Samples	# of Samples above MDL [a]	Trans-formation Used [c]	Maxi-mum (ppmv)	Mean (ppmv)	Standard Deviation (ppmv)	Upper 90 % confidence limit (ppmv)	Trans-formed PRQL	PRQL (ppmv)	EPA Code
1,1-Dichloroethane [c]	18	2	Natural log	2.14	0.35	0.81	0.60	2.30	10	N/A
1,1-Dichloroethylene [c]	18	4	Natural log	2.48	0.87	0.68	1.08	2.30	10	D029 [d]
1,1,1-Trichloroethane [c]	18	9	Natural log	4.14	1.65	1.53	2.13	2.30	10	F001, F002 [d]
1,1,2-Trichloro-1,2,2-trifluoroethane	18	0	None	2.35	1.72	0.46	b	-	10	F001, F002 [d]
1,1,2,2-Tetrachloroethane	18	0	None	2.35	1.18	0.85	b	-	10	N/A
1,2-Dichloroethane	18	0	None	2.35	1.35	0.73	b	-	10	N/A
1,2,4-Trimethylbenzene [f]	18	0	None	2.35	1.18	0.85	b	-	10	N/A
1,3,5-Trimethylbenzene [f]	18	0	None	2.30	1.20	0.80	b	-	10	N/A
Acetone	18	0	None	25.50	12.83	9.22	b	-	100	N/A
Benzene	18	2	None	5.00	1.57	1.29	1.97	-	10	F005 [d]
Bromoform	18	0	None	2.00	1.10	0.65	b	-	10	N/A
Butanol	18	0	None	27.50	24.83	1.94	b	-	100	N/A
Carbon disulfide [f]	18	0	None	2.50	1.70	0.58	b	-	10	N/A
Carbon tetrachloride [c]	18	1	Natural log	2.83	0.42	0.75	0.66	2.30	10	F001 [d]
Chlorobenzene	18	0	None	2.10	1.17	0.68	b	-	10	N/A
Chloroform	18	0	None	2.30	1.20	0.80	b	-	10	N/A
Chloromethane [g]	18	0	None	2.60	1.70	0.65	b	-	10	N/A
cis-1,2-Dichloroethylene	18	0	None	2.25	1.25	0.73	b	-	10	N/A
Cyclohexane [f]	18	1	None	3.50	1.29	0.94	1.59	-	10	N/A
Ethyl benzene [c]	18	2	Natural log	7.44	0.92	2.42	1.68	2.30	10	N/A
Ethyl ether	18	0	None	2.30	1.60	0.51	b	-	10	N/A
M&p-Xylene [c]	18	2	Natural log	8.46	0.91	2.78	1.78	2.30	10	N/A
Methanol [c]	18	17	Natural log	9.47	7.50	1.59	8.00	4.61	100	N/A [h]
Methyl ethyl ketone	18	0	None	24.50	13.50	8.00	b	-	100	F005 [d]
Methyl isobutyl ketone	18	0	None	19.50	16.50	2.18	b	-	100	N/A
Methylene chloride	18	0	None	2.30	1.30	0.73	b	-	10	F002 [d]
o-Xylene [c]	18	2	Natural log	7.00	0.85	2.19	1.54	2.30	10	N/A
Tetrachloroethylene	18	0	None	1.85	1.05	0.58	b	-	10	F001, F002 [d]
Toluene [c]	18	8	Natural log	3.40	0.87	1.02	1.19	2.30	10	F005 [d]
trans-1,2-Dichloroethylene	18	0	None	2.25	1.22	0.75	b	-	10	N/A
Trichloroethylene [c]	18	6	Natural log	2.20	0.57	0.68	0.78	2.30	10	F001, F002 [d]

a. When a measurement is reported as below detection, one-half the analysis method detection limit (MDL) is used. Note that the MDL for a given analyte may vary from sample to sample.

b. The mean and standard deviation presented are the mean and standard deviation of the MDL after dividing by 2. All measurements are below detection; therefore, the upper 90% confidence limit is not calculated.

c. The maximum, mean, standard deviation, UCL_{90}, and PRQL are presented as transformed values

d. The HWNs for these constituents are assigned based on AK. HWNs assigned by AK are applied to the waste stream even if headspace gas analytical results for the assigned compounds are not above the PRQL.

e. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and PRQL.[20]

f. Cyclohexane (CAS No. 110-82-7), 1,2,4-trimethylbenzene (CAS No. 95-63-6), 1,3,5-trimethylbenzene (CAS No. 108-67-8) and carbon disulfide (CAS No. 75-15-0) are not target analytes for this waste stream but will be reported because they have been added as target compounds on the Agilent system at the AMWTP [reference Section 2.2 of the AK Summary for Non-special Source Metal Debris Waste (BN296)].[9]

g. Chloromethane (CAS No. 74-87-3) is not a target analyte for this waste stream but will be reported because it has been added as a target compound for other waste streams at AMWTP.

h. Although the UCL_{90} level is above the PRQL for methanol, the waste is not ignitable; therefore, no HWN was applied.

Did the Data verify the Acceptable Knowledge? Yes X No_____

If no, describe the basis for assigning the EPA Hazardous Waste Code.

Statistics performed by: _____ Date: 12/28/05
Signature

Table 1B. Headspace Gas Summary Data – tentatively identified compounds. BN004-Lot 1

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
Ethanol [a]	53	5	18	27.8%	18	27.8%

a. The CAS No. for ethanol is 64-17-05. This is not a 40 CFR 261, Appendix VIII, listed analyte.

Did the data verify the Acceptable Knowledge? YES: X NO:_____

If no, describe the basis for assigning the EPA Hazardous Waste Code. N/A

Verification of % Detected Calculation: _____ Date: 12/28/05
Signature

Table 2. Metals Summary Data. BN004-Lot 1

ANALYTE	# Samples	# Samples above MDL [a, b]	Trans-formation Used [e]	Maximum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Trans-formed PRQL	PRQL [d] (mg/kg)	EPA Code [g]
Arsenic	5	5	None	6.00	4.92	1.00	5.61	–	100	N/A
Barium	5	5	None	260	230	33.9	253	–	2000	N/A
Cadmium [b]	5	5	Natural log	-0.073	-0.463	0.265	-0.281	3.00	20	D006 [c]
Chromium [b]	5	5	Natural log	4.22	3.43	0.470	3.75	4.61	100	D007 [c]
Lead	5	5	None	36.0	17.9	12.5	26.5	–	100	D008 [c]
Mercury	5	0	None	0.005	0.005	0.000	[i]	–	4	N/A
Selenium	5	3	None	0.980	0.564	0.283	0.758	–	20	N/A
Silver [b]	5	3	Natural log	2.64	0.080	2.02	1.46	4.61	100	D011 [c]
Antimony [b]	5	5	Natural log	0.182	-0.060	0.178	0.062	4.61	100	N/A [f]
Beryllium [b]	5	4	Natural log	0.095	-1.19	1.18	-0.384	4.61	100	N/A [f]
Nickel	5	5	None	28.0	22.6	5.32	26.2	–	100	N/A [f]
Thallium	5	2	None	1.90	0.959	0.655	1.41	–	100	N/A [f]
Vanadium [b]	5	5	Natural log	4.79	4.08	0.412	4.36	4.61	100	N/A [f]
Zinc	5	5	None	130	84.8	39.7	112	–	100	N/A [f]

a. When a measurement is reported as below detection, one-half the analysis MDL is used. Note that the MDL for a given analyte may vary from sample to sample.
b. The maximum, mean, standard deviation (SD), UCL_{90}, and PRQL are presented as transformed values.
c. These HWNs, assigned by AK, are applied to the waste stream even though analytical results for the assigned compounds are not above the PRQL.
d. To determine whether a HWN should be added, the UCL_{90} is compared against the appropriate limit. For toxicity characteristic constituents that do not have a PRQL in the permit, the TC limit (mg/L) multiplied by 20 is used to calculate the RTL. RTLs correspond to the analyte PRQL for analytes that are not characteristic hazardous waste constituents.
e. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and PRQL.
f. There are no associated toxicity characteristic HWNs with these analytes.
g. Spent stripping, cleaning, and plating operations in which cyanides and chromium were used are included in this waste stream; therefore, EPA HWNs F006, F007 and F009 are applied based on AK.
h. Distribution testing is not performed on 2 or fewer applicable samples; therefore, a normal distribution is assumed.
i. All measurement are below detection; therefore, the UCL_{90} will not be calculated.

Did the data verify the Acceptable Knowledge? Yes X No____

If no, describe the basis for assigning the EPA Hazardous Waste Code: N/A

Statistics performed by: Tamara L Stokes Date: 12/28/05
Signature

Table 3A. Total VOC Summary Data. BN004-Lot 1

ANALYTE	# Samples	# Samples above MDL [a, f]	Trans-formation Used [e]	Maxi-mum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Trans-formed PRQL	PRQL [c] (mg/kg)	EPA Code
1,1-Dichloroethylene	5	0	None	0.185	0.178	0.007	b	-	10	D029 [d]
Trans-1,2-dichloroethylene	5	0	None	0.095	0.088	0.004	b	-	10	N/A
1,1,1-Trichloroethane	5	0	None	0.095	0.088	0.004	b	-	10	F001/F002 [d]
1,1,2,2-Tetrachloroethane	5	0	None	0.185	0.178	0.007	b	-	10	N/A
1,1,2-Trichloro-1,2,2-trifluoroethane	5	0	None	0.095	0.088	0.004	b	-	10	F001/F002 [d]
1,1,2-Trichloroethane	5	0	None	0.095	0.088	0.004	b	-	10	N/A
1,2-Dichloroethane	5	0	None	0.185	0.178	0.007	b	-	10	N/A
Acetone	5	0	None	1.75	1.68	0.087	b	-	100	N/A
Benzene	5	0	None	0.185	0.178	0.007	b	-	10	F005 [d]
Bromoform	5	0	None	0.095	0.088	0.004	b	-	10	N/A
Butanol	5	0	None	1.75	1.68	0.087	b	-	100	N/A
Carbon disulfide	5	0	None	0.095	0.088	0.004	b	-	10	N/A
Carbon tetrachloride	5	0	None	0.095	0.088	0.004	b	-	10	F001 [d]
Chlorobenzene	5	0	None	0.095	0.088	0.004	b	-	10	N/A
Chloroform	5	0	None	0.095	0.088	0.004	b	-	10	N/A
Ethyl benzene	5	0	None	0.095	0.088	0.004	b	-	10	N/A
Ethyl ether	5	0	None	1.75	1.68	0.087	b	-	100	N/A
Isobutanol	5	0	None	1.15	1.11	0.048	b	-	100	N/A
Methanol	5	5	None	6700	3161	2690	5005	-	100	N/A [g]
Methyl ethyl ketone	5	0	None	1.75	1.68	0.087	b	-	100	F005 [d]
Methylene chloride	5	0	None	0.185	0.178	0.007	b	-	10	F002 [d]
Pyridine	5	0	None	1.75	1.68	0.087	b	-	100	N/A
o-Xylene	5	0	None	0.095	0.088	0.004	b	-	10	N/A
m&p-Xylene	5	0	None	0.185	0.178	0.007	b	-	10	N/A
Tetrachloroethylene	5	0	None	0.185	0.178	0.007	b	-	10	F001/F002 [d]
Toluene	5	0	None	0.095	0.088	0.004	b	-	10	F005 [d]
Trichloroethylene	5	0	None	0.095	0.088	0.004	b	-	10	F001/F002 [d]
Trichlorofluoromethane	5	0	None	0.095	0.088	0.004	b	-	10	N/A
Vinyl chloride	5	0	None	0.185	0.178	0.007	b	-	4	N/A

a. When a measurement is reported as below detection, one-half the analysis MDL is used. Note that the MDL for a given analyte may vary from sample to sample.
b. All measurement are below detection; therefore, the UCL_{90} will not be calculated.
c. To determine whether a HWN should be added, the UCL_{90} is compared against the appropriate limit. For toxicity characteristic (TC) wastes, the TC limit expressed as the RTL is used if compounds do not have a PRQL in the permit. For listed wastes, the PRQL is used.
d. These HWNs, assigned by AK, are applied to the waste stream even though analytical results for the assigned compounds are not above the PRQL.
e. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and PRQL.
f. Distribution testing is not performed on 2 or fewer applicable samples; therefore, a normal distribution is assumed.
g. Although the UCL_{90} was above the PRQL, the waste is not ignitable; therefore, HWN F003 was not applied.

Did the data verify the Acceptable Knowledge? Yes X No_____

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

Statistics performed by: Tamara E. Blue Date: 12/28/05
Signature

Table 3B. Total VOC Summary Data – tentatively identified compounds. BN004-Lot 1.

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
None	N/A	N/A	N/A	N/A	N/A	N/A

Did the data verify the Acceptable Knowledge? Yes__X__ No____

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

Verification of % Detected Calculation ____N/A____ Date: _____
Signature

Table 4A. Total SVOC Summary Data. BN004-Lot 1.

Analyte	# Samples	# Samples Above MDL [a, c]	Trans-formation Used [d]	Maxi-mum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Trans-fomed PRQL	PRQL (mg/kg)	EPA code
1,2-Dichlorobenzene (o-Dichlorobenzene)	5	0	None	0.100	0.100	0.000	[b]	-	40	N/A
1,4-Dichlorobenzene (p-Dichlorobenzene)	5	0	None	0.100	0.100	0.000	[b]	-	40	N/A
2,4-Dinitrophenol	5	0	None	0.200	0.200	0.000	[b]	-	40	N/A
2,4-Dinitrotoluene	5	0	None	0.100	0.100	0.000	[b]	-	2.6	N/A
bis(2-Ethylhexyl)phthalate [e]	5	0	None	0.200	0.200	0.000	[b]	-	40	N/A
Fluoranthene [f]	5	0	None	0.100	0.100	0.000	[b]	-	40	N/A
Hexachlorobenzene	5	0	None	0.100	0.100	0.000	[b]	-	2.6	N/A
Hexachloroethane	5	0	None	0.100	0.100	0.000	[b]	-	40	N/A
2-Methylphenol (o-Cresol)	5	0	None	0.100	0.100	0.000	[b]	-	40	N/A
3- & 4-Methylphenol (m- & p-Cresol)	5	0	None	0.200	0.200	0.000	[b]	-	40	N/A
Nitrobenzene	5	0	None	0.100	0.100	0.000	[b]	-	40	N/A
Pentachlorophenol	5	0	None	0.100	0.100	0.000	[b]	-	40	N/A
Phenol [g]	5	0	None	0.355	0.151	0.114	[b]	-	40	N/A

a. When a measurement is reported as below detection, one-half the analysis MDL is used. Note that the MDL for a given analyte may vary from sample to sample.

b. All measurement are below detection; therefore, the UCL_{90} will not be calculated.

c. Distribution testing is not performed on 2 or fewer applicable samples; therefore, a normal distribution is assumed.

d. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and PRQL.

e. Bis(2-Ethylhexyl) phthalate was detected as a TIC in BNINW216-Lot 1 in over 25% of the samples analyzed and was added to the target analyte list as required by the WAP. Bis(2-Ethylhexyl) phthalate is not a target analyte for the BN004 waste stream, but the data will be reported for this analyte. The CAS # for bis(2-Ethylhexyl) phthalate is 117-81-7.

f. Fluoranthene was detected as a TIC in BNINW216-Lot 1 in over 25% of the samples analyzed and was added to the target analyte list as required by the WAP. Fluoranthene is not a target analyte for the BN004 waste stream, but the data will be reported for this analyte. The CAS # for fluoranthene is 206-44-0.

g. Phenol was detected as a TIC in BNINW218-Lot 2 in over 25% of the samples analyzed and was added to the laboratory target analyte list as required by the WAP. Phenol is not a target analyte for the BN004 waste stream, but the data will be reported for this analyte. The CAS # for phenol is 108-95-2.

Did the data verify the Acceptable Knowledge? Yes __X__ No____

If no, describe the basis for assigning the EPA Hazardous Waste Code: N/A

Statistics performed by: Tamara J. Sblus Date: 12/28/05
Signature

Table 4B. Total SVOC Summary Data – tentatively identified compounds. BN004-Lot 1.

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
None	N/A	N/A	N/A	N/A	N/A	N/A

Did the data verify the Acceptable Knowledge? Yes__X__ No____

If no, describe the basis for assigning the EPA Hazardous Waste Code: N/A

Verification of % Detected Calculation N/A Date: _____
Signature

Table 5. Correlation of Container Identification Numbers to Data Package. BN004-Lot 1.

Container Number	Headspace Gas Data Package	RTR Data Package	RA Data Package	Visual Examination Data Package	Solid Sampling Data Package	Solid Analysis Data Packages
10001234	HS105_00151	RTR03-00072	ASY03-00348	N/A	N/A	N/A
10001239	HS105_00151	RTR03-00072	ASY03-00347	N/A	N/A	N/A
10001240	HS105_00151	RTR03-00072	ASY03-00347	N/A	N/A	N/A
10001318	HS105_00151	RTR03-00073	ASY03-00347	N/A	N/A	N/A
10001331	HS105_00151	RTR03-00073	ASY03-00347	N/A	N/A	N/A
10001355	HS105_00151 [a]	RTR03-00043	ASY03-00353	N/A	SSC05-00321	ALD05035S ALD05041V ALD05029N ALD05042M
10001387	HS205_00322 [a]	RTR03-00041	ASY03-00264	N/A	SSC05-00321	ALD05035S ALD05041V ALD05029N ALD05042M
10016677	HS105_00151	RTR04-00221	ASY04-00480	N/A	N/A	N/A
10016686	HS105_00151	RTR04-00226	ASY04-00483	N/A	N/A	N/A
10016706	HS505_00050	RTR04-00228	ASY04-00494	N/A	N/A	N/A
10016711	HS105_00151	RTR04-00182	ASY04-00414	N/A	N/A	N/A
10016719	HS105_00151	RTR04-00184	ASY04-00414	N/A	N/A	N/A
10016722	HS105_00151	RTR04-00184	ASY04-00415	N/A	N/A	N/A
10016825	HS505_00045	RTR04-00198	ASY04-00469	N/A	N/A	N/A
10016828	HS505_00045	RTR04-00197	ASY04-00461	N/A	N/A	N/A
10016843	HS505_00050	RTR04-00200	ASY04-00463	N/A	N/A	N/A
10016860	HS505_00050	RTR04-00201	ASY04-00463	N/A	N/A	N/A
10017109	HS505_00050	RTR04-00218	ASY04-00473	N/A	N/A	N/A
10017168	HS105_00151	RTR04-00219	ASY04-00474	N/A	N/A	N/A
10017169	HS205_00322 [a]	RTR04-00219	ASY04-00474	N/A	SSC05-00321	ALD05035S ALD05041V ALD05029N ALD05042M
10017184	HS105_00151	RTR04-00214	ASY04-00480	N/A	N/A	N/A
10019885	HS205_00322 [a]	RTR04-00322	ASY04-00690	N/A	SSC05-00321	ALD05035S ALD05041V ALD05029N ALD05042M
10048273	HS105_00151 [a]	RTR05-04066	ASY05-04785	N/A	SSC05-00321	ALD05035S ALD05041V ALD05029N ALD05042M

NOTE: *For headspace gas sampling data packages, the HSG prefix represents use of the DVS system and the HS prefix represents use of the HGAS system.*

a. Headspace gas data from cored drums were not included in the statistics for headspace gas results. These containers are not included in the BN004 reconciliation Lot 1.

Table 6. RTR/VE Summary of Prohibited Items and AK Confirmation. BN004-Lot 1 [a]

Container Number	RTR Prohibited Items	Visual Examination Prohibited Items [c]	AK Confirmation [b]
10001234	None	N/A	Complete
10001239	None	N/A	Complete
10001240	None	N/A	Complete
10001318	None	N/A	Complete
10001331	None	N/A	Complete
10001355	None	N/A	Complete
10001387	None	N/A	Complete
10016677	None	N/A	Complete
10016686	None	N/A	Complete
10016706	None	N/A	Complete
10016711	None	N/A	Complete
10016719	None	N/A	Complete
10016722	None	N/A	Complete
10016825	None	N/A	Complete
10016828	None	N/A	Complete
10016843	None	N/A	Complete
10016860	None	N/A	Complete
10017109	None	N/A	Complete
10017168	None	N/A	Complete
10017169	None	N/A	Complete
10017184	None	N/A	Complete
10019885	None	N/A	Complete
10048273	None	N/A	Complete

Notes:

a. See Table 5 for the associated RTR and visual examination data packages. None of the listed containers contains prohibited items as defined by Section B-1c of the Advanced Mixed Waste Treatment Project Quality Assurance Project Plan (QAPjP), MP-TRUW-8.2. The absence of prohibited items is determined and documented through acceptable knowledge and confirmation activities. Radiography or visual examination is performed on each container in this waste stream as a confirmation activity.

b. Acceptable Knowledge confirmations for RTR and visual examinations are conducted by an Acceptable Knowledge Expert on every drum by completing a checklist for each RTR and visual batch. This checklist can be accessed through the batches listed in Table 5.

c. None of these drums have a VE in lieu of RTR examination. N/A indicates that containers have been selected for visual examination by AMWTP.

Table 7. Sample Identification Number Cross Correlation Table. BN004-Lot 1

Container Number	Headspace Gas Sample Number	Solid Sample Number(s)
10001234	HS105_00151B-12	N/A
10001239	HS105_00151B-16	N/A
10001240	HS105_00151B-15	N/A
10001318	HS105_00151B-21	N/A
10001331	HS105_00151B-10	N/A
10001355	HS105_00151B-14 [a]	10066793, 10066794, 10066797
10001387	HS205_00322B-04 [a]	10066183, 10066184, 10066187
10016677	HS105_00151B-03	N/A
10016686	HS105_00151B-05	N/A
10016706	HS505_00050C-16	N/A
10016711	HS105_00151B-18	N/A
10016719	HS105_00151B-06	N/A
10016722	HS105_00151B-07	N/A
10016825	HS505_00045B-20	N/A
10016828	HS505_00045B-21	N/A
10016843	HS505_00050C-10	N/A
10016860	HS505_00050C-18	N/A
10017109	HS505_00050C-11	N/A
10017168	HS105_00151B-08	N/A
10017169	HS205_00322B-03 [a]	10066273, 10066274, 10066277
10017184	HS105_00151B-20	N/A
10019885	HS205_00322B-01 [a]	10066424, 10066425, 10066428
10048273	HS105_00151B-13 [a]	10066701, 10066702, 10066705

a. Headspace gas data from cored drums were not included in the statistics for headspace gas results. These containers are not included in the BN004 reconciliation Lot 1.

Attachment A
Evaluation of Required Number of Samples BN004-Lot 1

ANALYTE	Number of Samples	Number of Samples above MDL [a, h]	Trans-formation Used	Maxi-mum (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	Upper 90% confidence limit (mg/kg)	Trans-formed PRQL	PRQL [b] (mg/kg)	Required number of samples [c,e,g]	Comments
Arsenic	5	5	None	6.00	4.92	1.00	5.61	-	100	5	Code not required to be applied [i]
Barium	5	5	None	260	230	33.9	253	-	2000	5	Code not required to be applied [i]
Cadmium [f]	5	5	Natural log	-0.073	-0.463	0.265	-0.281	3.00	20	5	Code D006 applied per AK
Chromium [f]	5	5	Natural log	4.22	3.43	0.470	3.75	4.61	100	5	Code D007 applied per AK
Lead	5	5	None	36.0	17.9	12.5	26.5	-	100	5	Code D008 applied per AK
Mercury	5	0	None	0.005	0.005	0.000	-	-	4	-	No samples above MDL
Selenium	5	3	None	0.980	0.564	0.283	0.758	-	20	5	Code not required to be applied [i]
Silver [f]	5	3	Natural log	2.64	0.080	2.02	1.46	4.61	100	5	Code D011 applied per AK
Antimony [f]	5	5	Natural log	0.182	-0.060	0.178	0.062	4.61	100	5	No associated hazardous waste code [d]
Beryllium [f]	5	4	Natural log	0.095	-1.19	1.18	-0.384	4.61	100	5	Code not required to be applied [i]
Nickel	5	5	None	28.0	22.6	5.32	26.2	-	100	5	No associated hazardous waste code [d]
Thallium	5	2	None	1.90	0.959	0.655	1.41	-	100	5	No associated hazardous waste code [d]
Vanadium [f]	5	5	Natural log	4.79	4.08	0.412	4.36	4.61	100	5	No associated hazardous waste code [d]
Zinc	5	5	None	130	84.8	39.7	112	-	100	17	No associated hazardous waste code [d]
1,1-Dichloroethene (1,1-Dichloroethylene)	5	0	None	0.185	0.178	0.007	-	-	10	-	Code D029 applied per AK
trans-1,2-Dichloroethene (trans-1,2-Dichloroethylene)	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL
1,1,1-Trichloroethane	5	0	None	0.095	0.088	0.004	-	-	10	-	Codes F001/F002 applied per AK
1,1,2,2-Tetrachloroethane	5	0	None	0.185	0.178	0.007	-	-	10	-	No samples above MDL
1,1,2-Trichloro-1,2,2-trifluoroethane	5	0	None	0.095	0.088	0.004	-	-	10	-	Code F001/F002 applied per AK

ANALYTE	Number of Samples	Number of Samples above MDL [a, h]	Trans-formation Used	Maxi-mum (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	Upper 90% confidence limit (mg/kg)	Trans-formed PRQL	PRQL [b] (mg/kg)	Required number of samples [c,e,g]	Comments
1,1,2-Trichloroethane	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL
1,2-Dichloroethane	5	0	None	0.185	0.178	0.007	-	-	10	-	No samples above MDL
Acetone	5	0	None	1.75	1.68	0.087	-	-	100	-	No samples above MDL
Benzene	5	0	None	0.185	0.178	0.007	-	-	10	-	Code F005 applied per AK
Bromoform	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL
Butanol	5	0	None	1.75	1.68	0.087	-	-	100	-	No samples above MDL
Carbon disulfide	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL
Carbon tetrachloride	5	0	None	0.095	0.088	0.004	-	-	10	-	Code F001 applied per AK
Chlorobenzene	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL
Chloroform	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL
Ethyl benzene	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL
Ethyl ether	5	0	None	1.75	1.68	0.087	-	-	100	-	No samples above MDL
Isobutanol	5	0	None	1.15	1.11	0.048	-	-	100	-	No samples above MDL
Methanol	5	5	None	6700	3161	2690	5005	-	100	5	Code not required to be applied [j]
Methyl ethyl ketone	5	0	None	1.75	1.68	0.087	-	-	100	-	Code F005 applied per AK
Methylene chloride	5	0	None	0.185	0.178	0.007	-	-	10	-	Code F002 applied per AK
Pyridine	5	0	None	1.75	1.68	0.087	-	-	100	-	No samples above MDL
o-Xylene	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL
m&p-Xylene	5	0	None	0.185	0.178	0.007	-	-	10	-	No samples above MDL
Tetrachloroethene (Tetrachloroethylene)	5	0	None	0.185	0.178	0.007	-	-	10	-	Codes F001/F002 applied per AK
Toluene	5	0	None	0.095	0.088	0.004	-	-	10	-	Code F005 applied per AK
Trichloroethene (Trichloroethylene)	5	0	None	0.095	0.088	0.004	-	-	10	-	Codes F001/F002 applied per AK
Trichlorofluoromethane	5	0	None	0.095	0.088	0.004	-	-	10	-	No samples above MDL

ANALYTE	Number of Samples	Number of Samples above MDL [a, h]	Trans-formation Used	Maxi-mum (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	Upper 90% confidence limit (mg/kg)	Trans-formed PRQL	PRQL [b] (mg/kg)	Required number of samples [c,e,g]	Comments
Vinyl chloride	5	0	None	0.185	0.178	0.007	-	-	4	-	No samples above MDL
1,2-Dichlorobenzene (o-Dichlorobenzene)	5	0	None	0.100	0.100	0.000	-	-	40	-	No samples above MDL
1,4-Dichlorobenzene (p-Dichlorobenzene)	5	0	None	0.100	0.100	0.000	-	-	40	-	No samples above MDL
2,4-Dinitrophenol	5	0	None	0.200	0.200	0.000	-	-	40	-	No samples above MDL
2,4-Dinitrotoluene	5	0	None	0.100	0.100	0.000	-	-	2.6	-	No samples above MDL
bis(2-Ethylhexyl) phthalate	5	0	None	0.200	0.200	0.000	-	-	40	-	No samples above MDL
Fluoranthene	5	0	None	0.100	0.100	0.000	-	-	40	-	No samples above MDL
Hexachlorobenzene	5	0	None	0.100	0.100	0.000	-	-	2.6	-	No samples above MDL
Hexachloroethane	5	0	None	0.100	0.100	0.000	-	-	40	-	No samples above MDL
2-Methylphenol (o-Cresol)	5	0	None	0.100	0.100	0.000	-	-	40	-	No samples above MDL
3- & 4-Methylphenol (m- & p-Cresol)	5	0	None	0.20	0.200	0.00	-	-	40	-	No samples above MDL
Nitrobenzene	5	0	None	0.100	0.100	0.000	-	-	40	-	No samples above MDL
Pentachlorophenol	5	0	None	0.100	0.100	0.000	-	-	40	-	No samples above MDL
Phenol	5	0	None	0.355	0.151	0.114	-	-	40	-	No samples above MDL

a. The mean and standard deviation presented are the mean and standard deviation of the method detection limits (after dividing by 2). If all measurements are below detection, the UCL_{90} will not be calculated.

b. For analytes that have both an RTL and a PRQL, the PRQL is used to calculate the required number of samples.

c. The required number "n" of samples pertains only to toxicity characteristic or listed waste analytes and only to those analytes where the associated EPA HWN is not assigned (i.e., it only applies to those cases where a site intends to establish that the constituent is below the regulatory threshold and the associated EPA HWN does not apply).

d. If there is no hazardous waste code associated with an analyte, then that analyte will not be used to define the number of required samples.

e. If there are no samples above the MDL for a given analyte, then that analyte will not be used to define the number of required samples.

f. If a transformation is applied to the distribution to improve normality prior to calculating the mean and variance, then this same transformation is applied to the PRQL / RTL for that analyte.

g. If the calculated sample size is less than 5, then the number of required samples is set to the program-defined minimum of 5.

h. Distribution testing is not performed on 2 or fewer applicable samples; therefore, a normal distribution is assumed.

i. The HWN for characteristic or listed hazardous waste is not assigned based on AK, and the UCL_{90} is below the RTL or PRQL.

j. Although the UCL_{90} is above the PRQL for methanol, the waste is not ignitable; therefore, HWN F003 was not applied.

Acceptable Knowledge Summary for Special Setups Waste (BN004)

Advanced Mixed Waste Treatment Project

(Signature on file. See DCR-11340.) 06/27/12

Susan Peterman Date

TRU Programs Manager

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ACRONYMS AND ABBREVIATIONS

AK acceptable knowledge
AMWTP Advanced Mixed Waste Treatment Project
ATWIR Annual Transuranic Waste Inventory Report

CCP Central Characterization Project
CFR Code of Federal Regulations
CH-TRAMPAC Contact Handled Transuranic Waste Authorized Methods for Payload Control
CH-TRUCON CH-TRU Waste Content Codes

DOE Department of Energy

ECM Electrochemical Milling
EDL economic discard limit
EDMS Electronic Document Management System
EDTA Ethylenediaminetetraacetic acid
EPA Environmental Protection Agency

HF hydrofluoric acid
HSG headspace gas
HWN hazardous waste number

IDC item description code
INEEL Idaho National Engineering and Environmental Laboratory (now INL)
INEL Idaho National Engineering Laboratory (now INL)
INL Idaho National Laboratory

nCi/g nanocuries per gram
NDA non-destructive assay

PCB polychlorinated biphenyl
ppm parts per million
PRQL program required quantitation limit

RF Rocky Flats
RFETS Rocky Flats Environmental Technology Site
RTR real-time radiography

SDA Subsurface Disposal Area

TSA-RE Transuranic Storage Area-Retrieval Enclosure
TWBIR Transuranic Waste Baseline Inventory Report

UCL_{90} 90% upper confidence limit

VE Visual Examination
VOCs Volatile Organic Compounds

WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan (Attachment B of the WIPP Hazardous Waste Permit)
WIPP	Waste Isolation Pilot Plant
WMP	Waste material parameter
WMC	Waste Matrix Code
WTS	Waste Tracking System

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BN004[1]

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

Special Setups Waste[1]

1.2.2 Point of Generation

Rocky Flats (RF) Plant, Building 774[2]

1.2.3 Waste Stream Volume

2,302 55-gallon containers (480 m^3) – current volume[3]

The estimated percentages of transuranic (TRU) activity for special setups waste are 70% greater than 100 nanocuries per gram (nCi/g) and 30% less than 100 nCi/g.

Advanced Mixed Waste Treatment Project (AMWTP) will employ payload management practices in accordance with the Waste Acceptance Criteria (WAC) for waste stream BN004.[7]

1.2.4 Generation Dates

AMWTP stored containers of RF special setups waste generated from 1968 to 1988.[66] Waste stored at AMWTP with generation dates (i.e., pack date) later than 1988 are the result of repackaging (e.g., waste characterization activities).

1.2.5 TRUCON Codes

ID111/ID211[1, 4]

1.2.6 Waste Isolation Pilot Plant (WIPP) Waste Stream ID

Annual Transuranic Waste Inventory Report (ATWIR) Waste Stream ID: IN-BN004 (formerly identified as WIPP Identification Number Transuranic Waste Baseline Inventory Report [TWBIR] Waste Stream ID: IN-W157.144)[5, 67]

1.2.7 Summary Category Group

S3000 Homogenous Solids[1, 6]

1.2.8 Waste Matrix Code Group

Solidified Inorganics

1.2.9 Waste Matrix Codes

S3150 –Solidified Homogeneous Solids

Special setups waste consists of >50% by volume solidified waste form. Specifically, small quantities of liquids were solidified in large quantities of cement as special setups waste. Small quantities of absorbents (Oil-Dri® or vermiculite) were also added. This waste is at least 50% (by volume) inorganic solids and is classified as a homogeneous waste.[36]

1.2.10 Descriptions from the TWBIR and ATWIR

TWBIR waste stream description:

This waste, generated at RF, consists of liquids absorbed on a cement mixture. The liquid wastes were not compatible with aqueous treatment processes and are handled separately due to their plutonium complexing nature.[5]

ATWIR waste stream description:

IN-BN004 (Special Setups) waste was generated from a waste treatment process (predominately laboratory waste) generated in support of plutonium operations at the Rocky Flats Environmental Technology Site (RFETS). Resins and electrochemical milling (ECM) sludges were also solidified with the liquid waste. This waste stream is comprised of solidified waste assigned item description code (IDC) ID-RF-004 and ID-RF-802. Special setups consists of waste >50% by volume inorganic solidified waste. Specifically, small quantities of liquids solidified in large quantities of cement.[a] [67]

1.2.11 Defense Determination

The special setups wastes (BN004) generated at RF and shipped to the Idaho National Laboratory (INL) were generated exclusively through defense program activities. Liquid wastes that were subsequently solidified as special setups waste addressed by this summary were generated from defense related activities (e.g., weapons production and plutonium recovery activities) or from one of the four activities identified in the 1997 Department of Energy (DOE) Carlsbad Area Office (CAO) memorandum[10] as non-defense waste that was inadvertently mixed in the past and from which the non-defense portion cannot be segregated.

---

a. The description in the ATWIR will be revised in the next annual update to add IDC RF 744 and revise the waste stream description to "IN-BN004 (Special Setups) waste was generated from treating wastes (predominately laboratory waste) generated in support of plutonium operations at Rocky Flats. Resins and electrochemical milling sludges were also solidified with the liquid waste. This waste stream is comprised of solidified waste assigned IDC ID-RF-004, ID-RF-744 and ID-RF-802."

In accordance with interim guidance, defense wastes are identified as those wastes generated during work involving only defense activities or during work in which defense and non-defense wastes were inadvertently mixed in the past and from which the non defense portion cannot be segregated. The TRU wastes shipped to the INL covered by the BN004 waste stream profile (WSP) meet this definition.[60]

1.3 Waste Stream Description

1.3.1 Description

Special setups waste was generated from a waste treatment process that solidified process waste (predominantly laboratory liquid waste) generated in support of plutonium operations at RF. Resins and ECM sludges were also solidified with the liquid waste. This waste stream is comprised of solidified waste assigned IDCs RF 004, RF 744, and RF 802. The waste was generated in Building 774. The Special Setups waste is similar in material, physical form, and hazardous constituents and is a single waste stream. The TWBIR number, IDC, waste matrix code (WMC), and waste descriptions for the special setups waste stream are presented in Table 1-1.

Table 1-1. Physical waste form description for special setups waste.

IDC	WMC	Description
RF 004	S3150	Special Setups Waste
RF 744	S3150	Pits 11 and 12 Special Setups
RF 802	S3150	Solidified Laboratory Waste

Special Setups Waste – Building 774 (RF 004). This waste consists of liquids primarily from laboratory operations throughout the plant site that were neutralized, if required, and solidified in Building 774. A mixture of Portland cement and insulation cement (magnesia cement) was placed in a lined 55-gallon drum and identified with container prefix 744. The liquid was neutralized, if required, and then added to the cement mixture. Some drums may contain polyethylene bottles (<4 liters) of solidified waste.[19, 21]

Pits 11 and 12 Special Setups (RF 744). RF 744 was assigned by AMWTP to special setups containers retrieved from Subsurface Disposal Area (SDA) Pits 11 and 12 and identified with container prefix 744. The process and inputs were the same as waste containers identified as RF 004. The retrieved waste containers were originally generated prior to 1972, shipped to INL and buried in Pits 11 and 12. The waste containers were subsequently retrieved from the pits prior to 1979 and placed in the Transuranic Storage Area-Retrieval Enclosure (TSA-RE).[3]

Solidified Laboratory Waste – Building 774 (RF 802). RF 802 replaced RF 004 in approximately 1986.[43] RF changed the IDC, but the process and inputs remained the same.[11]

1.4 Process Description

1.4.1 Areas of Operation

The waste was generated in Building 774 by solidifying waste generated from various locations at RF.[13, 16, 23, 24, 40]

1.4.2 Process Flow Diagrams

The process flow diagram for the solidification of liquid waste as special setups waste is provided in the archived RF information, Waste Stream Residue Identification and Characterization (WSRIC) Building 774.[30]

1.4.3 Waste Generating Processes

The special setups waste treatment process solidified process waste (predominantly laboratory liquid waste that was not compatible with the primary aqueous waste treatment system). The liquids include complexing agents (e.g., Versene [ethylene diaminetetraacetic acid], tetraphosphoric acid, tributyl phosphate, citrate, oxalic acid, sodium lignosulfonate, and americium oxalate), strong acids, and strong bases. The special setups waste treatment process also solidified solids such as ECM sludges or resins. These wastes were generated primarily from the analytical laboratories, research and development laboratories, and maintenance shops located in Buildings 122, 123, 126, 371, 444, 559, 705, 707, 750, 771, 777, 779, 865, 881, 883, 886, and 991.[2, 4, 12, 14, 16, 21, 30, 31, 34, 39, 42, 44]

If the liquids generated in the analytical laboratories in Buildings 371, 559, and 771 contained plutonium above the economic discard limit (EDL), the liquids were sent to Building 771 for recovery prior to the transfer of the liquid waste to Building 774 for solidification.[27]

The bulk of the waste was packaged in small containers (typically plastic bottles) or in drums at the point of origin and transferred to Building 774; however, some of the liquid waste was received by pipeline transfers from Building 771. A setup logbook was used in Building 774 to record the types of waste and generation source. The date of treatment, generation location, waste description, and treatment process were entered in the logbook.[39, 48] The bulk of the liquid waste treated in the special setups process was laboratory waste, acids, and bases; however, other liquids (e.g., coolants, oils) were also solidified in Building 774. Therefore, individual containers in this waste stream may have limited amounts of organics (less than 10 liters). Containers of 50% or greater solidified organic waste are not included in this waste stream.

1.4.3.1 Neutralization and Solidification

In Building 774, the packaged waste received in plastic bottles was placed into a glovebox. Any acid waste was transferred from the glovebox into Tank T-7 located adjacent to the glovebox and neutralized with sodium hydroxide. After sodium hydroxide was added to

Tank T-7, pH paper was used to ensure the acid waste had been neutralized. Basic liquid wastes were not neutralized prior to solidification.[28, 48]

A mixture of approximately 250–300 pounds of Portland Type I/II cement and 100-150 pounds of insulation cement (magnesia cement) was placed in a lined 55-gallon drum, and the drum was placed on a drum roller to ensure mixing of the contents. The drum was then attached to the glovebox.[29, 48] Approximately 80–100 liters of the basic or neutralized liquid waste was added to the cement mixture.[21, 29, 48] The cement mixture in the drum chemically reacted with the waste solution to form a solid monolith.[28, 48] Periodically, polyethylene bottles (<4 liters) were filled with the cement mixture, sent to the small quantity waste generators on the plant site for addition of the liquid waste, and returned to Building 774 where they were packaged into drums.[21]

1.4.4 Material Inputs

Material inputs for special setups waste are presented in Table 1-2 (based on the type of waste) and include liquid wastes from laboratories, production, maintenance, and research and development activities. The special setups waste treatment process was used to solidify liquid wastes containing complexing agents that made the liquid incompatible or would interfere with the primary aqueous liquid waste treatment processes.

Table 1-2. Wastes treated in the solidification process.

Type of Waste	Compound
Laboratory Wastes	Aqueous wastes generated from sampling various waste streams including those that contain listed solvents (acetone, benzene, carbon tetrachloride, methanol, methylene chloride, methyl ethyl ketone, tetrachloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethylene, toluene, and xylene), toxicity characteristic metals (cadmium, chromium, lead, and silver), and electroplating wastes (cyanide bath rinse solutions that contained cadmium, chromium, nickel, and silver). Spent laboratory standards, including the above constituents and 1,1-dichloroethylene.
Acids/bases	Boric, chromic, hydrochloric, hydrofluoric, nitric, perchloric, phosphoric, tetraphosphoric, sodium hydroxide, sulfamic, sulfuric, oxalic, and tartaric.[2]

Type of Waste	Compound
Commercial products	Ox-out (a water solution of nitric acid and ammonium bifluoride);[33, 45] Versene (a trade name ethylenediaminetetraacetic acid [EDTA] product),[21, 54] Kepro developer (contains 1,1,1-trichloroethane),[33, 55] Metex solution (a trade name for a series of inorganic and organic acids or salts)[35] and Turco solutions (a trade name for a series of cleaners with various combinations of acids, complexing agents, and surfactants).[33, 53]
Complexing agents	Sodium lignosulfonate, tributyl phosphate, tetraphosphoric acid, citrate, oxalic acid, americium oxalate, and EDTA
ECM electrolyte	A mixture of chromic, sulfuric, and phosphoric acids[56]
Radionuclides	^{133}Ba, ^{55}Fe ^{237}Np, ^{239}Pu, ^{90}Sr, and tritium (sources)
Resins	Spent anion and cation resins
Other chemicals	Dicesium hexachloroplutonate, cyanide, acrylonitrile (vinyl cyanide), thiocyanate, and sodium sulfide solutions

1.4.5 Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for BN004, WMP data from 100% of the completed real-time radiography (RTR) and visual examination (VE) of special setups waste drums were obtained from the AMWTP Waste Tracking System (WTS) database on October 11, 2006. This represents 49% of the estimated number of drums for this waste stream. The special setups waste was generated at RF from 1971 through 1988. Drums evaluated to estimate the WMP weights per unit of waste were generated from 1972 through 1988. Approximately 3% of the waste was generated prior to 1972. AK indicates that the waste generated in 1971 is similar to the wastes that have undergone RTR and VE. Therefore, the WTS data is representative of the waste stream. WTS is AMWTPs comprehensive, DOE-audited waste tracking database in which all waste containers are tracked cradle-to-grave and all related characterization data are stored. A statistical analysis of the RTR and VE data was performed to estimate WMP weights (by percent) for special setups waste, excluding packaging, in accordance with the requirements of MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation, and are summarized in Table 1-3.[50, 57–59]

Table 1-3. Estimated waste material parameter weights per unit of waste for Special Setups Waste (BN004).

Potential Waste Material Parameters	Unit Weight by Percent
Iron-based Metals/Alloys	<1
Aluminum-based Metals/Alloys	<1
Inorganic matrix	99
Other Inorganic Materials	<1
Cellulosics	<1
Plastics (waste materials)	<1
Rubber	<1

Although individual drums in this waste stream may contain other homogenous solid waste and debris materials, the waste stream as a whole will be greater than 50%, by volume, inorganic solidified homogeneous solids.[2, 50]

1.5 Prohibited Items

The following items are prohibited at the WIPP in accordance with Section B-1c of MP-TRUW-8.2, Quality Assurance Project Plan, and Section 3 of MP-TRUW-8.1, Certification Plan for INL Transuranic Waste.[9, 63]

- Liquid waste and prohibited observable liquids
- Non-radionuclide pyrophoric materials
- Hazardous wastes not occurring as co-contaminants with TRU mixed wastes
- Wastes incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Wastes containing explosives or compressed gases
- Wastes with polychlorinated biphenyls (PCBs) not authorized under an U.S. Environmental Protection Agency (EPA) PCB waste disposal authorization
- Wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (hazardous waste numbers [HWNs] D001, D002, or D003)
- Waste that has ever been managed as high-level waste and waste from tanks specified in Table B-8 of MP-TRUW-8.2 unless specifically approved through a Class 3 permit modification.[63]

- Any waste container from a waste stream (or waste stream lot) that has not undergone either radiographic or VE of a statistically representative subpopulation of the waste stream in each shipment, as describe in Attachment B7 of MP-TRUW-8.2.[63]

- Sealed containers greater than four liters.

The absence of prohibited items is determined and documented through acceptable knowledge (AK) and characterization activities. Real-time radiography or VE is performed on each container in this waste stream to verify the absence of prohibited items.[51, 52] Containers that are identified as containing prohibited items during RTR or VE are treated or rejected, as appropriate. Drums containing prohibited items will not be shipped to WIPP. Non-hazardous solidification agents Aquaset®, Aquaset II-G®, and Micro Cel® E may be added to the waste by AMWTP to treat liquid in excess of WIPP WAC limits.[64, 65]

1.6 Resource Conservation and Recovery Act Determination

1.6.1 EPA Hazardous Waste Numbers

Special setups waste is characterized as mixed-TRU waste. Toxicity characteristic HWNs applied to the waste are D006, D007, D008, D011, and D029. Listed HWNs applied to this waste stream are F001, F002, F005, F006, F007, and F009.

1.6.2 Hazardous Determination

The hazardous waste determination for special setups waste is described in the following subsections.

1.6.2.1 Characteristic Waste

1.6.2.1.1 Ignitability

The materials in this waste stream do not meet the 40 Code of Federal Regulations (CFR) 261.21 definition of ignitability. The materials in this waste stream are not liquid waste. Furthermore, non hazardous absorbents (i.e., cement, vermiculite, and Oil-Dri®) were added during packaging for purposes of absorbing liquids. Containers identified with liquid in excess of WIPP WAC limits may be treated using non-hazardous solidification agents (e.g., Aquaset®, Aquaset II-G®, or Micro Cel® E) to render the waste acceptable prior to shipment.[64, 65] The materials are not liquid and are not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change. These materials are not compressed gases, and the containers do not contain compressed gases. These materials are not Department of Transportation (DOT) oxidizers as defined in 49 CFR 173. Feed solutions contained small amounts of oxidizers such as oxalic acid or nitric acid; however, the waste solutions were neutralized and solidified, and the final form does not meet the definition of an oxidizer.[16–21] Therefore, this waste stream does not exhibit the characteristic of ignitability (D001).

1.6.2.1.2 Corrosivity

The materials in this waste do not meet the definition of corrosivity as defined in 40 CFR 261.22. This waste is not a liquid. Furthermore, absorbents (i.e., cement, vermiculite, and Oil-Dri®) were added during packaging for purposes of absorbing liquids.[7, 18–21] Containers identified with liquid in excess of WIPP WAC limits may be treated using non-hazardous solidification agents to render the waste acceptable prior to shipment (e.g., Aquaset®, Aquaset II-G®, or Micro-Cel® E).[64, 65] Therefore, the corrosive characteristic (D002) does not apply to this waste stream.

1.6.2.1.3 Reactivity

The materials in this waste stream do not meet the 40 CFR 261.23 definition of reactivity. The materials are stable and will not undergo violent chemical change. The materials will not react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors, or fumes when mixed with water. The materials are not capable of detonation or explosive reaction. The materials are neither forbidden explosives nor Division 1.1, 1.2, or 1.3 (Class A or B) explosives as defined in 49 CFR 173, nor do the drums contain explosive materials.[16–21] On five occasions, small volumes of cyanide, acrylonitrile (vinyl cyanide), thiocyanate, and sodium sulfide solution were included in the liquid waste prior to solidification and are included in this waste stream.[39] However, if exposed to pH conditions between 2 and 12.5, they will not generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment because the chemicals have been stabilized in a solidified monolith. Containers identified with compressed gases or aerosol cans will have the prohibited items treated/removed prior to shipment. Containers with liquid in excess of WIPP WAC limits may be treated with non-hazardous solidification agents to render the waste acceptable prior to shipment (e.g., Aquaset®, Aquaset II-G®, or Micro-Cel® E).[64, 65] The materials in this waste stream are, therefore, not reactive wastes (D003).

1.6.2.1.4 Toxicity

The toxicity characteristic contaminants fall into one of two categories: metals and organics. Organic compounds include halogenated and non-halogenated solvents, pesticides, herbicides, and other toxic organic compounds.

AK documentation indicated the presence of toxicity characteristic metals cadmium (D006), chromium (D007), lead (D008), and silver (D011) because these constituents are present in the liquid wastes from the analytical laboratories and research and development operations.[1, 2, 41] Even though these contaminants were not detected in solid sampling and analysis at concentrations above their associated program required quantitation limit (PRQL) values, the waste stream is conservatively assigned EPA HWNs D006, D007, D008, and D011.

1,1 Dichloroethylene (D029) was detected in the headspace gas (HSG) sampling results. No use for 1,1-dichloroethylene was identified within the RF AK (except as a laboratory calibration standard); however, this constituent was detected in HSG sampling and analysis conducted previously at INL. Even though the calculated 90% upper confidence limit (UCL_{90})

value is below the PRQL value, EPA HWN D029 is conservatively assigned to the special setups waste.

The special setups waste includes analytical waste generated from the sampling of waste streams containing listed solvents including benzene, carbon tetrachloride, tetrachloroethylene, and trichloroethylene that were used as solvents in many operations on the plant site.[32] Because special setups wastes are characterized as listed hazardous wastes, the toxicity EPA HWNs for these constituents are not applied to this waste stream.

1.6.2.2 Listed Waste

1.6.2.2.1 F-Listed Hazardous Waste Numbers

The materials in this waste stream are listed hazardous wastes because they were mixed with or derived from waste listed in 40 CFR 261, Subpart D as hazardous waste from non-specific sources (40 CFR 261.31).

EPA HWN F001, F002, and F005 are assigned to the special setups waste for spent solvents including carbon tetrachloride (F001); tetrachloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethylene (F001, F002); methylene chloride (F002); and benzene, methyl ethyl ketone, and toluene (F005). EPA HWNs F006, F007 and F009 listed HWNs are assigned to the special setups waste because it may be contaminated with spent electroplating wastes. The special setups waste includes analytical waste generated from sampling and analyzing listed waste.

Carbon tetrachloride, tetrachloroethylene, trichloroethylene, 1,1,1-trichloroethane, and 1,1,2-trichloro-1,2,2-trifluoroethane were identified in AK documents as solvents commonly used in cleaning, degreasing, production, laboratory, and maintenance operations. Benzene, methylene chloride, and toluene were used as solvents in laboratory operations. In addition, 1,1,1-trichloroethane, trichloroethylene, and paint thinner (methyl ethyl ketone and toluene) were used for cleaning, and methylene chloride was used for paint removal.[2] Waste streams with these listed constituents were sampled and analyzed by the RF laboratories, and the waste generated from the laboratories is included in this waste stream. In addition, small amounts (4–8 liters) of organic solvents may have been added to the waste on occasion. Spent solvent wastes included electropolishing solution (containing 2-ethoxyethanol from metallography laboratories) and scintillation cocktail (containing toluene from tritium analysis).[39] Therefore, EPA HWNs F001, F002, and F005 are assigned to this waste stream.

Acetone, methanol, and xylene (non-chlorinated solvents) were also used as solvents in laboratory and production operations. Waste streams with these listed constituents were sampled and analyzed by the RF laboratories, and the waste generated from the laboratories is included in this waste stream. Methanol was detected in the HSG and solid samples at levels above the PRQL, but special setups waste is not a liquid waste. If a waste no longer exhibits the characteristic of ignitability, the F003 HWN can be removed [40 CFR 261.3(9)(1)]. Because the waste is not ignitable, the EPA HWN F003 is not assigned to this waste stream.

EPA HWNs F006, F007, and F009 are assigned because laboratories could have sampled and analyzed treated aqueous wastes from Buildings 374 and 774 treatment facilities. The treated aqueous waste from Buildings 374 and 774 include aqueous waste from electroplating operations (e.g., cyanide bath rinse solutions that contained cadmium, chromium, nickel, and silver) and the waste generated from the laboratories is included in this BN004 waste stream.[23, 27]

AK indicates that 1,1,1-trichloroethane, carbon tetrachloride, trichloroethylene, ethyl benzene, methanol, and xylene were detected above the PRQL based on HSG and solid sampling conducted previously at INL.[22] Confirmatory solid and HSG sampling and analysis did confirm the presence of listed solvent constituents; however, the concentrations are below the associated PRQLs (except for methanol). No additional EPA HWNs are required; therefore, EPA HWNs F001, F002, F005, F006, F007, and F009 are assigned to this waste stream.

1.6.2.2.2 P-, U-, and K-Listed Hazardous Waste Numbers

Although hydrofluoric acid (HF) was identified as a chemical used (for its intended purpose) during plutonium processing at RF, only spent HF sources could have been sent to special setups process. Based on this information, the U134 HWN does not apply to this waste stream.

Based on a review of AK, it was determined that the special setups waste will contain less than one percent beryllium by weight. If beryllium is present, it is a contaminant of the process and not an unused commercial chemical product, an off-specification species, a container residue, or a spill residue thereof. Therefore, the P-listed waste code for beryllium, as defined in 40 CFR 261.33, is not assigned to the waste.

The materials in this waste stream are not discarded commercial chemical products, off specification species, container residues, or spills thereof (40 CFR 261.33). The materials in this waste stream are not P- or U-listed hazardous waste.

The materials in this waste are not hazardous waste from specific sources since they were not generated from any processes listed in 40 CFR 261.32. The materials in this waste stream are, therefore, not K-listed hazardous waste.

1.6.2.3 Toxic Substances Control Act Regulated Contaminants

Polychlorinated biphenyls are not expected to be present in the special setups waste stream in concentrations greater than 50 parts per million (ppm). If any containers are identified during RTR/VE as containing PCB items (e.g., light ballasts) greater than 50 ppm, the drums containing the PCB items will be managed and shipped in accordance with the WIPP WAC.[9, 38]

1.6.2.4 Other Special Setups Waste Streams

RF107.07 was reviewed as being pertinent to this waste stream (BN004).[13] A more specific WMC (S3150) was assigned to BN004 by INL; whereas the general WMC (S3190) was assigned to RF107.07 by RFETS for these solidified inorganic waste streams. INL identified the

same WMC S3150 that was identified for IDC 004 in TWBIR. Listed waste EPA HWNs F001, F002, F005, F006, F007, and F009 were assigned to both waste streams; however, EPA HWNs D006, D007, D008, and D011, assigned to BN004 based on AK were retained although the UCL_{90} values were below the PRQL values.[2] EPA HWN D029 was conservatively assigned to BN004 because 1,1-dichloroethylene was detected in HSG sampling and analysis conducted previously at INL.[2]

RF107.07 assigned the additional EPA HWNs P030, P098, P099, P106, U003, U103, and U108, which are associated with RF waste generated after January 1995.[13, 16] None of the post-January 1995 waste is included in this waste stream.

1.7 Radionuclides

The WIPP-tracked radionuclides of concern for special setups waste are ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, and ^{241}Am.[8, 15, 28, 37] The remaining WIPP-tracked radionuclides, ^{137}Cs and ^{90}Sr, are expected to be present in measurable quantities in special setups waste because sources were disposed of in special setups.[47] In addition, tritium, plutonium, americium, depleted uranium, enriched uranium, ^{233}U, ^{55}Fe, ^{237}Np, ^{133}Ba, ^{60}Co, ^{228}Th, and Cm (no isotope specified)[2, 39, 46] were introduced into the solidification process in liquids received or as sources from various buildings.[2]

The ratios of the two most prevalent radionuclides in the container are compared to confirm existing AK data in compliance with WAC requirements.[7] The two most prevalent radionuclides anticipated in the special setups waste drums are ^{239}Pu and ^{240}Pu.[8]

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

Special setups waste was contained in an O-ring bag inside a prepared 55-gallon drum attached to the glovebox.[18, 20] Approximately 10 to 15 pounds of Portland cement were added on top of the special setups waste before the O-ring bag was sealed. The special setups waste may also be contained in polyethylene bottles (<4 liters) inside the lined 55-gallon drum.[21]

Depending on waste packaging requirements at the time, several combinations of bags and liners were used to prepare 55-gallon drums for shipment. From 1970 to 1972, waste drums were lined with a polyethylene drum bag. Three to five pounds of Portland cement were placed in the bottom of the drum and in the drum bag. Use of the 90 mil rigid polyethylene liner began in 1972.[21] The rigid liner was placed in each drum and lined with a polyethylene round bottom drum liner.[19, 21, 25, 26] Three to five pounds of Portland cement were placed in the bottom of the rigid liner and in the round bottom liner. When a drum was full, the drum liners were twisted and taped closed, the lid was secured with a bolted ring, and a tamper-indicating device was attached to the drum.[19, 21]

After drums were inspected, one to two quarts of absorbent material (Oil-Dri®) was placed on the top of the outer, sealed polyethylene drum bag. This procedure changed in February 1982

when vermiculite was used to fill the space between the outer, sealed polyethylene drum bag and the top of the 90-mil rigid liner. Any combination of plastic bags that does not exceed five layers of confinement (of which no more than three are inner bags) is acceptable for shipment to WIPP.[62]

Although the procedure changed in 1982 and required vermiculite to be used, strict adherence to the procedure was not followed based on observations from RTR and/or VE. As a result the type, amount, and expected time-frame of absorbent use will vary. The quantity of vermiculite varied from 3-12 pounds according to the amount of waste contained in each drum.[21, 62]

Some of the 55-gallon drums may be overpacked into 83- or 85-gallon drums. Either four 55-gallon drums or two 83- or 85-gallon drums, with either the drum lid filters or the drum lids removed, may be direct loaded into an Standard Waste Box (SWB) equipped with approved filters.

2.2 Flammability Consideration

The payload containers in the waste stream must comply with the Contact Handled Transuranic 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 sampling and analysis is performed when required by the Waste Analysis Plan (WAP) 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 ppm flammable VOCs, are evaluated for compliance with applicable CH-TRAMPAC requirements prior to shipment. Payloads containing flammable gases are managed in accordance with CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC).[61]

3.0 REFERENCES

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

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AMWTP Advanced Mixed Waste Treatment Project	Waste Stream Profile Form HWN Assignment Worksheet	AMWTP Form 1187 Effective Date: 07/17/02, Rev. 1 MP-TRUW-8.13 Page 1 of 1

WSPF Number: BN004 (RF004, RF802)

AK Source Document / Rev. Number: AMWTP-RPT-TRUW-59, Rev.0

hwn	(1) AK ASSIGNED	(2) STORAGE	(3) RECONC.	(4) DELETE RECONC.	(5) ITEMS/ CONST.	(6) FINAL	(7) PERMIT-TED
F001	X					X	✔
F002	X					X	✔
F003							✔
F004							✔
F005	X					X	✔
F006	X					X	✔
F007	X					X	✔
F009	X					X	✔
D004							✔
D005							✔
D006	X					X	✔
D007	X					X	✔
D008	X					X	✔
D009							✔
D010							✔
D011	X					X	✔
D022							✔
D029	X					X	✔
D032							✔

AK Expert: Vivian Sendelweck Vivian Sendelweck Date: 3/30/06
Print/Sign

Site Project Manager: R A Eschenbach Date: 3/30/06
Print/Sign
RA ESCHENBACH

Implementing Document: MP-TRUW-8.13

Waste Stream or Waste Type Description: Special Setups

Waste Stream or IDC Number: BN004

AK Information	AK#<1>	Source Document Reference Number
Generator site TRU waste stream (WS) - specific information		
Information identifying the building(s) and/or area (s) from which TRU waste was or is generated.	WS1	C001A, C073A, C184A, C522A, C618A, C822S, C842S, D061A, P001A, P012A, P014A, P016A, P024A, P052A, P067A, P1031A, P127A, P319A, P368A, P435S, P442A, P443A, P494A, P495A, P496A, P608A, P609A, P621A, P649A, P667A, P671S, P717A, P733S, P741A, P744A, P746A, P755A, P759S, P847A, P888A, P953A, U043A, U059A, U069A, U119A, U215A, U223A
Waste stream volume and time period of generation.	WS2	C499A, C507A, C522A, C534A, C535A, C543S, C620A, C842S, C855A, C856A, C861A, C875S, C876A, D032A, D061A, P024A, P090A, P1031A, P127A, P198A, P318A, P319A, P364A, P365A, P368A, P400A, P442A, P443A, P567A, P609A, P621A, P649A, P671S, P743A, P744A, P746A, P755A, P758A, P759S, P826A, P838A, P847A, P888A, U043A, U059A, U069A, U122A, U127A, U215A, U223A, U235S
Waste generating process description for each building, including processes with U134 waste generation, if applicable and process flow diagrams. See instructions if process flow diagrams are not available.	WS3	C008A, C010A, C014A, C175A, P001A, P012A, P014A, P015A, P016A, P024A, P052A, P067A, P070A, P073A, P078A, P107A, P319A, P368A, P435S, P442A, P443A, P494A, P496A, P608A, P609A, P621A, P649A, P667A, P671S, P717A, P743A, P744A, P746A, P758A, P759S, P888A, U043A, U119A
Material inputs or other information identifying chemical content, and event or process that may have modified the chemical properties after generation. Include data for newly generated waste obtained through VE and/or radiography, information demonstrating neutralization of U134 waste and chemical composition that could affect the isotopic distribution.	WS4	C063A, C065A, C085A, C245A, C546S, D061A, D070A, D076A, P016A, P024A, P033A, P052A, P053A, P070A, P091A, P107A, P119A, P164A, P207A, P307A, P310A, P319A, P365A, P368A, P393A, P401A, P409A, P435S, P442A, P443A, P494A, P495A, P496A, P605A, P606A, P607A, P608A, P609A, P621A, P649A, P667A, P717A, P744A, P759S, P808S, P888A, U043A, U054A, U107A, U119A

Implementing Document: MP-TRUW-8.13

AK Information	AK#<1>	Source Document Reference Number
Generator site TRU waste stream (WS) - specific information		
Material inputs or other information identifying physical waste form, and event or process that may have modified the physical properties after generation. Include data obtained through RTR or VE of newly generated waste and physical composition that could affect the isotopic distribution.	WS5	C313A, C315A, C316A, C460A, C499A, C504A, C534A, C546S, C566S, C620A, C840S, C841S, C842S, D061A, P001A, P012A, P014A, P015A, P016A, P021A, P024A, P039A, P043A, P052A, P063A, P064A, P070A, P073A, P090A, P141A, P207A, P319A, P365A, P368A, P372A, P393A, P399A, P435S, P442A, P443A, P465A, P494A, P495A, P496A, P567A, P605A, P606A, P607A, P608A, P609A, P621A, P649A, P667A, P670A, P717A, P741A, P744A, P746A, P755A, P758A, P759S, P838A, P847A, P881S, P888A, U119A, U223A, U230A
EPA hazardous waste constituents in the waste stream and Hazardous Waste Numbers assigned.	WS6	C065A, C079A, C085A, C245A, C313A, C566S, C607A, C840S, C841S, D001A, D011A, D064A, D070A, D076A, D077A, P012A, P013A, P015A, P016A, P052A, P053A, P080A, P207A, P307A, P310A, P365A, P368A, P393A, P435S, P442A, P443A, P494A, P495A, P605A, P606A, P607A, P609A, P649A, P667A, P668S, P717A, P733S, P743A, P744A, P756A, P838A, U046A, U054A, U059A, U060A, U082A, U107A
Specification of the isotopic ratios for the 10 WIPP-tracked radionuclides (241Am, 238PU, 239 Pu, 240 PU, 242Pu, 233U, 234U, 238 U, 90 Sr, and 137Cs) and the radionuclides comprising 95% of the hazard.	WS7	C002A, C130A, C222A, C281A, C285A, C459A, C506A, C551A, C552S, C566S, C840S, C841S, D051A, P024A, P090A, P198A, P227A, P240A, P307A, P322A, P368A, P398A, P435S, P442A, P443A, P494A, P609A, P611A, P621A, P649A, P743A, P744A, P745A, P755A, P759S, P838A, P888A, U043A, U235S
Documentation identifying the presence of prohibited items listed in Section B-1c of the WIPP-WAP.	WS8	C073A, C321A, C511A, C516A, C842S, D070A, P001A, P012A, P013A, P015A, P016A, P021A, P024A, P063A, P358A, P368A, P372A, P399A, P442A, P443A, P465A, P609A, P649A, P667A, P733S, P741A, P744A, P888A, U215A, U223A

<1> The AK#'s are to be used in the Acceptable Knowledge Source Document Summary to aid in the identification of program and waste stream-specific elements within a given document.

All required AK information has been compiled and tracking numbers assigned.

AK Expert: Nancy Kirk / Nancy Kirk (Print/Sign) Date: 9/16/10 (Date)

Site Project Manager: Steve Carpenter (Print/Sign) Date: 9/16/10

LDR NOTIFICATION- IDCs RF004 RF802 RF744

WASTE STREAM BN004

The mixed waste identified on manifest number _____ and bearing the EPA hazardous waste numbers D006, D007, D008, D011, D029, F001, F002, F005, F006, F007, and F009 are designated as transuranic (TRU) mixed waste and have been exempted from the land disposal prohibitions of 40 CFR 268 by the Land Withdrawal Act Amendments (Public Law 104-201). This amendment exempts WIPP waste from treatment standards promulgated pursuant to section 3004(m) of the Solid Waste Disposal Act [42 U.S. C. 6924(m)] and are not subjected to the Land Disposal Prohibitions in section 3004(d), (e), (f), and (g) of the Solid Waste Disposal Act. This waste is not prohibited for land disposal.

Container Identification numbers	Hazardous waste number(s)	Land Disposal Prohibition effective date
	D006	May 26, 2000
	D007	May 26, 2000
	D008	May 26, 2000
	D011	May 26, 2000
	D029	December 19, 1996
	F001	Nov 8, 1986
	F002	Nov 8, 1986
	F005	Nov 8, 1986
	F006	July 8, 1989
	F007	July 8, 1989
	F009	July 8, 1989

AMWTP
Advanced Mixed Waste Treatment Project

Bechtel BWXT Idaho, LLC

December 21, 2005 CCN 05-1550

Mr. Dale Bignell
Washington Regulatory and Environmental Services
4021 National Parks Highway
Carlsbad, NM 88220

Subject: Contract No. DE-AC07-99ID13727- Waste Stream Profile, BN004 - SPC-087-2005

Dear Mr. Bignell:

Attached is Waste Stream Profile (WSPF), BN004, Special Setups Waste, and AMWTP-RPT-TRUW-59, *Acceptable Knowledge Summary for Special Setups Waste (BN004)*, for your review and approval. We have evaluated and reviewed the profile, and believe it is compliant with the WAP.

If you have any questions feel free to call me at (208) 557-6323 or Eric P. Schweinsberg (208) 557-6425.

Sincerely,

Steve Carpenter
Acceptable Knowledge/ Alternate Site Project Manager
Bechtel BWXT Idaho, LLC
Advanced Mixed Waste Treatment Project

SPC:cc

cc: Rod Arbon, BBWI
Steve Carpenter, BBWI
Rick Chavez, WRES
Joan Connolly, BBWI
Elvin Dumas, BBWI
Guy Girard, DOE-ID
Tally Jenkins, DOE-ID
Ron Reeves, WRES
Frank Russo, BBWI
Jerry Wells, DOE-ID
Ed Ziemianski, DOE-ID
WIPP Site Documents

APPENDIX 8

RPT-TRUW-77, REV. 1
ACCEPTABLE KNOWLEDGE SUMMARY FOR SOLIDIFIED PLUTONIUM RECOVERY INCINERATOR WASTE (BN222)

Date: 06/27/12

Acceptable Knowledge Summary for Solidified Plutonium Recovery Incinerator Waste (BN222)

Advanced Mixed Waste Treatment Project

(Signature on file. See DCR-11343.) 06/27/12

Susan Peterman Date

TRU Programs Manager

Advanced Mixed Waste Treatment Project

Acceptable Knowledge Summary for Solidified Plutonium Recovery Incinerator Waste (BN222)

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ACRONYMS AND ABBREVIATIONS

AK	Acceptable Knowledge
AMWTP	Advanced Mixed Waste Treatment Project
ANL-W	Argonne National Laboratory-West
ATWIR	Annual Transuranic Inventory Report
BN	BNFL Inc.
CAO	Carlsbad Area Office (currently known as Carlsbad Field Office/CBFO)
CCP	Central Characterization Project
CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
CH-TRUCON	contact-handled Transuranic waste content code
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EDL	economic discard limit
EPA	U.S. Environmental Protection Agency
HSG	headspace gas
HWN	hazardous waste number
IDC	item description code
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory
MDL	method detection limit
nCi/g	nanocuries per gram
NDA	non-detectable analyte
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
ppm	parts per million
PRQL	program-required quantitation limit
RCRA	Resource Conservation and Recovery Act
RF	Rocky Flats Plant (name prior to 1990 when waste shipped to INL)
RFETS	Rocky Flats Environmental Technical Services (renamed in mid-1990s)
RTR	real-time radiography

TRU	transuranic
TSCA	Toxic Substances Control Act
TWBIR	Transuranic Waste Baseline Inventory Report
UCL_{90}	90% upper confidence limit
VE	visual examination
VOCs	Volatile Organic Compounds
WAC	Waste Acceptance Criteria
WMC	waste matrix code
WMP	waste material parameter
WSPF	waste stream profile form
WTS	waste tracking system
WIPP	Waste Isolation Pilot Plant

Acceptable Knowledge Summary for Solidified Plutonium Recovery Incinerator Waste (BN222)

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BN222, Rev. 0

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

Solidified Plutonium Recovery Incinerator Waste

1.2.2 Point of Generation

Rocky Flats Plant (RF)–Buildings 371, 771 and 776 [2, 4, 18, 22, 23, 26, 30, 39]

1.2.3 Waste Stream Volume

574, 55-gallon drums (122 m3) – current volume [31]
0, 55-gallon drums (0 m3) – projected volume

The above is an estimate of the number of containers for waste stream BN222. Approximately 100% of the containers have transuranic (TRU) activity greater than100 nCi/g. [5]

1.2.4 Generation Dates

Solidified Plutonium Recovery Incinerator Waste (waste stream BN222) was generated from 1974 to 1987. Containers from waste stream BN222 stored at AMWTP with generation dates (i.e., pack date) later than 1987 are the result of repackaging (e.g., waste characterization activities). [4, 22, 26]

1.2.5 Contact-Handled Transuranic waste content code (CH-TRUCON)

ID 111/ID 211, ID 114/ID 214 [8]

1.2.6 Transuranic Waste Inventory Baseline Inventory Report (TWBIR) Information

Annual Transuranic Waste Inventory Report (ATWIR) Waste Stream ID: IN-BN222. [9]

1.2.7 Summary Category Group

S3000- Homogeneous Solids [16]

1.2.8 Waste Matrix Code Group

Solidified Inorganics [16]

1.2.9 Waste Matrix Code (WMC)

S3150 – Solidified Homogeneous Solids [16]

WMC S3150 consists of at least 50 volume percent solidified homogeneous solids. The waste is comprised of particulate (ash and soot) and sludge waste* that has been immobilized/solidified with cement. [10]

1.2.10 Description from the annual update to the TWBIR

The waste is comprised of solidified homogeneous solid wastes generated from the RF plutonium recovery incinerator operations. The IN-BN222 waste stream includes IDCs ID-RF-292, ID-RF-807b/696, ID-RF-818, and ID-RF-820. The BN222 waste stream consists of waste >50% by volume solidified homogeneous solids, i.e., particulate or sludge waste solidified by adding Portland cement." [9]

1.2.11 AMWTP Defense-Related Determination

As outlined in the 1997 Carlsbad Area Office (CAO) interim guidance on insuring that waste qualifies for disposal at the Waste Isolation Pilot Plant (WIPP), TRU waste is eligible for disposal at WIPP if it has been generated in whole or part by one of the atomic energy defense activities listed in section 10101(3) of the Nuclear Waste Policy Act of 1982 (NWPA) and is not high level or spent nuclear fuel. [7, 40]

The waste comprising BN222 waste stream that was generated at RF and shipped to the Idaho National Laboratory (INL) was generated in support of defense research and development program activities or was inherently mixed with defense-related wastes to the extent that the defense and non-defense waste cannot be separated. The plutonium recovery incinerator operation was the initial step in recovering plutonium from cellulosic, plastic and filter waste at the RF. Incinerator ash has been determined to be a defense-related waste and was generated from defense-related activities or during work in which defense and non-defense waste (i.e., combustibles from the americium purification project) were inadvertently mixed as feed to the incinerator in the past and from which the non-defense portion cannot be segregated. [6]

The waste comprising BN222 waste stream meets the criteria of defense related waste as documented in the 1997 CAO memorandum. This memorandum also documents that

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* In accordance with RCRA definitions (40 CFR 260.10) any solid or semi-solid generated from an air pollution control facility is included in the definition of sludge. Some of this waste will meet the RCRA definition of sludge.

there is no historical record or evidence that the RF facility ever handled spent nuclear fuel or high level waste. [6]

In addition, BN222 waste stream was generated by a waste process that meets the criteria outlined in Section 2 (Definitions), Item 3 (atomic energy defense activity) of the NWPA. [40]

Based on the above information, the waste associated with this waste stream does not meet the definition of high level waste or spent nuclear fuel and is classified as defense-related waste.

1.3 Waste Stream Description

1.3.1 Description

This waste stream is comprised of plutonium recovery incinerator waste generated during the RF plutonium recovery operations within Building 771 that were subsequently solidified by adding Portland cement in either Building 771 or Building 371. Some containers of solidified waste were subsequently repackaged in Building 776. [2, 17, 23]

This waste stream includes: solidified ash from the incinerator burn chamber and solidified soot and scrubber sludge from the incinerator off-gas system of the RF Building 771 plutonium recovery incinerator. The BN222 waste stream, Solidified Plutonium Recovery Incinerator Waste, is from a single process and is similar in material, physical form, hazardous constituents, and is a single waste stream. See Section 1.7.2.[2, 17, 18, 23]

Incinerator off-gas scrubber sludge was generated by the filtration of the potassium hydroxide (KOH) scrubber liquid and consists of a diatomite (also called diatomaceous earth) filtrate material and fly ash. Prior to 1986, Portland cement was added to the off-gas scrubber sludge during the packaging process in Building 771 and the waste was identified as IDC RF-292. [17, 34, 39] During late 1985, incinerator off-gas scrubber sludge solidification activities ceased within Building 771. The off-gas scrubber sludge was transferred to Building 371 for solidification by adding Portland cement and water to the sludge and was identified as IDC RF-696 (aka RF-807b)†. [2, 16, 18, 23]

Building 771 plutonium recovery incinerator operations also produced incinerator ash from the incinerator burn chamber and incinerator soot from the clean-up of the plutonium recovery incinerator off-gas system. Prior to 1986, incinerator ash and soot

† RF-696 is an IDC developed by the 3,100 m^3 Project. IDC RF-696 was created to avoid confusion associated with the dual usage of IDC 807 by RF for two different waste streams. RF shipped both solidified by-pass sludge from Building 374 and incinerator sludge solidified in Building 371 to the INL as IDC 807. In order to avoid confusion during the INL 3,100 m^3 Project, the RF-696 (aka RF-807b) was created and assigned to drums of cemented incinerator sludge that were solidified in Building 371 and IDC RF-807 (aka RF-807a) was retained and assigned to drums of solidified by-pass sludge from Building 374.

were not solidified. The unsolidified incinerator ash and soot are not included in the BN222 waste stream. Beginning in late 1985, incinerator ash and soot wastes were solidified within Building 371 by adding Portland cement and water. The resulting wastes were identified as RF-818 and RF-820, respectively. [2, 16, 23]

Prior to shipment to the INL, RF conducted drum inspections and added absorbent material (i.e., vermiculite or Oil-Dri®). The added absorbent was typically placed outside the outer, sealed polyethylene drum bag; however some drums may contain no absorbent material. [16]

Containers that are identified as having prohibited liquids may be treated using Aquaset® or Micro-Cel® E absorbents to ensure that the waste is acceptable for disposal at WIPP. [42, 46]

Aquaset® is a non-hazardous sodium montmorillonite clay material. It may be used to solidify prohibited aqueous liquids within the waste containers comprising this waste stream.

Micro-Cel® E is a non-hazardous synthetic calcium silicate that may be used to solidify prohibited liquids within waste containers comprising this waste stream.

Some containers of solidified plutonium recovery incinerator wastes were subsequently repackaged in Building 776. The repackaging of plutonium recovery incinerator waste did not result in a change to the chemical composition or waste form for this waste. [2, 4]

Although individual drums may also contain small amounts of debris (PPE, plastic, metal, glass, cement bags, Ful-Flo filters, metal, unburned feed material, and broken plastic molds), each container in this waste stream will contain at least 50% by volume solidified homogeneous solid waste. [2, 16, 18]

1.4 Process Description

1.4.1 Areas of Operation

The plutonium recovery incinerator wastes were generated from the plutonium recovery incineration operations within RF Building 771. The wastes were subsequently solidified with Portland cement in Buildings 371 or 771. Repackaging of some containers of the waste was conducted within Building 776. The repackaging of plutonium recovery incinerator waste did not result in a change to chemical composition or waste form. [2, 4, 16, 17, 23, 30, 39]

1.4.2 Process Flow Diagram

Process flow diagrams for incineration, solidification and repackaging operations for BN222 waste stream are provided in the AMWTP archived RF documents: RF

procedure WO-4500 (TRU Waste Compliance Program for the WIPP-WAC), Rocky Flats Environmental Technology Site Backlog Waste Reassessment Baseline Book, and the Waste Stream and Residue Identification and Characterization for Building 776. [13, 15, 39]

1.4.3 Waste Generation

Building 771 housed the RF plutonium recovery incinerator. The plutonium recovery incinerator in Building 771 was constructed for two main purposes. The first was to reduce the volume of cellulosic, plastic and filter waste to reduce disposal costs. The second was to generate an ash from which plutonium could be recovered. The incineration system was comprised of a multi-chamber, refractory-lined firebox; heat exchangers; caustic scrubber off-gas system; rotary filter; ball mill (used to pulverize ash); dedicated vacuum system; various gloveboxes, tanks, pipes, and valves; and a filter plenum. [2, 34, 39]

BN222 waste stream includes ash, soot, and scrubber sludge generated from the plutonium recovery incinerator that was subsequently solidified. The waste within this waste stream was generated from the plutonium recovery incinerator operations within the Building 771. The plutonium recovery incinerator received combustible wastes (cellulosic, plastics, and Ful-Flo filters) that contained recoverable amounts of plutonium that were above the economic discard limit (EDL) from RF plutonium production and plutonium recovery operations. Combustible wastes that were fed to the incinerator included IDCs: RF-330 (Paper and Rags-Dry), RF-331 (Ful-Flo Filters not from Incinerator), RF-336 (Paper and Rags-Moist), and RF-337 (Plastic, Teflon, Washables, PVC). The ash, soot and sludge waste resulting from the plutonium incinerator recovery incineration process underwent subsequent solidification within Buildings 371 and/or 771 using Portland cement. [2, 18, 23, 34, 39]

The off-gas scrubber system was composed of: two air-to-gas heat exchangers that drew in room air to help cool the incinerator off-gas before it passed through a caustic scrubber with a venturi off-gas system component and resulted in an increased scrubbing efficiency of the KOH caustic scrubber solution. After the off-gas passed through the venturi scrubber, the gas was filtered through the incinerator filter plenum prior to being discharged into the Building 771 HVAC system. The KOH caustic solution was processed through a rotary drum vacuum filter to separate the particulate material from the caustic solution. Incinerator off-gas scrubber sludge was generated by the filtration of the KOH scrubber liquid and consists of a diatomite filtrate material and fly ash. [2, 34, 39]

Prior to 1974, incinerator off-gas sludge did not undergo solidification and was identified as RF-290. The unsolidified sludge is not included as part of the BN222 waste stream. Beginning in 1974 but prior to 1977, Portland cement was added to sludge for absorption of free liquids. The sludge was placed in a PVC bag and sealed with tape, double contained in plastic bags, and placed into 1-gallon metal paint cans containing Portland

cement. After 1977 but prior to 1986, Portland cement was added in layers with the sludge and the sludge was capped with Portland cement. The sludge was packaged in poly bottles (2-liter, 4-liter, or 1-gallon polyethylene bottles) that were double bagged. Up to 25 cans or bottles were placed in a 55-gallon drum and identified as IDC RF-292. [2, 16, 17, 34, 39]

During late 1985, the plutonium recovery incinerator off-gas sludge was transferred to Building 371 and solidified. The solidified sludge waste was produced by mixing Portland cement and water with incinerator sludge within plastic molds and allowed to cure. The solidified sludge waste was removed from the molds, double-bagged prior to placement into 55-gallon containers, and identified as IDC RF-696. IDC RF-696 is incinerator sludge solidified in Building 371 that was generated between 1985 and 1987 (see prior footnote). [2, 22, 35, 36, 37]

Prior to 1986, plutonium recovery incinerator ash from the burn chamber and incinerator soot from clean up of the off-gas system did not undergo solidification and were identified as RF-420 (incinerator ash) or RF-422 (soot). The unsolidified ash and soot are not included as part of the BN222 waste stream. During late 1985, this ash and soot underwent solidification in Building 371. The solidified ash and soot wastes were produced by mixing Portland cement and water within plastic molds and allowed to cure. The solidified ash and soot wastes were removed from the molds, double-bagged prior to placement into 55-gallon containers, and identified as IDCs RF-818 and RF-820, respectively. [2, 23, 37]

Some containers of solidified plutonium recovery incinerator wastes underwent repackaging within Building 776. The repacking did not result in a change to the physical form or chemical composition of the solidified waste. [2, 4, 15]

1.4.4 Material Inputs

Building 771 generated plutonium recovery incinerator wastes. [2, 17, 23]

Combustible wastes used as feed to the plutonium recovery incinerator contained recoverable amounts of plutonium. These combustible wastes were generated from routine and non-routine activities in support of plutonium production and recovery operations from RF Buildings 371, 707, 771, 776, 777 and 779. The combustible wastes used as feed to the plutonium recovery incinerator included RF-330 (Paper and Rags-Dry), RF-331 (Ful-Flo filters), RF-336 (Paper and Rags-Moist), and RF-337 (Plastic, Teflon, Wash, PVC). The BN222 waste stream may contain chemical constituents associated with the combustible waste feed IDCs that were generated by the plutonium production and recovery processes. Hazardous waste chemical constituents are discussed in Section 1.4.6. [2, 23, 34, 39]

Diatomaceous earth and potassium hydroxide are material inputs to the plutonium incinerator off gas scrubber system. Although corrosive material was part of the material inputs to this waste stream the waste will not meet the definition of a corrosive waste. The waste stream is not a liquid waste and absorbents (i.e., cement, vermiculite, and Oil-Dri®) were added during packaging at RF for purposes of absorbing liquids and to prevent the accumulation of liquids in the drum. Furthermore, any containers found to have WIPP-prohibited liquids will be treated by AMWTP to render the waste acceptable prior to shipment. [2, 25]

The BN222 wastes underwent solidification using Portland cement within Buildings 771 or 371. [2, 18, 23, 34, 39]

Prior to shipment to the INL, non-hazardous absorbents such as Oil-Dri® or vermiculite were typically placed between the outer drum bag and the rigid liner. Non-hazardous solidification agents Aquaset® and Micro-Cel® E may be added to the waste by AMWTP to treat prohibited liquids. [2, 32, 33]

1.4.5 Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for the BN222 waste stream, WMP data for 521 containers with completed real-time radiography (RTR) or visual examination (VE) data of BN222 waste drums were obtained from the AMWTP Waste Tracking System (WTS) database for containers examined prior to August 17, 2009. This population represents greater than 90% of the estimated number of drums for this waste stream (i.e., 521 out of 574 drums). Four hundred and forty four drums of the 444 drums included in Lot 1 have been characterized by RTR/VE and their data are included in the WMP calculations. Drums used to calculate WMPs were generated from 1974 through 1987 and are representative of the waste stream. The estimated WMP weights (by percent) for the BN222 waste stream, excluding drum packaging, were calculated in accordance with the requirements of MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation. These weight percentages are summarized in Table 1-1. [19, 27]

Table 1-1. Estimated Waste Material Parameter Weight per Unit of Waste for Solidified Plutonium Recovery Incinerator Waste. (BN222)

Waste Material Parameters	Weight per Unit Waste by Percent
Iron-based Metals/Alloys	2 %
Aluminum-based Metals/Alloys	<1 %
Other Metals	<1 %
Other Inorganic Materials	1 %
Cellulosics	<1 %
Rubber	<1 %
Plastic (waste materials)	7 %
Organic Matrix	0 %
Inorganic Matrix	90 %
Soils/Gravel	0 %

Although individual drums in this waste stream may contain debris materials, the waste within each container will be greater than 50%, by volume, solidified inorganic homogenous waste. [2, 17, 30]

1.4.6 Constituents Associated with RCRA-Regulated Hazardous Waste Numbers (HWNs) for Combustible Waste Feed to Incinerator

The hazardous constituents associated with RCRA-regulated HWNs that are contaminants of the combustible waste feed to the plutonium recovery incinerator and the resulting solidified plutonium recovery incinerator waste are presented in Table 1-2.

Table 1-2. Potential Chemical Contaminants Associated with Combustible Waste Feed to the Plutonium Recovery Incinerator

Chemical	Source of Chemical Contaminant
1-Butanol	Analytical laboratory analysis [2]
1,1,1-Trichloroethane	Analytical laboratory analysis, plutonium component production, cleaning, degreasing, decontamination solvent. [1, 2, 39]
1,1,2-Trichloro-1,2,2-triflouroethane (Freon TF)	Analytical laboratory analysis, plutonium component production, cleaning, degreasing. [1, 2, 39]
Acetone	Analytical laboratory analysis, cleaning, plutonium component production. [1, 2, 39]
Arsenic	Analytical laboratory analysis. [1, 2, 25, 34, 39]
Barium	Analytical laboratory analysis. [1, 2, 25, 34, 39]
Benzene	Analytical laboratory analysis, plutonium component production. [1, 2]
Beryllium	A component of weapons parts. [2, 34]
Cadmium	Analytical laboratory analysis. [1, 2, 25, 34, 39]
Carbon disulfide	Analytical laboratory analysis. [34, 38]
Carbon tetrachloride	Analytical laboratory analysis, plutonium component production, cleaning, degreasing. [1, 34, 39]
Chloroform	Analytical laboratory analysis. [1, 2, 24, 25, 38, 41]
Chromium	Analytical laboratory analysis. [1, 2, 24, 25, 34, 39]
Lead	Analytical laboratory analysis, contained in paint. [1, 2, 25 34, 39]
Mercury	Analytical laboratory analysis. [1, 25, 34, 39]
Methanol	Analytical laboratory analysis, cleaning, glass.[1, 2]
Methyl ethyl ketone	Analytical laboratory analysis, contaminant in paint. [1, 34]
Methylene chloride	Analytical laboratory analysis, paint removal. [1, 2, 39]
Selenium	Analytical laboratory analysis. [1, 2, 25, 34, 39]

Chemical	Source of Chemical Contaminant
Silver	Analytical laboratory analysis. (1, 2, 25, 34, 39)
Tetrachloroethylene	Plutonium component production, analytical laboratory analysis, cleaning, degreasing. (1, 2, 39)
Toluene	Analytical laboratory analysis. (1, 2, 24, 34)
Trichloroethylene	Analytical laboratory analysis, plutonium component production, cleaning, degreasing, decontamination solvent. (1, 2, 39)
Xylene	Analytical laboratory analysis, cleaning, glass. (1, 2)

In addition, the F006, F007 and F009 HWNs assigned to this waste stream are associated with cadmium, chromium, lead and cyanide electroplating chemicals. These HWNs were previously assigned by the 3,100 m^3 project to the WIPP-approved WSPF INW222.001 Miscellaneous Cemented Sludge due to the identification of minor amounts of filter debris (i.e. Ful-Flo filters) within containers of cemented incinerator sludge. Filter debris waste contaminated with electroplating waste are assigned the F006, F007 and F009 HWNs.

1.5 AK Sufficiency Determination

No Acceptable Knowledge (AK) Sufficiency Determinations apply to this waste stream.

1.6 Prohibited Items

WIPP prohibited items have been identified through RTR/VE. Potential prohibited items that may be found in this waste stream are identified in RPT-TRUW-05, Waste Matrix Code Reference Manual, (e.g., sealed containers > 4 liters, liquids). (16)

The following items are prohibited at the WIPP in accordance with MP-TRUW-8.1, Certification Plan for INL Transuranic Waste and MP-TRUW-8.2, Quality Assurance Project Plan: (3, 11)

- Liquid waste - Waste shall contain as little residual liquid as is reasonably achievable by pouring, pumping and/or aspirating, and internal containers shall contain less than 1 inch or 2.5 centimeters of liquid in the bottom of the container. Total residual liquid in any payload container (i.e., 55-gallon drum or standard waste box) may not exceed 1 volume percent of that container. Payload containers with U134 waste shall have no detectable liquid

- Non-radionuclide pyrophoric materials

- Hazardous wastes not occurring as co-contaminants with TRU mixed wastes

- Wastes incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Wastes containing explosives or compressed gases
- Wastes with polychlorinated biphenyls (PCBs) not authorized under an Environmental Protection Agency (EPA) PCB waste disposal authorization
- Wastes exhibiting the characteristics of ignitability, corrosivity, or reactivity (HWNs D001, D002, or D003)
- Waste that has ever been managed as high-level waste and waste from tanks specified in Table B-8 of MP-TRUW-8.2, unless specifically approved through a Class 3 permit modification
- Any waste container from a waste stream (or waste stream lot) that has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment
- Sealed containers greater than four liters.

The absence of prohibited items is determined and documented through AK and characterization activities (i.e., RTR/VE). RTR or VE is performed on each container to verify the absence of prohibited items. [20, 21] Drums containing prohibited items will not be shipped to WIPP. Drums with prohibited items are treated or rejected as appropriate. [44, 45]

1.7 RCRA Determination

1.7.1 EPA HWNs

BN222 waste stream is characterized as mixed-TRU waste because mixed-TRU combustible waste generated from routine and non-routine activities in support of plutonium production and recovery operations was treated in the plutonium recovery incinerator in Building 771. The plutonium recovery incinerator wastes in BN222 were solidified with the addition of Portland cement. Applicable AK HWNs are supported by the chemical constituents identified in Section 1.4.6 and by AMWTP analytical results.

Toxicity characteristic HWNs applied to the BN222 waste stream are D004, D005, D006, D007, D008, D009, D010, D011 and D022. Listed HWNs applied to this waste stream are F001, F002, F005, F006, F007 and F009. [1, 2, 14, 18, 24, 25, 29, 30]

1.7.2 Hazardous Determination

Ignitability

The waste materials in this waste stream do not meet the 40 Code of Federal Regulation (CFR) 261.21 definition of *ignitability*. The BN222 waste stream is not a liquid waste. Furthermore non-hazardous absorbents (i.e., cement, vermiculite, and Oil-Dri®) were added during packaging for purposes of absorbing liquids. Containers with WIPP-prohibited liquids will be treated using non-hazardous solidification agents (e.g., Aquaset® or Micro-Cel® E) to render the waste acceptable prior to shipment. In addition, the waste materials in this waste stream are not compressed gas and do not contain compressed gas and the waste does not meet the United States Department of Transportation (DOT) definition of an oxidizer as defined in 49 CFR 173. Finally, the waste is not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change. This waste stream does not exhibit the characteristic of ignitability (D001). [1]

Corrosivity

The waste materials in this waste stream do not meet the 40 CFR 261.22 definition of *corrosivity*. The BN222 waste stream is not liquid. Furthermore, absorbents (i.e., cement, vermiculite, and Oil-Dri®) were added during packaging for purposes of absorbing liquids. [2, 25] Containers with WIPP-prohibited liquids will be treated by AMWTP to render the waste acceptable prior to shipment using Aquaset® or Micro-Cel® E). This waste stream does not exhibit the characteristic of corrosivity (D002). [1]

Reactivity

The waste materials in this waste stream do not meet the 40 CFR 261.23 definition of *reactivity*. The BN222 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 is not a sulfide bearing 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 of if heated under confinement. The waste is not readily capable 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 Part, 173. Although the waste contains minor amounts of filter debris (i.e. Ful-Flo filters) that are assigned F006, F007 and F009 listed HWNs 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]

Toxicity

BN222 waste stream contains RCRA toxicity constituents associated with toxicity characteristic metals and organics. The RCRA toxicity characteristic metals and organics assigned to this waste stream are: arsenic (D004), barium (D005), cadmium (D006), chromium (D007), lead (D008), mercury (D009), selenium (D010), silver (D011) and chloroform (D022). [25, 34]

Solid samples were analyzed at the AMWTP for RCRA toxicity characteristic metals. Statistics were calculated based on using one-half the method detection limit (MDL) for less than detectable observations and with data transformation applied where appropriate. The 90 percent upper confidence limit (UCL_{90}) exceeded the program-required quantitation limit (PRQL) for the toxicity characteristic metals: cadmium, chromium and lead. The D006, D007 and D008 HWNs were previously assigned based on AK. Therefore the D006, D007 and D008 HWNs are retained to the BN222 waste stream.

Although the AMWTP calculated UCL_{90} values did not exceed the PRQL for arsenic, barium, mercury, selenium and silver, the corresponding D004, D005, D009, D010, and D011 HWNs are assigned based on AK to the BN222 waste stream. [1, 24, 25]

RCRA toxicity characteristic organic compounds include halogenated and non-halogenated toxic compounds. The plutonium recovery incinerator accepted plutonium-contaminated solid combustibles including paper, plastic, polypropylene and rubber wastes. The combustible materials may have been contaminated with RCRA toxicity characteristic organic compounds including tetrachloroethylene, trichloroethylene, carbon

tetrachloride, methyl ethyl ketone, and benzene. [25] AMWTP solid sampling analytical results reflect UCL_{90} values below the PRQL (or not detected) for methyl ethyl ketone (D035), tetrachloroethylene (D039), trichloroethylene (D040), carbon tetrachloride (D019), and benzene (D018). These constituents were identified through AK as F-listed hazardous waste sources for this waste stream and are addressed below under the F-Listed HWNs section. The D018, D019, D035, D039, D040 HWNs are not assigned to the BN222 waste stream.

Chloroform was detected above the PRQL by the 3,100 m^3 Project in the headspace gas analytical results for containers in the WIPP-approved INW222.001 WSPF and HWN D022 was assigned by the 3,100 m^3 Project. Although chloroform was not detected in the solid sampling performed by AMWTP, the D022 HWN is assigned based on AK to the BN222 waste stream. [25]

Listed Waste

F-Listed HWNs

F-listed HWNs F001, F002, F003, F005, F006, F007 and F009 were assigned by the 3,100 m^3 Project to the INW222.001 WSPF. F-listed HWNs F001, F002, and F005 were assigned by RFETS to the RF118.01 and RF119.01 WSPFs. The AMWTP has assigned the F-listed HWNs F001, F002, F005, F006, F007 and F009 to the BN222 waste stream. [24, 25, 34]

AK documentation reflects that the incinerator waste comprising this waste stream have been contaminated with the F001, F002 and F005 spent solvent constituents associated with combustible feed materials to the incinerator. [2] The resultant incinerator waste would retain applicable listed HWNs based on current regulatory requirements (i.e., the RCRA derived from rule).

AK identified that halogenated solvents were used in the plutonium production operations for cleaning and degreasing (tetrachloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, and 1,1,2-trichloro-1,2,2-trifluoroethane), and methylene chloride was used primarily for paint removal. None of these compounds were reported in the AMWTP solid sampling for this waste stream with UCL_{90} values above their associated PRQLs. The F001 and F002 HWNs are assigned based on AK for tetrachloroethylene, trichloroethylene, 1,1,1-trichloroethane, and 1,1,2-trichloro-1,2,2-trifluoroethane (F001 and F002); carbon tetrachloride (F001); and methylene chloride (F002) to the BN222 waste steam. [24, 25]

Non-halogenated F003 compounds (acetone, methanol, 1- butanol, and xylene) were also identified in the AK record as potential contaminants associated with the combustible waste processed in the plutonium recovery incinerator operations. [2] The RFETS did not assign the F003 HWN to IDCs comprising this waste stream; however, the F003 HWN

was assigned to INW222.001 WSPF. [25, 34] In accordance with current RCRA criteria, if a waste no longer exhibits the characteristic of ignitability, the F003 HWN is not applicable [40 CFR 261.3(g)(1)]. The BN222 waste stream does not exhibit the characteristic of ignitability. The F003 HWN has not been assigned to the BN222 waste stream. [1, 43]

AMWTP AK reflects that F005 spent solvent constituents: benzene, carbon disulfide, methyl ethyl ketone, and toluene are associated with combustible waste that was feed to the plutonium recovery incinerator. The 3,100 m^3 Project assigned F005 to benzene and toluene in INW222.001 WSPF. The UCL_{90} value for toluene was reported by the 3,100 m^3 Project above the PRQL in the headspace gas analytical results for containers in the WIPP-approved INW222.001 WSPF. Toluene was also detected in the AMWTP solid sampling for this waste stream but the analytical results reflect that the UCL_{90} for toluene was below its associated PRQL. Because the above spent solvent constituents were identified in AK and were associated with feed to the plutonium recovery incinerator, the F005 HWN is assigned to the BN222 waste stream. [2, 24, 25, 34]

During the 3,100 m^3 Project, the F006, F007 and F009 HWNs were assigned to INW222.001 WSPF miscellaneous cemented sludge based on the mixture rule due to the presence of filter media (i.e., identification of Ful-Flo filters) within the waste stream. To support consistent HWN application associated with prior INL profiling for the same wastes, the AMWTP has assigned the F006, F007 and F009 HWNs based on AK to the BN222 waste stream. [14, 25]

P-, U- and K-Listed HWNs

The waste materials in this waste stream are not discarded, unused, commercial chemical products, off-specification species, a manufacturing intermediate or contains spill residues thereof that would meet the listing of P or U-listed hazardous waste as identified in 40 CFR 261.33. 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, 25]

Although hydrofluoric acid was identified as a chemical used during plutonium processing and in the laboratories at RF, only spent forms of hydrofluoric acid would have contaminated the waste. Furthermore this waste stream was not mixed with, does not contain, and was not derived from an unused commercial chemical product, an off-specification species thereof, a manufacturing intermediate or contains spill residues thereof that would be classified as a U134 HWN. Based on this information, the U134 HWN is not assigned to the BN222 waste stream. [1, 2, 25]

Beryllium was identified in AK as a potential contaminant for RF wastes. Based on a review of AK, it was determined that the BN222 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, a container residue or contains a spill residue thereof. Therefore, the P015 HWN for beryllium is not assigned to the BN222 waste stream. [1, 25, 34]

The waste materials within this waste stream are not hazardous waste from specific sources listed in 40 CFR 261.32 (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 the BN222 waste stream are not assigned K-listed HWNs. [1, 25, 34]

Table 1-3 provides information that justifies that the IDCs included in the waste stream meet the WIPP waste stream definition. These IDCs included in this waste stream are from a single process (Building 771 plutonium recovery incinerator operations). In addition the IDCs contain similar hazardous constituents/HWNs and are similar in physical form (solidified incinerator sludge, ash and soot).

Table 1-3. IDCs, similar hazardous constituents/HWNs, waste stream generation process and waste physical form description.

IDC	Hazardous Constituents/HWNs	Waste Stream Generation Process	Waste Physical Form Description	Same Waste Stream
RF-292	D004-D011, D022, F001, F002, F005, F006, F007, F009*	Building 771 Plutonium recovery incinerator	Solidified plutonium recovery off-gas sludge	Yes
RF-696/807b	D004-D011, D022, F001, F002, F005, F006, F007, F009*	Building 771 Plutonium recovery incinerator	Solidified plutonium recovery off-gas sludge	Yes
RF-818	D004-D011, D022, F001, F002, F005, F006, F007, F009*	Building 771 Plutonium recovery incinerator	Solidified plutonium recovery incinerator ash	Yes
RF-820	D004-D011, D022, F001, F002, F005, F006, F007, F009*	Building 771 Plutonium recovery incinerator	Solidified plutonium recovery incinerator soot	Yes

* D022, F006, F007 and F009 assigned based on AK from INL 3,100 m^3 Project INW222.001 WSPF. [25]

Toxic Substances Control Act (TSCA) Regulated Contaminants

PCB items and PCB concentrations equal to or exceeding 50 ppm are not expected in the BN222 waste stream. If containers are identified as containing PCB electrical items (e.g., ballast, capacitors) the waste containers will be labeled and shipped in accordance with applicable WIPP WAC requirements. [1]

Other Applicable Waste Streams

The following waste streams were reviewed as being pertinent to the BN222 waste stream: RFETS waste streams RF118.01 (un-solidified ash from Building 771 plutonium recovery incinerator) and RF119.01 (solidified off-gas scrubber sludge from Building 771 plutonium recovery incinerator); Idaho National Engineering and Environmental Laboratory (INEEL) 3,100 m^3 Project waste stream INW222.001 (which includes IDCs RF-292 and RF-696). [24, 25, 34]

The waste matrix code S3150 (Solidified Homogeneous Solids) was assigned to the BN222 waste stream by AMWTP and to the INW222.001 waste stream by the 3,100 m^3 Project at INEEL. [24, 25] The waste matrix codes S3111 (Ash) and S3129 (Unknown/Other Inorganic Sludges) were assigned by RFETS to the RF118.01 and RF119.01 waste streams (respectively). [34] AMWTP has assigned the more specific WMC S3150 to the BN222 waste stream versus the WMC S3129 assigned by RFETS. The WMC S3111 was applied by RFETS to the incinerator ash waste stream that was not solidified and is not applicable to waste in the BN222 waste stream.

RF118.01 WSPF is the RFETS waste stream profile for the un-solidified incinerator ash generated after August 1989. The un-solidified ash (i.e., IDC RF-420) is not included in the BN222 waste stream; however the solidified ash waste (i.e., IDC RF-818) is included in the BN222 waste stream. The HWNs identified within RF118.01 WSPFs are included within BN222 waste stream. [34]

RF119.01 WSPF is associated with incinerator sludge (IDC RF-292) generated after January 1984. Solidified incinerator sludge generated prior to 1988 is included in the BN222 waste stream. The HWNs identified within RF119.01 WSPF are included within BN222 waste stream. [34]

EPA HWNs D004 through D011, F001, F002, and F005 were assigned by RFETS to the RF118.01 and RF119.01 waste streams. [34] In addition to the D004 through D011, F001, F002 and F005; D022, F003, F006, F007 and F009 HWNs were also assigned to the INW222.001 waste stream by the 3,100 m^3 Project. The EPA HWN D022 was assigned by the 3,100 m^3 Project to the WIPP-approved INW222.001 WSPF because chloroform was detected in headspace gas (HSG) sampling with UCL_{90} values above the PRQL. [24, 25] The F006, F007 and F009 HWNs were assigned to the INW222.001 waste stream based on the presence of filter media (i.e., Ful-Flo filters) within drums of cemented

incinerator sludge (i.e., RF-292). The AMWTP retains the D004 through D011, F001, F002, and F005 HWNs assigned by RFETS and the 3,100 m^3 Project for the BN222 waste stream and furthermore retains D022 and F006, F007 or F009 HWNs assigned by the 3,100 m^3 Project. [14, 25]

The F003 HWN constituents are listed only for ignitability. If a waste no longer exhibits the characteristic of ignitability, the F003 HWN can be removed [40 CFR 261.3(g)(1)]. The BN222 waste stream does not exhibit the characteristic of ignitability. [42, 44. 45, 46]

1.8 Radionuclides

The WIPP-tracked radionuclides of concern for this waste 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 within this waste stream. [2, 5]

To confirm existing AK data, the ratios of the two most prevalent radionuclides in the isotopic mix are compared. The two most prevalent radionuclides expected in BN222 waste drums are ^{239}Pu and ^{240}Pu. [5]

The recommended default mass fraction values of the plutonium isotopes to be used as the AK-based values and confirmed at the AMWTP during non-destructive assay (NDA) are listed in RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge. [5]

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

2.1.1 Drums

This waste was typically packaged in one of three packaging configurations: double bags inside 1-gallon metal cans, polyethylene bottles (2-liter, 4-liter, 1-gallon bottles) that were double-bagged, or only PVC bags. [2, 16, 17, 23]

Up to 25 cans, bottles, or bagged solidified waste were placed in a 55-gallon drum. [16, 17, 23, 30] Depending on waste packaging requirements at the time, several combinations of drum bags and liners were used to prepare the 55-gallon drums for shipment. Variations include, but are not limited to: a rigid liner was placed in each drum with one or two polyethylene drum bags (including o-ring bags and round bottom poly bags). [12]

Atypical packaging include the use of Vollrath cans as well as various combinations of the types and numbers of drum bags including no drum bags. [16]

The most prevalent manner of bag closure was "twist and tape", however, "twisted and tied" or "fold and tape" were also used. Heat-sealed "filtered bags" may be found in some RF containers that were visually examined at Argonne National Laboratory-West (ANL-W) as part of a previous VE program conducted in Idaho. [16]

Prior to March 1982, one to two quarts of absorbent material (i.e., Oil-Dri®) was usually placed on top of the outer, sealed polyethylene drum bag; however some drums may contain no absorbent material. After February 1982 vermiculite was also used to fill the space between the outer, sealed polyethylene drum bag and the top of the 90-mil rigid liner. The quantity of vermiculite varied from 3-12 pounds in each drum. [16]

2.2 Flammability Consideration

The payload containers in the waste stream must comply with the Contact Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with the flammable gas limits will be performed for volatile organic compounds (VOCs), hydrogen and methane. Headspace gas sampling and analysis is performed when required by the CH-TRAMPAC. 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 ppm 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, Central Characterization Project (CCP) Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC). [28]

3.0 REFERENCES

1. RPT-TRUW-12, AMWTP Waste Stream Designations, current revision [P393A]

2. RPT-TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant, current revision [P649A]

3. MP-TRUW-8.1, Certification Plan for INL Transuranic Waste, current revision

4. Discrepancy Report D061A, Prefix use, building numbers, and process changes that occurred during the operational history at the Rocky Flats (RF) Facility, Rev. 3, August 5, 2009 [D061A]

5. RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge, current revision [P398A]

6. Memorandum from George E. Dials, DOE CAO, to J. M. Roberson, RFFO, and J. M. Wilcynski, INEEL, Identification of Defense Waste Streams Generated at Rocky Flats Environmental Technology Site (RFETS), May 20, 1997 [C191A]

7. Interim Guidance on Ensuring that Waste Qualifies for Disposal at the Waste Isolation Pilot Plant, February 13, 1997 [P203A]

8. DOE/WIPP-01-3194, CH-TRU Waste Content Codes (CH-TRUCON), Rev. 30, July 2009

9. DOE/TRU-09-3425, Annual Transuranic Waste Inventory Report - 2009, U. S. Department of Energy, Carlsbad Field Office, Rev. 0

10. DOE/LLW-217, DOE Waste Treatability Group Guidance, T. D. Kirkpatrick, Prepared for DOE Idaho Operations Office, Rev. 0, January 1995 [P670A]

11. MP-TRUW-8.2, Quality Assurance Project Plan, current revision.

12. WO-4034, Packaging Wastes for Shipment Offsite (U), Rev. C, October 13, 1986 [P063A]

13. WO-4500, TRU Waste Compliance Program for WIPP-WAC (U), Rev. F, January 19, 1987 [P043A]

14. Assessment of Hazardous Waste Numbers Assigned to Rocky Flats Description Code (IDCs): RF-292, RF-371 and RF-377, January 29, 2009 [D043A]

15. Waste Stream Residue Identification and Characterization, Building 776, Version 3.2, 1992 [P078A]

16. RPT-TRUW-05, Waste Matrix Code Reference Manual, current revision. [P399A]

17. WM-F1-82-021, Content Code Assessments for INEL Contact-Handled Stored Transuranic Wastes, October 1982 [P024A]

18. EDF-2722, Waste Stream Summary Sheet-Miscellaneous Cemented Sludge, INEEL, Rev. 4, January 6, 2003 [P286A]

19. Memorandum to file, Waste Material Parameter Weight per Unit Waste Calculations for Proposed BN222 Waste Stream, MLJ-002-09, September 15, 2009 [C605A]

20. INST-OI-12, Real-Time Radiography Operations (Drum), current revision

21. INST-OI-34, Non-Facility Visual Examination Operations, current revision

22. Memorandum to File from Jeff Harrison, Historical Use of IDC 807, July 18, 1996 [C114A]

23. INEL-95/0281, Idaho National Engineering Laboratory Code Assessment of the Rocky Flats Transuranic Waste, July, 1995 [P016A]

24. INEEL/EXT-02-00112, Characterization of Rocky Flats Plant Building Miscellaneous Cemented Sludge Waste Stream (IDCs 292 and 807b), Rev. 0, February, 2002 and Rev 1, March 2002 [P287A]

25. Waste Stream Profile Form INW222.001-Miscellaneous Cemented Sludges, Transmittal Letter (CCN 31196) from Thomas Monk to Jerry. L. Wells, U.S. DOE, April 10, 2002 and WSPF Update for WIPP Operating Record, 2/19/03 [P288A]

26. BBWI-Generated Drum Data, including Data from the Transuranic Waste Management Information System (TWMIS) [U127A]

27. MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation, current revision

28. CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC), current revision [P672A]

29. EDF-369, Hazardous Waste Constituents of INEL Contact-Handled Stored Transuranic Waste. D. E. Kudera, May 19, 1989 [P307A]

30. EGG-WMM-6503, TRU Waste Sampling Program: Volume I – Waste Characterization. Clements, Thomas L. Jr., and Donald E Kudera, September 1985 [P015A]

31. Discrepancy Report D062A, Volume Estimate for Proposed Waste Stream BN222, Solidified Plutonium Recovery Incinerator Waste, Rev. 1, September 15, 2009 [D062A]

32. Material Safety Data Sheet for Portland cement, Lone Star Industries, Inc. [P429A]

33. Material Safety Data Sheet for Oil-Dri® Floor Absorbent, Oil-Dri Corporation of America, July 21, 1988 [P426A]

34. RMRS-WIPP-98-100, RFETS Acceptable Knowledge TRU/TRM Waste Stream Summaries, Section 7.3 Rev. 14, May 23, 2002 and Section 7.37, Rev. 0, January 6, 2005 [P435S]

35. Letter to File, Assignment of Unique IDC (696) to IDC 807b Waste Containers, July 12, 2002 [C235A]

36. WO-4034, Waste Packaging for Offsite Shipment (U), Rev. A, August 16, 1985 [P372A]

37. Memorandum from J.K. Paynter to Al Morgan, EG&G Rocky Flats, Inc., "Creation and deletion dates of IDCs" June 16, 1994 [C050A]

38. Estimating Historical Emissions from Rocky Flats (Task 5 Draft report), November 1992 [P023A]

39. Rocky Flats Environmental Technology Site Backlog Waste Reassessment Baseline Book, May 5, 1994 - March 5, 2001 [P052A]

40. U.S. Congress, Nuclear Waste Policy Act of 1982 [P757A]

41. EDF-RWMC-421, EPA Hazardous Waste Codes Found in INEL Stored TRU Waste Content Codes, EG&G Idaho, Inc. Rev. 4, April 1, 1994 [P310A]

42. Material Safety Data Sheets; Aquaset II-H, Fluid Tech, Inc. August 1, 2001 [P401A]

43. Discrepancy Report D076A, of the F003 HWN assignment between AK source documents and WIPP-approved WSPFs, September 21, 2009 [D076A]

44. INST-OI-68, Drum Treatment Facility Operations, current revision

45. INST-FOI-23, Special Case Waste Operations, current revision

46. Material Safety Data Sheet; MICRO-CEL®E, Celite Corporation, January 17, 2007 [P808S]

47. Resource Conservation and Recovery Act, Code of Federal Regulations, Parts 260 through 268, Current version

APPENDIX 9

BN835 SOLIDIFIED ACID/CAUSTIC WASTE STREAM PROFILE PACKAGE

Date: 10/2/12

B-2012-0203
RECORD
JMC 10/02/12

AMWTP Advanced Mixed Waste Treatment Project

AK Source Document Review Summary

Form-1068, Rev. 4
Effective: 01/08/09

Implementing Document: MP-TRUW-8.13

1. Source Document Tracking Number: P437A	**2. Revision:** 9

3. Category

- [x] Published Documentation
- [ ] Unpublished Documentation
- [ ] Correspondence
- [ ] Discrepancy

4. Title/Description Information: BN835 Solidified Acid/Caustic Waste Stream Profile Package, Change Notice #1, and Change Notice #2

Document Number: N/A
Revision: N/A
Author: AMWTP, CBFO
Date: 4/7/05

5. AK Element	6. Generator Or Waste Type(s)	7. Location in Source Doc.	8. AK Information Summary:
WM2, WM3, WM5, WM6, WM7	MD	all	The AK Summary Report addresses the WM elements associated with facility mission, operations description, type and quantity of TRU waste generated, correlation of waste streams generated from the same process, and defense determination. The WSPF includes references to the documents that address the remaining WM elements.
WS1, WS2, WS3, WS4, WS5, WS6, WS7, WS8	MD-834, MD-835	all	WSPF and AK Summary Report provides a summary of the information that addresses all of the WS elements.

9. Document Summary:

The WSP package includes characterization information for waste stream BN835 that was approved by CBFO. This revision of the WSP package includes the following documents:
•CBFO Approval letter of CN #2 for WSP BN835. April 2, 2008
•Change Notice # 2 for WSP BN835, March 27, 2008
•CBFO Approval letter of CN #1 for WSP BN835. February 15, 2007
•Change Notice # 1 for WSP BN835, February 14, 2007
•CBFO Approval letter of WSP BN835, April 7, 2005
•WSPF (Form-1195), DQO (Form-1597), and CIS (including Form-1598) for BN835, Rev. 0, April 6, 2005
•Acceptable Knowledge Summary, RPT-TRUW-23, Rev. 6, June 27, 2012
•WSPF HWN Assignment Worksheet (Form-1187) for BN835, August 30, 2005
•TRU Waste Stream AK Documentation Checklist (Form-1067) for BN835, Rev. 3, August 21, 2008
•LDR Notification – IDCs 834, 835, Waste Stream BN835
•BNFL, Inc. transmittal letter Waste Stream Profile BNINW835, EPS-087-2004, December 20, 2004
•BNFL, Inc. transmittal letter Container List for Waste Stream BN835, Lot1, EPS-008-2005, February 23, 2005

Revision 8 updates record to include revised AK Summary Report (RPT-TRUW-23)

Revision 9 of P437A updates the record to include revised AK Summary Report RPT-TRUW-23, Rev. 6, June 27, 2012

10. Source Document Data Limitations (if any):

The characterization only applies to containers certified for disposal at WIPP.

11. AK Expert:	Julie Collins		10/2/2012
	Print	Sign	Date

P437A R9

Update for WIPP Operating Record (Change Notice # 2)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

Please add the following information to the WIPP Operating Record for Waste Stream Profile Form (WSPF) BN835, Revision 0. This waste stream is Solidified Acid/Caustic Waste and was approved by DOE/CBFO on April 7, 2005. Change Notice #1 was approved February 15, 2007.

This WSPF is being revised. The WSPF Form-1195 and AK Summary components are bolded. The updates are:

1. **WSPF Form-1195, Date of audit report approval by NMED**

   Add additional audit approval date January 18, 2008.

2. **WSPF Form-1195, Title, version, number, and date of documents used for WAP Certification**

   Update the following procedures:

   Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Rev. 14, 12/27/07.

   Quality Assurance Project Plan, MP-TRUW-8.2, Rev. 10, 10/25/07.

   Delete the following procedure:

   Contact-Handled Transuranic Waste Authorized Methods for Payload Control, MP-TRUW-8.3, Rev. 6, 7/01/06.

   Add the following procedure:

   CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC), CCP-PO-003, Rev. 10, 11/16/06

3. **AK Summary, Solidified Acid/Caustic Waste (RPT-TRUW-23), Report Number**

   Revise report number from AMWTP-RPT-TRUW-23 to RPT-TRUW-23.

4. **AK Summary, Solidified Acid/Caustic Waste (RPT-TRUW-23), Section 1.2.4, Generation Dates**

   Added the following after the dates:

   AMWTP stores containers of Mound solidified acid/caustic waste generated from 1975 to 1985. Waste stored at AMWTP with generation dates (i.e., pack date) later than 1985 are the result of repackaging (e.g., waste characterization/treatment activities).

5. **AK Summary, Solidified Acid/Caustic Waste (RPT-TRUW-23), Section 1.2.6, Transuranic Waste Baseline Inventory Report (TWBIR) Information**

   Revise to: WIPP Identification Numbers: IN-W174.154, IN-W177.156 [5]

Update for WIPP Operating Record (Change Notice # 2)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

6. **AK Summary, Solidified Acid/Caustic Waste (RPT-TRUW-23), Section 1.3.1, Description**

Revise Table 1-1 as follows:

TWBIR Numbers	IDC	WMC	Description
IN-W174.154	834	S3113	Acidic waste contained approximately 95% nitric acid with trace amounts of hydrofluoric, hydrochloric, sulfuric and oxalic acids. IDC 834 waste was generated from 1975 through 1980. Since December 1976, acidic waste was combined with caustic liquid wastes from plutonium processing. [1, 16, 17, 18, 23] Acidic waste was absorbed with vermiculite, clay absorbent mixed with diatomaceous earth or aluminum-magnesium-iron silicate clay material (Florco). There are 901 containers of IDC 834. [1, 16]
IN-W177.156	835	S3113	Caustic waste consists primarily of sodium hydroxide and limited amounts of ammonium hydroxide. IDC 835 was generated from 1974 through 1985. Caustic waste was absorbed with vermiculite, clay absorbent mixed with diatomaceous earth or aluminum-magnesium-iron silicate clay material (Florco). [1, 16, 17, 18, 23] There are 1,676 containers of IDC 835. [1, 16]

7. **AK Summary, Solidified Acid/Caustic Waste (RPT-TRUW-23), Section 1.5, Prohibited Items**

Revised first sentence of first paragraph as follows:

The absence of prohibited items is determined and documented through AK and characterization activities.

Add the following bullets to the first paragraph:

- Waste that has ever been managed as high-level waste and waste from tanks specified in Table B-8 of MP-TRUW-8.2, Quality Assurance Plan, unless specifically approved through a Class 3 permit modification. [14]

- Any waste container from a waste stream (or waste stream lot) that has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment, as describe in Attachment B7 of MP-TRUW-8.2, Quality Assurance Project Plan. [14]

Update for WIPP Operating Record (Change Notice # 2)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

8. **AK Summary, Solidified Acid/Caustic Waste (RPT-TRUW-23), Section 1.7, Radionuclides**

Add the following as the last sentence of the first paragraph:

The solidified acid/caustic waste stream does not contain concentrations of plutonium in excess of 20% by weight for the aggregate of any material category. [7, 29, 30]

9. **AK Summary, Solidified Acid/Caustic Waste (RPT-TRUW-23), Section 2.2, Flammability Considerations**

Revise last sentence as follows:

Payloads containing flammable VOCs are managed in accordance with CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC).

10. **AK Summary, Solidified Acid/Caustic Waste (RPT-TRUW-23), References**

Revise existing references as follows:

4. DOE/WIPP-01-3194, CH-TRU Waste Content Codes (CH-TRUCON), February 2008

5. DOE/TRU-2006-3344, Transuranic Waste Baseline Inventory Report-2004, U.S. Department of Energy, Carlsbad Field Office

8. DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, U. S. Department of Energy, Carlsbad Field Office, Waste Isolation Pilot Plant, October 29, 2007

9. 9NM4890139088-TSDF, Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Current Revision

13. CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC). [P672A]

Add the following references:

29. INEL-95/0412, Waste Description Information for Transuranically-Contaminated Wastes Stored at the Idaho National Engineering Laboratory, December 1995 [P365A]

30. MP-TRUW-8.1, Certification Plan for INL Transuranic Waste

Update for WIPP Operating Record (Change Notice # 2)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

Reason/Justification for the Changes

The audit report approval dates were updated to reflect the most recent approval date.

The documents used for WAP certification were revised to reflect the most recent revisions and to identify new TRAMPAC procedure required to support change in shipping contractor at AMWTP.

The AK Summary report number was changed to reflect changes in document control protocols.

CCP was added to the acronym list of RPT-TRUW-23 to identify the Central Characterization Project

AK Summary Section 1.2.6, Transuranic Waste Baseline Inventory Report (TWBIR) Information, was changed to update the TWBIR numbers to reflect the current TWBIR.

AK Summary Section 13.1, Table 1-1 was changed to update the TWBIR numbers to reflect the current TWBIR.

AK Summary Section 1.2.4, Generation Dates was changed to provide clarification that pack dates later that 1985 are the result of repackaging.

AK Summary Section 1.5, Prohibited Items was changed to add two prohibited items to reflect the requirements of the updated Quality Assurance Project Plan, MP-TRUW-8.2, Section B-1c.

AK Summary Section 1.7, Radionuclides was changed to reflect compliance with requirement in Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Section 3.1.6.

AK Summary Section 2.2, Flammability Consideration was updated to reflect new TRAMPAC procedure.

AK Summary Section 3, References was updated to identify references that support the information revised or updated in the AK Summary.

Update for the WIPP Operating Record (BN835) certification:

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

Signature of Site Project Manager	Printed Name and Title	Date
Eric P. Schweinsberg	Eric P. Schweinsberg, SPM	3/27/08

Washington
TRU Solutions LLC

WRES:07:034
UFC:5822.00

February 15, 2007

Mr. Richard Provencher, Deputy Manager
U.S. Department of Energy
Idaho Clean-up Project
Idaho Operations Office (NE.ID)
1955 Fremont Avenue
Idaho Falls, ID 83401-1222

Subject: UPDATE FOR WIPP OPERATING RECORD (CHANGE NOTICE #1) SOLIDIFIED ACID/CAUSTIC WASTE (BN835, REV.0)

Dear Mr. Provencher:

Washington TRU Solutions, on behalf of the Permittees, has approved the Change Notice Number 1 for Advanced Mixed Waste Treatment Project (AMWTP) Waste Stream Profile Form (WSPF) BN835, Rev. 0, Solidified Acid/Caustic Waste. We have concluded that the WSPF is complete and that the waste stream determination was made in accordance with applicable procedures and guidance..

We therefore approve the Change Notice as submitted. Using the methods approved at AMWTP, AMWTP may enter the data into the certification and shipping modules of the WIPP Waste Information System.

If you have any questions on this matter, please contact me at (505) 234-7545.

Sincerely,

W. M. Wierzbicki, Manager
Regulatory Compliance

WMW:ks

Enclosure

P.O. Box 2078 • Carlsbad, New Mexico USA 88221-2078
Phone: (505) 234-7200 • Fax: (505) 234-7063

Update for WIPP Operating Record (Change Notice # 1)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

Please add the following information to the WIPP Operating Record for Waste Stream Profile Form (WSPF) BN835, Revision 0. This waste stream is Solidified Acid/Caustic Waste and was approved by DOE/CBFO on April 7, 2005.

This WSPF is being revised. The WSPF Form-1195 and AK Summary components are bolded. The updates are:

1. **WSPF Form-1195, Date of audit report approval by NMED**

   Delete audit approval date 7/02/04 and add additional audit approval dates 4/1/05, 12/9/05, and 1/23/07.

2. **WSPF Form-1195, Title, version, number, and date of documents use for WAP Certification**

   Update the following procedures:

   Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Rev. 12, 1/24/07.

   Contact-Handled Transuranic Waste Authorized Methods for Payload Control, MP-TRUW-8.3, Rev. 6, 7/01/06.

   Quality Assurance Project Plan, MP-TRUW-8.2, Rev. 8, 1/24/07.

3. **WSPF Form-1195, Waste Stream Information, Applicable TRUCON Content Codes**

   Revise the TRUCON Content Codes to ID111/ID211.

4. **WSPF Form-1195, Required Waste Stream Information, new item entitled Waste material parameter weight estimates per unit of waste**

   Add the new item: See Section 1.4.4, Table 1.2 of the AK summary. This is listed as Item 8 in the Change Notice.

5. **AK Summary, Solidified Acid/Caustic Waste (AMWTP-RPT-TRUW-23), Report Number**

   Revise report number from BNFL-5232-RPT-TRUW-23 to AMWTP-RPT-TRUW-23.

6. **AK Summary, Solidified Acid/Caustic Waste (AMWTP-RPT-TRUW-23), TABLES**

   Revise Table of Contents per the following:

   Delete Table 2-1, Typical Packaging Parameters for Solidified Acid/Caustic Waste

Update for WIPP Operating Record (Change Notice # 1)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

Add Table 1-2 Estimated Waste Material Parameter Weights per Unit of Waste for Solidified Acid/Caustic Waste (BN835)

7. **AK Summary, Solidified Acid/Caustic Waste (AMWTP-RPT-TRUW-23), Section 1.2.5., TRUCON Codes**

Revise the TRUCON Content Codes to ID111/ID211.

8. **AK Summary, Solidified Acid/Caustic Waste (AMWTP-RPT-TRUW-23), Section 1.4, Process Description**

Add new Section 1.4.4 as follows:

1.4.4. Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for BN835, waste material parameter data from 100% of the completed RTR and VE of Solidified Acid/Caustic Waste drums were obtained from the AMWTP Waste Tracking System (WTS) database on October 11, 2006. This represents 87% of the estimated number of drums for this waste stream. The Solidified Acid/Caustic waste was generated at Mound from 1974 to 1985. Drums evaluated to estimate the WMP weights per unit of waste were generated from 1974 through 1985 and are representative of the waste stream. WTS is AMWTP's comprehensive, DOE-audited waste tracking database in which all waste containers are tracked cradle-to-grave and all related characterization data are stored. A statistical analysis of the RTR and VE data was performed to estimate WMP weights (by percent) for Solidified Acid/Caustic wastes, excluding packaging, in accordance with the requirements of MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation and are summarized in Table 1-2. [15, 28]

Table 1-2. Estimated Waste Material Parameter Weights per Unit of Waste for Solidified Acid/Caustic Waste (BN835).

Waste Material Parameters	Weight per Unit Waste by Percent
Iron-based Metals/Alloys	<1
Aluminum-based Metals/Alloys	<1
Other Inorganic Materials	<1
Plastics (waste)	<1
Rubber	<1
Cellulosics	3
Inorganic Matrix	97

Although individual drums in this waste stream may contain other homogenous solid waste and debris materials, the waste stream as a whole will be greater than 50% by volume inorganic particulate absorbents, including absorbed liquid wastes. [1, 28]

9. **AK Summary, Solidified Acid/Caustic Waste (AMWTP-RPT-TRUW-23), Section 1.7, Radionuclides**

Revise first sentence of last paragraph to read as follows: AMWTP will employ payload management with the WAC for waste stream BN835. [8]

10. **AK Summary, Solidified Acid/Caustic Waste (AMWTP-RPT-TRUW-23), Section 1.9, Shipping Considerations**

Section 1.9, Shipping Considerations, delete Section 1.9 and delete Table 2-1 and its introductory paragraph.

Add new Section 2.0, Shipping Consideration, as follows:

2.0 Shipping Consideration

2.1 Waste Packaging

Each 55-gallon drum was lined with a 90-mil rigid polyethylene drum liner. Typically, the rigid liners were lined with a polyethylene drum bag. Typically, plywood spacers were placed between the rigid liner lid and the drum lid before the drum lid was installed. Any combination of plastic bags that does not exceed five layers of confinement (of which no more than three are inner bags) is acceptable for shipment to WIPP. Containers with excess layers of confinement or packaging configurations not addressed by an approved TRUCON code for this waste stream will be segregated and vented or rejected, as appropriate. [1, 19, 26]

2.2 **Flammability Consideration**

The payload containers in the waste stream must comply with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with the flammable gas limits will be performed for volatile organic compounds (VOCs), hydrogen and methane. Headspace gas sampling and analysis is performed when required by the WAP and/or CH-TRAMPAC. At a minimum, the headspace gas analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with headspace gas results exceeding 500 ppm flammable VOCs, are evaluated for compliance with applicable CH-TRAMPAC requirements prior to shipment. Payloads containing flammable VOCs are managed in accordance with MP-TRUW-8.3, Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC).

Update for WIPP Operating Record (Change Notice # 1)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

11. AK Summary, Solidified Acid/Caustic Waste (AMWTP-RPT-TRUW-23), References

Update reference number 5 to Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, U. S. Department of Energy, Carlsbad Field Office, DOE/WIPP 02-3122, Rev. 6, November 15, 2006.

Delete reference number 15 for MP-TRUW-8.3 because it was a duplicate of reference number 13 and replace reference number 15 with the following: MP-TRUW-8.13, Collection, Review and Management of Acceptable Knowledge Documentation, Rev. 15, January 2007.

Add the following as reference number 19: AMWTP-RPT-TRUW-05, Waste Matrix Code Reference Manual Rev. 15, November 2006. (P399A)

Add the following as reference number 20: Monsanto Research Corp 1976, Mound Site Waste Management Reports and Site Plans 1972 to 1976. (P523A).

Add the following as reference number 21: Monsanto Research Corp 1980, Mound Site Waste Management Reports and Site Plans1977 to 1980. (P522A).

Add the following as reference number 22: Monsanto Research Corp 1989, Mound Site Waste Management Reports and Site Plans1981 to 1989. (P524A)

Add the following as reference number 23: Clements, T.L., WIPP Immobilization Criterion Study – TLC-9-84, July 2, 1984. (C349A)

Add the following as reference number 24: Braun, R.T., Radioactive Waste Shipped to INEL, January 28, 1976. (C359A)

Add the following as reference number 25: Edling, D. A. Disposition of High Level Radioactive Caustic and Acid TRU Drums, February 21, 1975. (C362A)

Add the following as reference number 26: Monsanto Research Corp 1989, Mechanical Manual MD-70205 (June 24, 1976 to February 2, 1989), TRU Waste Management February 2, 1989. (P510A)

Add the following as reference number 27: Monsanto Research Corp 1977, Radioactive Waste Process Flowsheets TRU Waste Management, May 31, 1977. (U132A)

Add the following as reference number 28: Memorandum to File from Tim Venneman, "Waste Material Parameter Weight Calculations and Supporting Data to Determine Waste Material Parameter Weight per Unit of Waste" TV-001-07, January 19, 2007. (C534A)

Update for WIPP Operating Record (Change Notice # 1)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

Reason/Justification for the Change

The NMED audit report approval dates were revised and updated to reflect the approval dates for audits conducted subsequent to the WSPF submittal and to delete the approval date for non-S3000 audit(i.e., 7/2/04 was the approval date for the HSG system)."

The documents used for WAP certification were revised to reflect the most recent revisions.

WSPF Form-1195 TRUCON Content Codes were revised to delete the alpha suffixes.

New item entitled waste material parameter weight estimates per unit of waste was added to Form-1195 as required by MP-TRUW-8.2, Quality Assurance Project Plan, Section B3-12b.

The AK Summary for Solidified Acid/Caustic Waste was renumbered to reflect the current operating contractor for the AMWTP facility.

The Table of Contents for the AK Summary was revised to accommodate changes required by the revised WIPP Hazardous Waste Facility Permit requirements as described in MP-TRUW-8.2, Section B3-12b.

AK Summary TRUCON Content Codes were revised to delete the alpha suffixes and for consistency with WSPF Form-1195.

Waste material parameter weight estimates per unit of waste and method for determining those estimates were incorporated into new Section 1.4.4 and Table 1-2 to meet the revised WIPP Hazardous Waste Facility Permit requirements as described in the Quality Assurance Project Plan, MP-TRUW-8.2, Section B3-12b.

Section 1.9 was deleted and the information concerning flammability considerations was incorporated into Section 2.2.

Table 2-1 and introductory paragraph to Table 2-1 were deleted because packaging information was incorporated into new Section 2.1.

Shipping Consideration Section 2.0 was added to provide format consistency between AMWTP-RPT-TRUW reports.

Waste Packaging Section 2.1 was added to provide waste packaging information to replace the information from the deleted Table 2-1.

Flammability Consideration, Section 2.2, replaced Section 1.9 and was added to clarify the method used for determining flammability as described in MP-TRUW-8.2, Section B3-11a.

Update for WIPP Operating Record (Change Notice # 1)

Solidified Acid/Caustic Waste (BN835, Rev. 0)

The AK Summary for Solidified Acid/Caustic Waste reference list was updated to identify references that support the information revised or updated in the AK Summary including the addition of supporting information as requested during the EPA baseline audit.

Update for the WIPP Operating Record (BN835) certification:
I hereby certify that I have reviewed this Update for WIPP Operating Record, and it is complete and accurate to the best of my knowledge. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature of Site Project Manager	Printed Name and Title	Date
Eric P. Schweinsberg	Eric P. Schweinsberg, SPM	2/14/07

DOE F 1325.8

United States Government

Department of Energy

memorandum

Carlsbad Field Office
Carlsbad, New Mexico 88221

DATE: April 7, 2005

REPLY TO ATTN OF: CBFO:OCT:KWW:GS:05-1003:UFC 5822.00

SUBJECT: Approval of Advanced Mixed Waste Treatment Project Waste Stream Profile Form Number BN835, Solidified Acid/Caustic Waste

TO: Richard Provencher, DOE-ID
Jeff Snook, DOE-ID

The Carlsbad Field Office (CBFO) has evaluated the Advanced Mixed Waste Treatment Project (AMWTP) Waste Stream Profile Form Number (WSPF) BN835, Solidified Acid/Caustic Waste. We have concluded that the WSPF is complete and that the waste steam determinations were made in accordance with CBFO procedures and guidance. The CBFO therefore approves the AMWTP WSPF as submitted.

If you have any questions, please contact me at (505) 234-7357.

Kerry W. Watson, Director
Office of Characterization and Transportation

Attachment

P437A

cc: w/o attachment

F. Marcinowski, DOE HQ	*ED
A. Holland, CBFO	ED
R. McCallister, CBFO	ED
M. Navarrete, CBFO	ED
A. Dobson, BNFL	ED
A. Dumas, BNFL	ED
E. Schweinsberg, BNFL	ED
D. Swale, BNFL	ED
D. Kump, WTS	ED
D. Speed, WTS	ED
D. Standiford, WTS	ED
M. Strum, WTS	ED
R. Chavez, WRES	ED
R. Reeves, WRES	ED
H. Borher, DOE-ID	ED
B. Edgerton, DOE-ID	ED
T. Jenkins, DOE-ID	ED
C. Maggart, DOE-ID	ED
J. Medema, DOE-ID	ED
J. Wells, DOE-ID	ED
L. Price, LANL	ED
CBFO M&RC	
WIPP Operating Record	

*ED denotes Electronic Distribution
CBFO:OCT:KOAW:GS:05-1002:UFC

WASTE STREAM PROFILE FORM

Waste Stream Profile Number: BN835, Rev. 0

Generator site name: Advanced Mixed Waste Treatment Project

Technical contact: Eric Schweinsberg

Generator site EPA ID: ID4890008952

Technical contact phone number: (208) 557-7164

Date of Audit report approval by NMED: 12/23/03; 7/02/04

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

Certification Plan for INEEL Contact-Handled Transuranic Waste, MP-TRUW-8.1, Rev. 1, 01/14/03; Rev. 2, 04/03/03; Rev. 3, 10/31/03; Rev. 4, 02/11/04; Rev. 5, 8/18/04; Rev. 7, 11/29/04.

Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC), MP-TRUW-8.3, Rev. 1, 2/06/03; Rev. 2, 3/29/04; Rev. 3, 12/15/04

Quality Assurance Project Plan (QAPjP), MP-TRUW-8.2, Rev. 1, 2/26/03; Rev. 2, 3/31/03; Rev. 3, 8/19/04

Did your facility generate this waste? ☐Yes ☒No If no, provide the name and EPA ID of the original generator: Mound, OH6890008984

Waste Stream Information[1]

WIPP ID: IN-W174.1082, IN-W174.154 IN-W177.1083, IN-W177.156

Summary Category Group: S3000

Waste Matrix Code Group: Solidified Inorganics

Waste Stream Name: Solidified Acid/Caustic Waste

Description from the WTWBIR: This waste comes from Mound. It consists of acid liquids, mainly nitric, adsorbed onto a clay called Florco (aluminum, magnesium, iron silicate clay). The waste also consists of caustic waste and neutralized liquids, absorbed onto a clay called Florco. The Florco is then placed in a drum bag in a drum lined with a 90-mil poly liner. See note.
Note. The description in the WTWBIR is not entirely correct with respect to the absorbents used in this waste stream. Vermiculite and clay mixed with diatomaceous earth were also used as absorbents.

Defense TRU Waste: (Ref. 10) ☒Yes ☐No

Check One: ☒CH ☐RH

Number of SWBs: 0

Number of Drums: 2577
Note: The number of drums identified in the TWBIR is incorrect. The number of containers identified in the WSPF is consistent with AK provided by Mound.

Number of Canisters: 0

Batch Data report numbers supporting this waste stream characterization: See Characterization Information Summary, Table 5

List applicable EPA Hazardous Waste Codes:[2] D007, D008, D009, F001, F002

Applicable TRUCON Content Codes: ID111MA/211MA, ID111MC/211MC, ID111MD/211MD

Acceptable Knowledge Information[1]

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

Required Program Information

Map of site: See Reference List, No. 1, Appendix A; No. 2

Facility mission description: See Reference List No. 1, Section 3; No. 3

Description of operations that generate waste: See Reference List, No. 1

Waste identification/categorization schemes: See Reference List, No. 4

Types and quantities of waste generated: See Reference List, No. 1, Section 3, 4; Nos. 3, 5 and 6

Correlation of waste streams generated from the same building and process, as appropriate: See Reference List, No. 1

Waste certification procedures: See Reference List 7 and 8

Required Waste Stream Information

Area(s) and building(s) from which the waste stream was generated: See Reference List, No. 9

Waste stream volume and time period of generation: See Reference List, No. 9

Waste generating process description for each building: See Reference List, No. 9

Process flow diagrams: See Reference List, No. 9

Material inputs or other information identifying chemical/radionuclide content and physical waste form:
See Reference List, No. 9

Which Defense Activity generated the waste: (check one)

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

Supplemental Documentation See Reference List, No. 1

Process design documents: See Reference List, No. 1

Standard operating procedures: See Reference List, No. 1

Safety Analysis Reports: See Reference List, No. 1

Waste packaging logs: See Reference List, No. 1

Test plans/research project reports: See Reference List, No. 1

Site databases: See Reference List, No. 1

Information from site personnel: See Reference List, No. 1

Standard industry documents: See Reference List, No. 1

Previous analytical data: See Reference List, No. 1

Material safety data sheets: See Reference List, No. 1

Sampling and analysis data from comparable/surrogate Waste: See Reference List, No. 1

Laboratory notebooks: See Reference List, No. 1

Sampling and Analysis Information [21, 22, 23]

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

Radiography: See Reference List, No. 10

Visual Examination: See Reference List, No. 11

Headspace Gas Analysis

VOCs: See Reference List, No. 12, 20

Flammable: See Reference List, No. 12

Other gases (specify): N/A

Homogeneous Solids/Soils/Gravel Sample Analysis *(See Reference List for Dates)*

Total metals: See Reference List, Nos. 13, 14, 15, 20

PCBs: N/A

VOCs: See Reference List, Nos. 16, 20

Nonhalogenated VOCs: See Reference List, Nos. 17, 20

Semi-VOCs: See Reference List, Nos. 18, 19, 20

Other (specify): N/A

Waste Stream Profile Form Certification:

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

Signature of Site Project Manager	Printed Name and Title	Date
[signature]	Eric Schweinsberg	4/6/05

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

(2) If radiography, visual examination, headspace gas analysis, and/or homogeneous solids/soils/gravel sample analysis were used to determine EPA Hazardous Waste Codes, attach signed Characterization Information Summary documenting this determination.

Waste Stream Profile Continuation Sheet

Reference List

1. Acceptable Knowledge Document for INEEL Stored Transuranic Waste – Mound Plant Waste, BNFL-5232-RPT-TRUW-13, Rev. 2, March 2005.
2. Site Plan of the Advanced Mixed Waste Treatment Facility, DWG-5232-52-0101, Rev. 0, April 1999.
3. AMWTP TRU Waste Management Acceptable Knowledge Elements, BNFL-5232-RPT-TRUW-06, Rev. 2, March 2005.
4. AMWTP Waste Stream Designations, BNFL-5232-RPT-TRUW-12, Rev. 2, March 2005.
5. Estimated Earthen and Geofabric Covered TRU Waste Inventory in the TSA at Radioactive Waste Management Complex (RWMC), RWMC EDF-837, August 1995.
6. Container Inventory Report for WMF-629 thru WMF-633 (TRIPS query), December 2002.
7. Certification Plan for INEEL Contact-Handled Transuranic Waste, MP-TRUW-8.1, Rev. 7, November 2004.
8. Advanced Mixed Waste Treatment Project TRU Waste Certification, MP-TRUW-8.5, Rev. 12, January 2005.
9. Acceptable Knowledge Summary For Solidified Acid/Caustic Waste, BNFL-5232-RPT-TRUW-23, Rev. 0, March 2005.
10. Real Time Radiography Operations, INST-OI-12, Rev. 22, March 2005.
11. Visual Examination Operating Procedures and Data Reporting, INST-OI-34, Rev. 10, FC-3, February 2005.
12. Drum Vent/Headspace Gas Sample Operations, INST-OI-13, Rev. 19, FC-1, October 2004.
13. Microwave Assisted Digestion of Homogeneous Solids and Soil/Gravel, INEEL Analytical Laboratories Department Analytical Chemistry Methods Manual, ACMM-8909, Rev. 8, January 2004.
14. Determination of Mercury by CVAA for TRU Waste Characterization, INEEL Analytical Laboratories Department Analytical Chemistry Methods Manual, ACMM-2810, Rev. 2, April 2003.
15. Determination of Metals by ICP-AES for TRU Waste Characterization, INEEL Analytical Laboratories Department Analytical Chemistry Methods Manual, ACMM-2901, Rev. 2, April 2003.
16. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, INEEL Analytical Laboratories Department Analytical Chemistry Methods Manual, ACMM-9260, Rev. 9, July 2003.
17. Determination of Nonhalogenated Volatile Organics by Gas Chromatography, INEEL Analytical Laboratories Department Analytical Chemistry Methods Manual, ACMM-9441, Rev. 8, April 2003.
18. Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, INEEL Analytical Laboratories Department Analytical Chemistry Methods Manual, ACMM-9270, Rev. 6, February 2004.
19. Sample Preparation for Semi-Volatile Organic Compounds and Polychlorinated Biphenyls, INEEL Analytical Laboratories Department Analytical Chemistry Methods Manual, ACMM-9500, Rev. 9, February 2004.
20. RCRA Statistical Sampling, MP-TRUW-8.25, Rev. 9, March 2005.
21. BNFL Inc., Memorandum, Sampling Plan for BN835 – EPS-063-2004, August 2004.
22. Data Reconciliation, MP-TRUW-8.11, Rev. 9, January 2005.
23. Preparation of Waste Stream Profile Forms, MP-TRUW-8.14, Rev. 4, November 2004.

Characterization Information Summary

Description

Advanced Mixed Waste Treatment Project (AMWTP) has compiled Acceptable Knowledge (AK) information for the waste stream BN835 as required by the Waste Isolation Pilot Plant (WIPP) Waste Analysis Plan (WAP) and the Contact-Handled Transuranic Waste Acceptance Criteria (CH-WAC). In addition, AMWTP has conducted confirmatory testing and analysis using real time radiography (RTR), headspace gas sampling and analysis, solid sampling and analysis, and radioassay.

Solid sampling was performed on randomly selected containers obtained from waste stream BN835, Solidified Acid/Caustic Waste from the Mound Plant. This waste stream Lot 1 population consists of 504 drums of mixed transuranic waste. Six drums were selected for solid sampling from the Lot 1 population. All of the drums were selected using a simple random selection method in accordance with MP-TRUW-8.25, RCRA Statistical Sampling. BNFL, Inc. memorandum EPS-063-2004, Sampling Plan for BN835, presents the Lot 1 evaluation for the required number of samples, the random generation verification, the list of sampled containers and the comprehensive list of containers. The list of containers will be submitted as a supplement to this report under a separate deliverable. This Characterization Information Summary (CIS) presents analytical data from six containers for the solids totals analysis and 17 containers for headspace gas analysis. These data meet the necessary requirements for confirmatory characterization.

Headspace gas analysis is presented in Tables 1A and 1B. Solid sampling data from the six containers is summarized in Tables 2, 3A, 3B, 4A and 4B of this CIS. Table 5 lists the correlation of container numbers to characterization data packages. Table 6 presents the RTR/Visual Examination (VE) summary of prohibited items and AK confirmation. Table 7 presents the correlation between the container number, the headspace gas sample number and the solid sample number.

These six containers satisfy the "n" required sample data for the characterization of the BN835 Lot 1 (see Attachment 1). The confirmatory characterization process for this waste stream will continue by conducting solids sampling and analysis of randomly selected cores on a waste stream lot basis.

Data Results

The data in this CIS is obtained from the required ("n") samples and is used to determine the mean concentrations and the 90% upper confidence levels (UCL_{90}s) for toxicity characteristic (TC) compounds and to conservatively assign and/or confirm hazardous waste codes for the BN835 waste stream.

The solid samples from the Lot 1 drums were analyzed by the Analytical Laboratories Department at the Idaho National Laboratory (INL) under a program certified in 2003.

Characterization Information Summary

Hazardous waste numbers (HWNs) are assigned based on Acceptable Knowledge. HWNs assigned by AK are applied to the waste stream even if headspace gas analytical results for the assigned compounds are not above the program required quantitation limit (PRQL). There were no solid sampling UCL_{90} results above the PRQLs for metals. There were no solid sampling results above the MDLs for VOCs. AK data indicate that there are no WAP target analyte semi-volatile organic compounds (SVOCs) present in the waste and there were no solid sampling results above the MDLs for SVOCs. Headspace gas results indicate that 1,1,1-trichloroethane and trichloroethylene have UCL_{90}s above the PRQL and provide confirmation of AK application of HWNs F001 and F002.

The HWN assignment for BN835 waste stream includes D007 (chromium), D008 (lead) and D009 (mercury), and listed codes F001 and F002 for 1,1,1-trichloroethane and trichloroethylene and F001 for carbon tetrachloride.

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

WSPF# BN835

Data Quality Objective	Yes	No	N/A	Comment
1. Have all containers in the lot been assigned an appropriate 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 TRU radioactive waste?	✓			AK was used to determine that the waste stream is TRU waste (BNFL-5232-RPT-TRUW-23).
4. Have mean concentrations, UCL_{90} values for the mean concentration, standard deviations, and the number of samples collected for each VOC in the headspace gas of waste containers in the waste stream lot been evaluated against the constituent hazardous waste number assignments?	✓			
5. Has the potential flammability of TRU waste headspace gases been evaluated for the lot?	✓			Containers will be evaluated on an individual basis through headspace gas and WWIS.
6. Have mean concentrations, UCL_{90} for the mean concentrations, standard deviations, and number of samples collected for VOCs, SVOCs, and metals in the waste stream (if applicable) lot been evaluated against the constituent hazardous waste number assignments?	✓			
7. Does the waste stream exhibit a toxicity characteristic (TC) under 40 CFR Part 261, Subpart C?	✓			
8. Can the waste stream be classified as hazardous or nonhazardous at the 90-percent confidence level?	✓			
9. Have a sufficient number of waste containers been visually examined (as a QC check on radiography) to determine with a reasonable level of certainty that the UCL_{90} for the miscertification rate is less than 14 percent for the summary category group?	✓			All of the containers in this report were included in the S3000 miscertification selection process (EPS-059-2004), however none were selected by random process.
10. Was an appropriate packaging configuration and Drum Age Criteria (DAC) applied and documented in the headspace gas sampling documentation and was the drum age criteria met prior to sampling?	✓			
11. Have all TICs been appropriately identified and reported in accordance with the requirements of Section B3-1 for the lot?	✓			
12. Have the overall completeness, comparability, and representativeness QAOs been met for each of the analytical and testing procedures as specified in Sections B3-2 through B3-9 for the lot?	✓			
13. Have the PRQLs for all analyses been met for the lot?	✓			See footnote e Table 3A for non-detects with dilution.

Eric Schweinsberg — Signature of Site Project Manager

Eric Schweinsberg — Printed Name

4/6/05 — Date

WSPF Number: BN835

SQAO [signature] Date: 4/6/05

SQAO signature indicates that the information presented in this package is consistent with analytical batch reports.

SPM [signature] Date: 4/6/05

SPM signature indicates concurrence with all information presented in this report.

Characterization Description:

Drum selection and quantity of drums for Totals Analysis; Reduced Headspace Gas Sampling; and/or Newly Generated Soils/Gravel have been evaluated and meet the requirements established in MP-TRUW-8.25, *RCRA Statistical Sampling*.

Y ☐ N☐ NA ☒

Eric Schmeckpeper 4/6/05

SPM Signature Date

For "N" or "NA" provide rationale.

Drum selection and quantity of drums for Totals Analysis only has been evaluated and meets the requirements of MP-TRUW-8.25.

Table 1A. Headspace Gas summary data. BN835 Lot 1

ANALYTE	Number of Samples	# of Samples above MDL[a]	Transformation Used[e]	Maximum (ppmv)	Mean (ppmv)	Standard Deviation (ppmv)	Upper 90% Confidence Limit (ppmv)	Transformed PRQL	PRQL (ppmv)	EPA Code
1,1-Dichloroethane	17	0	None	4.10	3.04	1.01	b	-	10	N/A
1,1-Dichloroethylene[c]	17	9	Natural log	2.65	1.52	0.835	1.79	2.30	10	N/A
1,1,1-Trichloroethane[c]	17	17	Natural log	5.39	4.13	0.897	4.42	2.30	10	F001, F002[d]
1,1,2-Trichloro-1,2,2-trifluoroethane[c]	17	2	Natural log	2.03	0.826	0.536	1.00	2.30	10	N/A
1,1,2,2-Tetrachloroethane	17	0	None	4.55	3.46	1.03	b	-	10	N/A
1,2-Dichloroethane	17	0	None	4.35	2.93	1.07	b	-	10	N/A
Acetone	17	0	None	15.7	13.1	2.05	b	-	100	N/A
Benzene	17	0	None	3.30	2.19	0.763	b	-	10	N/A
Bromoform	17	0	None	4.35	2.79	1.19	b	-	10	N/A
Butanol	17	0	None	19.5	14.4	3.26	b	-	100	N/A
Chlorobenzene	17	0	None	4.10	3.00	1.04	b	-	10	N/A
Carbon tetrachloride[c]	17	4	Natural log	3.00	1.15	0.753	1.39	2.30	10	F001[d]
Chloroform	17	0	None	4.30	2.83	1.09	b	-	10	N/A
cis-1,2-dichloroethylene	17	0	None	3.85	2.38	0.981	b	-	10	N/A
Ethyl benzene	17	0	None	4.70	3.13	1.18	b	-	10	N/A
Ethyl ether	17	0	None	4.65	2.81	1.17	b	-	10	N/A
m-Xylene/p-Xylene	17	0	None	4.45	3.66	1.11	b	-	10	N/A
Methanol[c]	17	6	Natural log	4.42	3.17	0.646	3.38	4.61	100	N/A
Methyl ethyl ketone	17	0	None	18.7	11.9	4.76	b	-	100	N/A
Methyl isobutyl ketone	17	0	None	12.5	10.0	1.99	b	-	100	N/A
Methylene chloride[c]	17	2	Natural log	3.34	1.36	0.828	1.62	2.30	10	N/A
o-Xylene	17	0	None	4.00	2.91	0.964	b	-	10	N/A
Tetrachloroethylene	17	0	None	3.85	3.07	0.918	b	-	10	N/A
Toluene[c]	17	5	Natural log	2.26	1.13	0.535	1.31	2.30	10	N/A
trans-1,2-dichloroethylene	17	0	None	3.30	2.08	0.863	b	-	10	N/A
Trichloroethylene[c]	17	13	Natural log	6.67	3.42	1.96	4.05	2.30	10	F001, F002[d]

a. When a measurement is reported as below detection, one-half the analysis method detection limit (MDL) is used. Note that the MDL for a given analyte may vary from sample to sample.

b. The mean and standard deviation presented are the mean and standard deviation of the method detection limits (after dividing by 2). All measurements are below detection; therefore, the upper 90% confidence limit is not calculated.

c. The maximum, mean, standard deviation, and UCL_{90}, and PRQL are presented as transformed values.

d. The HWNs for these constituents have been applied based on acceptable knowledge.

e. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and PRQL.

Did the data verify the Acceptable Knowledge? YES: X NO:_____

If no, describe the basis for assigning the EPA Hazardous Waste Code. N/A

Statistics Performed by: [signature] Date: 4/6/05
Signature

Table 1B. Headspace gas summary data – tentatively identified compounds. BN835 Lot 1

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
2-Propanol, 2-methyl-	113.3	3	17	18	17	18

NOTE: 2-Propanol, 2-methyl- is found in less than twenty-five percent of the samples from Lot 1. It is not identified in acceptable knowledge and is not listed in 40 CFR, Part 261, Appendix VIII. Therefore, in accordance with the WIPP WAP, no further action is required.

Did the data verify the Acceptable Knowledge? YES: X NO:_____

If no, describe the basis for assigning the EPA Hazardous Waste Code. N/A

Verification of % Detected Calculation: _____ Date: 4.6.05
Signature

Table 2. Metals summary data. BN835 Lot 1

ANALYTE	# Samples	# Samples above MDL[e]	Transformation Used[f]	Maximum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Transformed RTL	RTL[d]	EPA Code
Arsenic[a]	6	6	Natural log	0.470	0.022	0.252	0.174	4.61	100	N/A
Barium[a]	6	6	Natural log	5.19	4.75	0.321	4.94	7.60	2000	N/A
Cadmium	6	6	None	0.870	0.703	0.196	0.821	-	20	N/A
Chromium	6	6	None	89.0	81.8	5.91	85.4	-	100	D007[b]
Lead[a]	6	6	Natural log	2.30	1.99	0.185	2.10	4.61	100	D008[b]
Mercury	6	1	None	0.023	0.016	0.006	0.019	-	4	D009[b]
Selenium	6	2	None	0.770	0.484	0.206	0.608	-	20	N/A
Silver	6	0	None	0.200	0.183	0.026	c	-	100	N/A
Antimony[a]	6	6	Natural log	0.588	0.219	0.235	0.361	4.61	100	N/A
Beryllium[a]	6	6	Natural log	1.72	1.47	0.234	1.61	4.61	100	N/A
Nickel[a]	6	6	Natural log	3.89	3.55	0.209	3.67	4.61	100	N/A
Thallium	6	5	None	1.50	1.09	0.382	1.32	-	100	N/A
Vanadium	6	6	None	88.0	82.2	5.27	85.3	-	100	N/A
Zinc[a]	6	6	Natural log	4.41	4.25	0.118	4.32	4.61	100	N/A

a. The maximum, mean, standard deviation, and UCL_{90}, and RTL are presented as transformed values.
b. The HWNs for these constituents have been applied based on acceptable knowledge and have been retained for this waste stream even though the data did not confirm the presence above the RTL.
c. The mean and standard deviation presented are the mean and standard deviation of the method detection limits (after dividing by 2). All measurements are below detection; therefore, the upper 90% confidence limit is not calculated.
d. For toxicity characteristic constituents that do not have a PRQL in the permit, the TC limit (mg/L) multiplied by 20 is used to calculate the regulatory threshold limit (RTL) as the PRQL.
e. When a measurement is reported as below detection, one-half the analysis method detection limit (MDL) is used. Note that the MDL for a given analyte may vary from sample to sample.
f. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and RTL.

Did the data verify the Acceptable Knowledge? YES: X NO:_____

If no, describe the basis for assigning the EPA Hazardous Waste Code. N/A

Statistics Performed by: Tamara L Blus
Signature

Date: 4/6/05

Table 3A. Solid Sample Analysis - Total VOC summary data. BN835 Lot 1

Analyte	# Samples	# Samples above MDL[a]	Trans-formation Used[f]	Maximum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Trans-formed PRQL	PRQL (mg/kg)[c]	EPA Code
1,1-Dichloroethylene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
(trans)-1,2-Dichloroethylene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
1,2-Dichloroethane	6	0	None	0.095	0.088	0.004	b	-	10	N/A
1,1,1-Trichloroethane	6	0	None	0.095	0.088	0.004	b	-	10	F001, F002[d]
1,1,2,2-Tetrachloroethane	6	0	None	0.095	0.088	0.004	b	-	10	N/A
1,1,2-Trichloro-1,2,2-Trifluoroethane	6	0	None	0.190	0.178	0.007	b	-	10	N/A
1,1,2-Trichloroethane	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Acetone	6	0	None	-	e	-	b	-	100	N/A
Benzene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Bromoform	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Butanol	6	0	None	-	e	-	b	-	100	N/A
Carbon disulfide	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Carbon tetrachloride	6	0	None	0.190	0.178	0.007	b	-	10	F001[d]
Chlorobenzene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Chloroform	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Ethyl benzene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Ethyl ether	6	0	None	-	e	-	b	-	100	N/A
Isobutanol	6	0	None	-	e	-	b	-	100	N/A
Methanol	6	0	None	-	e	-	b	-	100	N/A
Methylene chloride	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Methyl ethyl ketone	6	0	None	-	e	-	b	-	100	N/A
m-Xylene/p-Xylene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
o-Xylene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Pyridine	6	0	None	-	e	-	b	-	100	N/A
Tetrachloroethylene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Toluene	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Trichloroethylene	6	0	None	0.095	0.088	0.004	b	-	10	F001, F002[d]
Trichlorofluoromethane	6	0	None	0.095	0.088	0.004	b	-	10	N/A
Vinyl chloride	6	0	None	0.095	0.088	0.004	b	-	4	N/A

a. When a measurement is reported as below detection, one-half of the analysis MDL is used. Note that the MDL for a given analyte may vary from sample to sample.

b. The mean and standard deviation presented are the mean and standard deviation of the method detection limits (after dividing by 2). All measurements are below detection; therefore, the upper 90% confidence limit is not calculated.

c. For toxicity characteristic constituents that do not have a Program Required Quantitation Limit (PRQL) in the permit, the TC limit (mg/L) multiplied by 20 is used to calculate the RTL as the PRQL. For listed constituents, the PRQL is used.

d. These HWNs were assigned to the waste stream based upon acceptable knowledge and have been retained for this waste stream even though the data did not confirm the presense above the PRQL

e. All samples were diluted due to radionuclide content and were below the MDL. Diluted samples below the MDL are not used to calculate the maximum, mean, standard deviation and upper 90% confidence limit.

f. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and RTL.

Did the data verify the Acceptable Knowledge? YES: X NO: _____

If no, describe the basis for assigning the EPA Hazardous Waste Code. N/A

Statistics Performed by: Tamara E Sobus Date: 4/6/05

Signature

Table 3B. Total VOC summary data – tentatively identified compounds. BN835 Lot 1

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
None	N/A	N/A	N/A	N/A	N/A	N/A

Did the data verify the Acceptable Knowledge? YES: X NO:_____

If no, describe the basis for assigning the EPA Hazardous Waste Code. N/A

Verification of % Detected Calculation: N/A Date:_____

Signature

Table 4A. Solid Sample Analysis - Total SVOC summary data. BN835 Lot 1

Analyte	# Samples	# Samples Above MDL[a]	Trans-formation Used[d]	Maximum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Trans-formed PRQL	PRQL (mg/kg)[c]	EPA Code
1,4-Dichlorobenzene	6	0	None	0.100	0.100	0.000	b	-	40	N/A
2,4-Dinitrotoluene	6	0	None	0.100	0.100	0.000	b	-	2.6	N/A
Cresols	6	0	None	0.200	0.200	0.000	b	-	40	N/A
Hexachloro-benzene	6	0	None	0.100	0.100	0.000	b	-	2.6	N/A
Hexachloroethane	6	0	None	0.100	0.100	0.000	b	-	40	N/A
Nitrobenzene	6	0	None	0.100	0.100	0.000	b	-	40	N/A
Pentachlorophenol	6	0	None	0.100	0.100	0.000	b	-	40	N/A
2,4-Dinitrophenol	6	0	None	0.100	0.100	0.000	b	-	40	N/A
1,2-Dichlorobenzene (ortho-Dichlorobenzene)	6	0	None	0.100	0.100	0.000	b	-	40	N/A

a. When a measurement is reported as below detection, one-half of the analysis MDL is used. Note that the MDL for a given analyte may vary from sample to sample.

b. The mean and standard deviation presented are the mean and standard deviation of the method detection limits (after dividing by 2). All measurements are below detection; therefore, the upper 90% confidence limit is not calculated.

c. For toxicity characteristic constituents that do not have a PRQL in the permit, the TC limit (mg/L) multiplied by 20 to calculate the RTL is used as the PRQL. For listed constituents, the PRQL is used.

d. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL^{90}, and PRQL.

Did the data verify the Acceptable Knowledge? YES: X NO: _____

If no, describe the basis for assigning the EPA Hazardous Waste Code. N/A

Statistics Performed by: Tamara S Blue
Signature

Date: 4/6/05

Table 4B. Total SVOC summary data – tentatively identified compounds. BN835 Lot 1

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
bis(2-Ethylhexyl) phthalate	2.70	1	6	17	6	17

Did the data verify the Acceptable Knowledge? YES: X NO:_____

If no, describe the basis for assigning the EPA Hazardous Waste Code. N/A

Verification of % Detected Calculation: D Kar[illegible] Date: 4.6.05

Signature

Table 5. Correlation of container identification numbers to data package. BN835 Lot 1

Container Number	Headspace Gas Sampling Data Package	RTR Data Package	RA Data Package	Visual Examination Data Package	Solid Sampling Data Package	Solid Analysis Data Package
10001521	HSG04-00415	RTR04-00163	ASY04-00430	N/A	N/A	N/A
10001524	HSG04-00419	RTR04-00160	ASY04-00406	N/A	N/A	N/A
10001525	HSG04-00408	RTR04-00163	ASY04-00401	N/A	SSC04-00004	ALD04012S ALD04018M ALD04014N ALD04013V
10001527	HSG04-00412	RTR04-00163	ASY04-00429	N/A	N/A	N/A
10001547	HSG04-00390	RTR04-00079	ASY04-00353	N/A	N/A	N/A
10001659	HSG04-00408	RTR04-00163	ASY04-00402	N/A	N/A	N/A
10001665	HSG04-00415	RTR04-00163	ASY04-00750	N/A	N/A	N/A
10001667	HSG04-81005	RTR04-00079	ASY04-00352	N/A	N/A	N/A
10001675	HSG04-00412	RTR04-00164	ASY04-00751	N/A	N/A	N/A
10001689	HSG04-81005	RTR04-00163	ASY04-00430	N/A	N/A	N/A
10001694	HSG04-00392	RTR04-00079	ASY04-00358	N/A	N/A	N/A
10001701	HSG04-00419	RTR04-00160	ASY04-00406	N/A	N/A	N/A
10001703	HS205_00016	RTR04-00163	ASY04-00401	N/A	SSC04-00004	ALD04012S ALD04018M ALD04014N ALD04013V
10011369	HSG04-00449	RTR04-00243	ASY04-00661	N/A	SSC04-00008	ALD04017S ALD04022M ALD04019N ALD04018V
10018987	HSG04-00449	RTR04-00214	ASY04-00468	N/A	SSC04-00008	ALD04017S ALD04022M ALD04019N ALD04018V
10021963	HSG04-81006	RTR04-00251	ASY04-00721	N/A	SSC04-00008	ALD04017S ALD04022M ALD04019N ALD04018V
10022194	HS205_00016	RTR05-00041	ASY04-00878	N/A	SSC04-00008	ALD04017S ALD04022M ALD04019N ALD04018V

NOTE: For headspace gas sampling data packages, the HSG prefix represents use of the DVS system and the HS prefix represents use of the HGAS system.

Table 6. RTR/VE summary of prohibited items and AK confirmation. BN835 Lot 1

Container Number	RTR Prohibited Items[a]	Visual Examination Prohibited Items[d]	AK Confirmation[b,c,e]
10001521	None	N/A	Complete
10001524	None	N/A	Complete
10001525	None	N/A	Complete
10001527	None	N/A	Complete
10001547	None	N/A	Complete
10001659	None	N/A	Complete
10001665	None	N/A	Complete
10001667	None	N/A	Complete
10001675	None	N/A	Complete
10001689	None	N/A	Complete
10001694	None	N/A	Complete
10001701	None	N/A	Complete
10001703	None	N/A	Complete
10011369	None	N/A	Complete
10018987	None	N/A	Complete
10021963	None	N/A	Complete
10022194	None	N/A	Complete

a. See Table 5 for the associated RTR data packages. None of the identified containers contain prohibited items as defined by Section B-1c of the Advanced Mixed Waste Treatment Project Quality Assurance Project Plan (QAPjP), MP-TRUW-8.2.
b. Acceptable Knowledge confirmation for RTR and visual examination is conducted by an Acceptable Knowledge Expert or Designee on every drum by completing a checklist for each RTR and visual batch. This checklist can be accessed through the data packages listed in Table 5.
c. None of these drums have VE in lieu of RTR examination.
d. N/A indicates these containers were not randomly selected for VE.
e. The absence of prohibited items is determined and documented through acceptable knowledge and confirmation activities. Radiography or visual examination is performed on each container in this waste stream as a confirmation activity.

Table 7. Sample identification number cross-correlation table. BN835 Lot 1

Container Number	Headspace Gas Sample Number	Solidified Sample Number(s)
10001521	HSG04-00415C5	N/A
10001524	HSG04-00419C5	N/A
10001525	HSG04-00408B5	10017088, 10017086, 10017085
10001527	HSG04-00412B11	N/A
10001547	HSG04-00390B11	N/A
10001659	HSG04-00408B7	N/A
10001665	HSG04-00415C7	N/A
10001667	HSG04-81005B4	N/A
10001675	HSG04-00412B8	N/A
10001689	HSG04-81005B5	N/A
10001694	HSG04-00392B5	N/A
10001701	HSG04-00419C4	N/A
10001703	HS205_00016B-03	10017834, 10017832, 10017831
10011369	HSG04-00449B6	10021973, 10021971, 10021970
10018987	HSG04-00449B5	10022154, 10022152, 10022151
10021963	HSG04-81006C9	10022110, 10022108, 10022107
10022194	HS205_00016B-01	10022274, 10022273, 10022271

NOTE: The number presented in the Headspace Gas Sample Number column of this table is a combination of the batch number (HSG04-00415) and the sequential instrument ID used in the batch for reporting (C5). This combination is unique and will allow traceability back to the data as collected and reported.

Attachment 1

Evaluation of required number of samples BN835 Lot 1

ANALYTE	Number of Samples[g]	Number of Samples above MDL[h]	Transformation Used[e]	Maximum (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	Upper 90% Confidence Limit (mg/kg)	Transformed PRQL	PRQL (mg/kg)	Required Number of Samples[d, f]	Comments
1,1,1-Trichloroethane	6	0	None	0.095	0.088	0.004	a	-	10		Code F001, F002 applied[b]
1,1,2,2-Tetrachloroethane	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
1,1,2-Trichloro-1,2,2-trifluoroethane	6	0	None	0.190	0.178	0.007	a	-	10		No samples above MDL
1,1,2-Trichloroethane	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
1,1-Dichloroethene (1,1-Dichloroethylene)	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
1,2-Dichlorobenzene (o-Dichlorobenzene)	6	0	None	0.100	0.100	0.000	a	-	40		No samples above MDL
1,2-Dichloroethane	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
1,4-Dichlorobenzene (p-Dichlorobenzene)	6	0	None	0.100	0.100	0.000	a	-	40		No samples above MDL
2,4-Dinitrophenol	6	0	None	0.100	0.100	0.000	a	-	40		No samples above MDL
2,4-Dinitrotoluene	6	0	None	0.100	0.100	0.000	a	-	2.6		No samples above MDL
Cresols	6	0	None	0.200	0.200	0.000	a	-	40		No samples above MDL
Acetone	6 (6)	0	None	-	-	-	a	-	100		No samples above MDL
Antimony	6	6	Natural log	0.588	0.219	0.235	0.361	4.61	100	5	No associated hazardous waste code[c]
Arsenic	6	6	Natural log	0.470	0.022	0.252	0.174	4.61	100	5	Code not required to be applied [i]
Barium	6	6	Natural log	5.19	4.75	0.321	4.94	7.60	2000	5	Code not required to be applied [i]
Benzene	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Beryllium	6	6	Natural log	1.72	1.47	0.234	1.61	4.61	100	5	No associated hazardous waste code[c]
Bromoform	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Butanol	6 (6)	0	None	-	-	-	a	-	100		No samples above MDL
Cadmium	6	6	None	0.870	0.703	0.196	0.821	-	20	5	Code not required to be applied [i]
Carbon Disulfide	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Carbon Tetrachloride	6	0	None	0.190	0.178	0.007	a	-	10		Code F001 applied[b]
Chlorobenzene	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Chloroform	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Chromium	6	6	None	89.0	81.8	5.91	85.4	-	100	5	Code D007 applied[b]
Ethyl ether	6 (6)	0	None	-	-	-	a	-	100		No samples above MDL
Ethyl benzene	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Hexachlorobenzene	6	0	None	0.100	0.100	0.000	a	-	2.6		No samples above MDL
Hexachloroethane	6	0	None	0.100	0.100	0.000	a	-	40		No samples above MDL

ANALYTE	Number of Samples[g]	Number of Samples above MDL[h]	Transformation Used[e]	Maximum (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	Upper 90% Confidence Limit (mg/kg)	Transformed PRQL	PRQL (mg/kg)	Required Number of Samples[d, f]	Comments
Isobutanol	6 (6)	0	None	-	-	-	a	-	100		No samples above MDL
Lead	6	6	Natural log	2.30	1.99	0.185	2.10	4.61	100	5	Code D008 applied[b]
m&p-Xylene	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Mercury	6	1	None	0.023	0.016	0.006	0.019	-	4.0	5	Code D009 applied[b]
Methanol	6 (6)	0	None	-	-	-	a	-	100		No samples above MDL
Methyl ethyl ketone	6 (6)	0	None	-	-	-	a	-	100		No samples above MDL
Methylene Chloride	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Nickel	6	6	Natural log	3.89	3.55	0.209	3.67	4.61	100	5	No associated hazardous waste code[c]
Nitrobenzene	6	0	None	0.100	0.100	0.000	a	-	40		No samples above MDL
o-Xylene	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Pentachlorophenol	6	0	None	0.100	0.100	0.000	a	-	40		No samples above MDL
Pyridine	6 (6)	0	None	-	-	-	a	-	100		No samples above MDL
Selenium	6	2	None	0.770	0.484	0.206	0.608	-	20	5	Code not required to be applied[i]
Silver	6	0	None	0.200	0.183	0.026	a	-	100		No samples above MDL
Tetrachloroethene (Tetrachloroethylene)	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Thallium	6	5	None	1.50	1.09	0.382	1.32	-	100	5	No associated hazardous waste code[c]
Toluene	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
trans-1,2-Dichloroethene (trans-1,2-Dichloroethylene)	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Trichloroethene (Trichloroethylene)	6	0	None	0.095	0.088	0.004	a	-	10		Code F001, F002 applied[b]
Trichlorofluoromethane	6	0	None	0.095	0.088	0.004	a	-	10		No samples above MDL
Vanadium	6	6	None	88.0	82.2	5.27	85.3	-	100	5	No associated hazardous waste code[c]
Vinyl Chloride	6	0	None	0.095	0.088	0.004	a	-	4		No samples above MDL
Zinc	6	6	Natural log	4.41	4.25	0.118	4.32	4.61	100	5	No associated hazardous waste code[c]

NOTE:

a. The mean and standard deviation presented are the mean and standard deviation of the method detection limits (after dividing by 2) for all measurements that are below detection. Therefore, since measurements are below detection, the upper 90% confidence limit will not be calculated.

b. These HWNs, assigned by AK, are applied to the waste stream even if analytical results for the assigned compounds are not above the PRQL.

c. If there is no hazardous waste code associated with an analyte, then that analyte will not be used to define the number of required samples.

d. If there are no samples above the MDL for a given analyte, then that analyte will not be used to define the number of required samples.

e. If a transformation is applied to the distribution to improve normality, prior to calculating the mean and variance, then this same transformation is applied to the PRQL / RTL for that analyte.

f. If the calculated sample size is less than 5, then the initial estimated number of required samples is set to the program defined minimum of 5.

g. Diluted samples below the MDL are not used to calculate the maximum, mean, standard deviation and upper 90% confidence limit. The number of diluted samples below the MDL are noted as (#) in the Number of samples column.

h. Distribution testing is not performed on 2 or fewer applicable samples; therefore, a normal distribution is assumed.

i. The HWN is not assigned based on AK, and the upper 90% confidence limits are below the RTL or PRQL.

Acceptable Knowledge Summary for Solidified Acid/Caustic Waste (BN835)

Advanced Mixed Waste Treatment Project

(Signature on file. See DCR-11331.)
Susan Peterman
TRU Program Manager

06/27/12
Date

Advanced Mixed Waste Treatment Project

Acceptable Knowledge Summary for Solidified Acid/Caustic Waste (BN835)

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ACRONYMS

AK	acceptable knowledge
AMWTP	Advanced Mixed Waste Treatment Project
CCP	Central Characterization Project
CFR	Code of Federal Regulations
CH	contact-handled
DOT	U.S. Department of Transportation
DU	depleted uranium
EDL	economic discard limit
EPA	U.S. Environmental Protection Agency
EU	enriched uranium
HWN	hazardous waste number
IDC	item description code
INL	Idaho National Laboratory
PCB	polychlorinated biphenyl
PMC	plutonium-molybdenum cermet
PP	Plutonium Processing (Bldg. 38)
PPO	Pressed plutonium oxide
R	Research (Building)
RTG	Radioisotopic Thermoelectric Generators
RTR	real-time radiography
SM	Special Metallurgical (Building)
SW	Semi-Works (Building)
TRUCON	TRUPACT-II Content Code
TSCA	Toxic Substances Control Act
TWBIR	Transuranic Waste Baseline Inventory Report
VE	visual examination
VOCs	volatile organic compounds
WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan (Attachment B of the WIPP Hazardous Waste Permit)
WIPP	Waste Isolation Pilot Plant
WD	Waste Disposal (Building)
WDA	Waste Disposal Annex
WMC	waste matrix code
WMP	waste material parameter
WS	Waste Solidification (Facility)

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BN835 (2)

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

Solidified Acid/Caustic Waste (2)

1.2.2 Point of Generation

Mound Plant – Special Metallurgical (SM)/Plutonium Processing (PP) Building (Building 38) (also known as SM/PP complex); Semi-Works (SW) Building/Research (R) Building (also known as SW/R Complex); and Waste Solidification (WS) Facility. [1, 20, 21, 22]

1.2.3 Waste Stream Volume (Retrievably Stored)

2,577 – 55 and 85-gallon drums [3]

1.2.4 Generation Dates

1974 - 1985 [1, 3, 16]

AMWTP stores containers of Mound solidified acid/caustic waste generated from 1975 to 1985. Waste stored at AMWTP with generation dates (i.e., pack date) later than 1985 are the result of repackaging (e.g., waste characterization/treatment activities).

1.2.5 TRUPACT-II Content (TRUCON) Codes

ID111/ID211 [4]

1.2.6 Transuranic Waste Baseline Inventory Report (TWBIR) Information

Waste Stream ID: IN-BN835 (previously identified as IN-W174.154, IN-W177.156) [5]

1.2.7 Summary Category Group

S3000 – Homogenous Solids [2, 6]

1.2.8 Waste Matrix Code Group

Solidified Inorganics [2, 9]

1.2.9 Waste Matrix Code

S3113 – Inorganic Particulate Absorbents [2, 6, 19]

Waste Matrix Code (WMC) S3113 consists of waste that is primarily inorganic particulate absorbent materials (i.e., ≥ 50% by volume), including absorbed aqueous liquids, if present. Typical examples of inorganic particulate materials are clay, vermiculite, and diatomaceous earth. [6]

1.2.10 Description from the WTWBIR

This waste comes from the Mound Laboratory. It consists of acid liquids, mainly nitric, absorbed onto a clay called Florco (aluminum, magnesium, iron silicate clay). The waste also consists of caustic liquid waste and neutralized waste liquids, absorbed onto a clay called Florco. The Florco is then placed in a drum bag in a drum lined with a 90-mil poly liner. [5]

*Prior to the use of Florco, clay absorbent mixed with diatomaceous earth and vermiculite were added to acid and caustic liquid wastes to absorb liquids.

1.3 Waste Stream Description

1.3.1 Description

The Solidified Acid/Caustic waste stream consists of drums containing solidified acid (Item Description Code [IDC] 834) and caustic (IDC 835) wastes combined with nonhazardous absorbent (vermiculite, clay absorbent mixed with diatomaceous earth or aluminum-magnesium-iron silicate clay material [Florco]). [1, 10] The waste stream was generated from pressed plutonium oxide (PPO) sphere or plutonium molybdenum cermet (a material consisting of ceramic particles bonded with metal) (PMC) production, isotope recovery, cleaning or leaching of items, and construction of standards. After 1976 acidic and caustic liquid wastes were commingled during the waste treatment process. This waste is similar in material, physical form, and hazardous constituents, and is therefore considered a single waste stream. Table 1-1 identifies the WMC and typical waste description for the Solidified Acid/Caustic Waste. [1, 16, 17, 18]

Table 1-1. Physical Waste Form Descriptions for Solidified Acid/Caustic Waste.

TWBIR Numbers	IDC	WMC	Description
IN-W174.154	834	S3113	Acidic liquid waste contained approximately 95% nitric acid with trace amounts of hydrofluoric, hydrochloric, sulfuric and oxalic acids. IDC 834 waste was generated or repackaged from 1975 through 1980. Since December 1976, acidic liquid waste was combined with caustic liquid waste from plutonium processing in the WS building. [1, 16, 17, 18, 21, 23, 31] Acidic liquid waste was absorbed with vermiculite, clay absorbent mixed with diatomaceous earth or aluminum-magnesium-iron silicate clay material (Florco). There are 901 containers of IDC 834. [1, 16]
IN-W177.156	835	S3113	Caustic liquid waste consists primarily of sodium hydroxide and limited amounts of ammonium hydroxide. IDC 835 was generated from 1974 through 1985. Caustic liquid waste was absorbed with vermiculite, clay absorbent mixed with diatomaceous earth or aluminum-magnesium-iron silicate clay material (Florco). [1, 16, 17, 18, 23] There are 1,676 containers of IDC 835. [1, 3]

1.4 Process Description

1.4.1 Areas of Operation

This waste stream was primarily generated in the PP Building during plutonium processing and recovery operations and from the corrosive vapor scrubber. Liquid waste was collected and processed in the Waste Disposal (WD) Building, which included the Waste Disposal Annex (WDA). Problems with leakage associated with the waste lines used to transfer wastewater to the WDA prompted construction of the high-risk WS Facility. Acidic and caustic liquid waste (also referred to historically as high-risk alpha wastewater) was then processed at the WS Facility. [17, 20, 21, 22]

Acidic and caustic materials were used in research activities, metallography, and decontamination of laboratory equipment and components in the SW/R Complex and the PP Building. Chemical analysis of samples in R Building generated small amounts of acidic and caustic liquid waste. [17, 18]

1.4.2 Waste Generating Processes

1.4.2.1 Plutonium Processing

Acidic and caustic liquid wastes generated during plutonium processing in the PP and R Buildings were classified as high-risk or low-risk depending upon radionuclide activity. The classification of liquids as high-risk or low-risk designated the treatment methodology. Low-risk liquid waste was processed in the Special Metallurgical Building (SM) or WD Building prior to being discharged as treated effluent; this waste is not part of BN835. High-risk liquid wastes were absorbed onto a vermiculite, diatomaceous earth or clay material and shipped offsite for disposal. [16, 17]

High-risk liquid wastes were caustic or acidic depending on where they were generated in the plutonium processes; either during isotope recovery, cleaning or leaching of items, or construction of assay standards. The plutonium processes that generated waste stream BN835 were:

- Pressed plutonium oxide (PPO) production,
- Plutonium-molybdenum cermet (PMC) production,
- Plutonium recovery and,
- Production of standards

The PPO process involved dissolution of ^{238}Pu oxide in a mixture of nitric and hydrofluoric acid. The resulting solution was treated with ammonium hydroxide to precipitate plutonium hydroxide. The solution was filtered, and the plutonium precipitate was washed with dilute ammonium hydroxide solution generating caustic liquid waste. The washed precipitate was vacuum dried and then air-dried overnight. The dried precipitate was crushed to produce a fine powder that was pressed into a 'button' for use in radioisotopic thermoelectric generators (RTGs). Subsequent process activities did not produce liquid waste. [16] See Figure A-1, Mound PPO sphere fabrication flowsheet, for a flow diagram of this process. [1, 17, 18, 20, 21, 32, 33]

The PMC process used a cermet consisting of a sintered granular plutonium dioxide coated with molybdenum to produce ^{238}Pu heat sources. Filtrate from this process was a liquid waste that was subsequently separated into either liquid exceeding the economic discard limit (EDL) sent to recovery or liquid below the EDL sent to waste disposal. [16] See Figure A-2, Mound Plutonium-molybdenum cermet (PMC) production, for a flow diagram of this process. [1, 17, 20]

The plutonium recovery process involved washing or leaching solid objects contaminated with plutonium in water or acid solutions. Following washing or leaching, objects were either returned to their original use or declared as high or low-risk waste based upon assay. Highly acidic plutonium solutions and the wash water were sent to plutonium recovery. The PPO and PMC RTG materials that did not meet product specifications were dissolved in a nitric and hydrofluoric acid mixture and reprocessed. Glass fiber filters were dissolved in a hydrofluorinator-pressurized vessel, and the volatile silicon tetrafluoride generated was removed via a caustic scrubber. Caustic scrubber solutions were designated as recoverable, or high-risk / low risk waste, based on the EDL and sent to recovery or waste treatment as applicable. (16, 17, 18) See Figure A-3, Mound Plutonium recovery flow diagram, for a flow diagram of this process. (1, 17, 20)

High-risk acid waste was also generated during ^{234}U separation projects in R Building. The ^{234}U was extracted from aged ^{238}Pu using nitric acid in R Building. (16) See Figure A-4, Mound Chemical separation steps for recovery and purification of uranium-234 from plutonium-238, for a flow diagram of this process. (1, 17)

Caustic liquid waste was generated primarily from the corrosive vapor scrubber system in the PP Building. The system was charged with a caustic solution (sodium hydroxide) to scrub acidic fumes from all PP operations. Some caustic liquid waste was also generated and processed in the R Building. (1, 16, 17, 18, 20, 21, 22, 33)

After 1976, high-risk acidic liquid waste was combined with caustic liquid waste for processing. This liquid waste was processed at the WS Facility. (1, 16, 17, 20, 21)

Small quantities of waste drums in this waste stream were generated in the SW/R Complex and PP Building from processes other than plutonium recovery (i.e. production of assay standards, research activities, metallography, chemical analysis of samples, and decontamination of laboratory equipment and components). Assay standards were constructed by adding solutions of known plutonium content to absorbent in small (1, 2, and 4 liter*) plastic bottles. These solidified standards were placed in 55-gallon drums to simulate waste drums. (1, 16, 17)

*Drums containing sealed bottles greater than 4-liters will be removed from this waste stream if identified by real-time radiography (RTR).

The H Building housed laundry facilities for both uncontaminated and contaminated clothing. Waste generated at the H Building from the laundry, the floor drains, and a sink was collected in a holding tank and drained through a pipe to a lift station at the SW Building. From the lift station, the H Building wastewater was pumped to the WD Building influent tanks. Products used in the H Building that would have entered the wastewater included liquid soap containing ethylene glycol monobutyl ether and sodium hydroxide, powdered soap that contained ammonium bicarbonate and sodium hexametaphosphate, and fabric softener. (16, 17, 22)

The SW/R Building complex included a small laboratory section that handled alpha emitting radionuclides such as ^{238}Pu and ^{239}Pu. This laboratory was used for research and development, mostly involving solvent extraction processes. The sink and floor drains from these laboratories were connected to a sump equipped with a steam lift pump that pumped the wastewater to the R Building and then to the alpha influent tanks in the WD Building. Chemicals used in the laboratory included carbon tetrachloride, dichloromethane, 1,1,1-trichloroethane, organophosphate, nitric acid, and sulfuric acid. Chemicals used in other R Building operations included hydrogen peroxide; ammonium hydroxide; hydrofluoric, nitric, sulfuric and lactic acids; methanol, propanol, mineral oil, ethanol, acetone and trichloroethylene; sodium sulfite solution; potassium and copper sulfates; carbonates; and sodium hydroxide (lime).[16, 17, 21, 34, 35, 36]

The SM and the PP processes were virtually the same and are discussed as the SM/PP complex. Wastewater was collected in a 10,000-gallon tank on the west side of the PP Building, pumped to a tanker truck, and transported to the WD Building. PP wastewater from floor drains, shower water, sinks, and a laboratory were collected in sumps. The sump water was then pumped to a tank on the west side of PP and then pumped to a tanker truck for transport to the WD Building for treatment.[16, 17] Wastes generated from plutonium processes were managed as illustrated in Figure 3-5 in RPT-TRUW-13, AK Document for INL Stored Transuranic Waste-Mound Plant Waste. [1]

The laboratory in PP Building performed a variety of analytical procedures, such as mass spectrometry, calorimetry, ion exchange, radiochemical separations, liquid scintillation, gamma spectroscopy, and plating of alpha samples for counting. Vials of liquid scintillation solution were bagged for pickup, and sent to Building 23 as mixed waste. All other spent chemicals from PP Building were poured down the sink drains into the wastewater tank. Chemicals used in the laboratories included acetone, nitric acid, sulfuric acid, sodium hydroxide, and acetic acid. 1,1,1-trichloroethane was once used in the SM/PP as a degreaser for metal parts. [16, 17]

In the WD Building, the floor and sink drains are connected to or pumped from sumps to the WD alpha influent tanks. There is a small laboratory in the WD Building where the alpha and beta waste streams are analyzed for pH, sludge moisture, and influent and effluent scintillation counts. This laboratory was not used on a routine basis, but the sink was connected to the WD tanks. Hazardous compounds used in the laboratory included Instagel, which has a xylene base. [12, 17]

An old underground alpha waste pipeline had been used to transfer wastes to the WD Building from the H Building laundry and the SW/R Complex. The drains and connections to this line were plugged when the line was replaced; however, a small amount of water from this pipe continued to be received at the WD Building, mainly after rains. [16, 17]

Floor drains in all buildings described discharged to the alpha wastewater treatment system. Materials common to the floor drains included soapy shower water, mop and plutonium decontamination water, cleansers and detergents, mineral oil, coal-tar based paint, alcohol (ethanol, methanol, propanol), and acetone. Acids (nitric, sulfuric, hydrochloric, and hydrofluoric) were discharged into drains from laboratory sinks. Small amounts of solid chemical wastes were also included in the liquid waste: potassium carbonate, potassium sulfate, copper sulfate, calcium carbonate, oxalic acid, lithium chloride, zirconium oxide, sodium carbonate, caustic soda and lime, potassium pyrosulfite, potassium bromide, nickel sulfate, asbestos fiber, methylene blue, mercury, lead, beryllium, and cyanides. [17, 37, 38, 39, 40, 41, 42]

1.4.2.2 Solidification Process

Liquid waste generated from processes in the PP Building was transferred into a holding tank at the WS Facility and sparged to ensure suspension of the plutonium throughout the liquid batch. After sparging, a 10-gallon aliquot was transferred into a calibrated tank and gravity-fed into a prepared 55-gallon drum. [26] Each prepared drum was filled with 150 pounds of absorbent. After being filled, the drums were kept under negative pressure for a minimum of 16 hours to allow for off-gassing before they were sealed. [1, 17, 20, 21, 22, 27] See Figure A-6, ^{238}Pu Acid-caustic TRU Waste Flowsheet, for a flow diagram of the treatment process in WS Building. [20, 21, 22, 27]

From 1974 to 1976, diatomaceous earth based absorbents (e.g., AutoDri) were used. These absorbents contained calcium carbonate that reacted with the acidic liquid waste and produced carbon dioxide. [17, 18, 24, 25, 27, 37, 43, 44, 45] Closure of those drums was delayed to ensure adequate off-gassing. A different absorbent, trade name Florco, was introduced into the solidification process in 1975 and was used exclusively after 1976. Florco did not contain calcium carbonate and did not produce off-gassing. [1, 16, 17, 18, 26, 27, 44, 45, 46]

Vermiculite was used for wastes processed from the WDA, which discontinued processing high-risk wastes in 1974. Some waste may contain vermiculite. See Figure A-5, Process Flow for the Alpha Wastewater Treatment System in the WD Building, for a flow diagram of the treatment process in the WD Building. [1, 17, 20, 21, 22, 27]

1.4.3 Material Inputs

Material inputs for Solidified Acid/Caustic Waste are listed below: [17, 18, 32]

- Nitric and hydrofluoric acid mixture
- Approximately 95% of the acidic liquid waste is nitric acid with trace amounts of hydrofluoric, hydrochloric, sulfuric and oxalic acids
- Ammonium hydroxide
- Silicon tetrafluoride (removed via the caustic scrubber)

- Sodium carbonate
- Sodium hydroxide
- Hydrogen peroxide
- Hydroxylamine
- Ferrous sulfamate
- Pyrosulfate
- Absorbent (vermiculite, clay with diatomaceous earth, or aluminum-magnesium-from silicate clay). [10,]

In addition to the material inputs listed above, acceptable knowledge (AK) documentation indicates that the following chemicals and organic compounds were used in the Mound Buildings where plutonium processing and recovery occurred, and were potentially discharged into the wastewater treatment system (the WD Facility). Consequently, the potential exists for the following compounds to be present in this waste stream.

- Chemicals used in the SW and R Buildings (laboratory section) included carbon tetrachloride, dichloromethane, 1,1,1-trichloroethane, nitric acid, and sulfuric acid. [16, 17, 36]
- An alloy containing chromium was used for encapsulation of pressed plutonium oxide spheres in R Building. [17]
- Chemicals used in other R Building operations included hydrogen peroxide; ammonium hydroxide; hydrofluoric, nitric, sulfuric and lactic acids; methanol, propanol, mineral oil, ethanol, acetone and trichloroethylene; sodium sulfite solution; potassium and copper sulfates; tri-n-octylphosphine; carbonates; and sodium hydroxide. [16, 17, 34, 35, 36, 37, 38, 39, 40, 41, 42]
- Chemicals used in the laboratory in the PP Building included acetone, nitric acid, sulfuric acid, sodium hydroxide, and acetic acid. 1,1,1-trichloroethane was once used in the PP Building as a degreaser for metal parts. [16, 17]
- The wash water or leachate from leaded glovebox gloves was sent to the plutonium recovery process in PP Building. [17]
- Paint (coal-tar based), alcohol, and acetone from the H and WD Buildings were discharged into the alpha wastewater treatment system via the floor drains. [16, 17, 37, 39, 40]

- Hazardous compounds used in a small laboratory located in the WD Building included a xylene based liquid scintillation cocktail, Insta Gel. [16, 17]

- Small amounts of solid chemical wastes were also included in the liquid waste discharged to the treatment system: potassium carbonate, potassium sulfate, copper sulfate, calcium carbonate, oxalic acid, lithium chloride, zirconium oxide, sodium carbonate, caustic soda and lime, potassium pyrosulfite, potassium bromide, nickel sulfate, asbestos fiber, methylene blue, mercury, lead, beryllium, and cyanides. [17, 37, 39, 40, 41, 42]

1.4.4 Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for BN835, WMP data from 100% of the completed RTR and visual examination (VE) of Solidified Acid/Caustic Waste drums were obtained from the Advanced Mixed Waste Treatment Project (AMWTP) Waste Tracking System (WTS) database on October 11, 2006. This represents 87% of the estimated number of drums for this waste stream. The Solidified Acid/Caustic waste was generated at Mound from 1974 to 1985. Drums evaluated to estimate the WMP weights per unit of waste were generated from 1974 through 1985 and are representative of the waste stream. WTS is AMWTP's comprehensive, DOE-audited waste tracking database in which all waste containers are tracked cradle-to-grave and all related characterization data are stored. A statistical analysis of the RTR and VE data was performed to estimate WMP weights (by percent) for Solidified Acid/Caustic wastes, excluding packaging, in accordance with the requirements of MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation and are summarized in Table 1-2. [15, 28]

Table 1-2. Estimated WMP Weights per Unit of Waste for Solidified Acid/Caustic Waste (BN835).

Waste Material Parameters	Weight per Unit Waste by Percent
Iron-based Metals/Alloys	<1
Aluminum-based Metals/Alloys	<1
Other Inorganic Materials	<1
Plastics (waste)	<1
Rubber	<1
Cellulosics	3
Inorganic Matrix	97

Although individual drums in this waste stream may contain other homogenous solid waste and debris materials, the waste stream as a whole will be greater than 50% by volume inorganic particulate absorbents, including absorbed liquid wastes. [1, 28]

1.5 Prohibited Items

The absence of prohibited items is determined and documented through AK and characterization activities. RTR or VE is performed on each container in this waste stream to verify the absence of the following prohibited items.

- Liquid waste,
- Non-radionuclide pyrophoric materials,
- Hazardous wastes not occurring as co-contaminants with transuranic 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 exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA HWNs of D001, D002, or D003),
- Waste with polychlorinated biphenyls (PCBs) not authorized under an U.S. Environmental Protection Agency (EPA) PCB waste disposal authorization,
- Waste that has ever been managed as high-level waste and waste from tanks specified in Table B-8 of MP-TRUW-8.2, Quality Assurance Project Plan, unless specifically approved through a Class 3 permit modification, [14]
- Any waste container from a waste stream (or waste stream lot) that has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment, as described in Attachment B7 of MP-TRUW-8.2, [14]
- Sealed inner containers greater than four liters.

Drums with prohibited items will be treated or rejected as appropriate. Drums with prohibited items will not be part of the waste stream shipped to WIPP. [9]

1.6 RCRA Determination

1.6.1 EPA Hazardous Waste Numbers

This waste has been characterized as a mixed waste. The following EPA Hazardous Waste Numbers (HWNs) have conservatively been assigned to this waste stream.

Toxicity Codes: D007, D008, D009

Listed Codes: F001, F002

Solid samples were analyzed for total metal, volatile organic compounds (VOCs), and semivolatile organic compound (SVOC) constituents. Statistics were calculated based on using one-half the method detection limit (MDL) for less than detectable observations with data transformation applied where appropriate. Using this method, the calculated 90 percent upper confidence limit (UCL_{90}) of the mean concentration did not exceed the associated regulatory threshold limit (RTL) for Resource Conservation and Recovery Act (RCRA) characteristic metals or solvents, or F-listed solvents.

Non-halogenated VOCs (NHVOCs) were extracted using water. The amount of radionuclides extracted with the NHVOC target analytes was higher than those methods that use organic solvent extraction. The radioactivity levels were higher than the laboratory safe handling limits for the analytical instrumentation, therefore requiring dilution of the extracts for the NHVOC samples. The results for these NHVOCs were all non-detects (below the method detection limit [MDL]). The elevated MDLs due to dilution resulted, in some cases, with the MDL above the program required quantification limit (PRQL). Diluted sample results below the MDL were not used to calculate the mean and therefore no UCL_{90} was calculated. The NHVOC pyridine was the only compound that if one half the MDL was used to calculate the mean, the resultant UCL_{90} would be above the PRQL. Pyridine was not identified through AK as part of the waste stream nor was it identified as a TIC in the headspace gas VOC analysis or in the solid sample SVOC TIC analysis. A review of AK confirmed that pyridine was not believed to be present in the waste stream. Based on statistical, chemical and AK review, a HWN for pyridine was not assigned.

Headspace gas sampling and analysis detected 8 VOCs (1,1-dichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloro-1, 2, 2-trifluoroethane, carbon tetrachloride, methanol, methylene chloride, toluene, trichloroethylene). Statistics were calculated based on using one-half the MDL for less that detectable observations with data transformations applied where appropriate. Of the 8 VOCs detected, only 1,1,1-trichloroethane and trichloroethylene have a UCL_{90} above the PRQL and provide confirmation of AK application of HWNs F001 and F002. Therefore, sample data confirms that no additional characteristic or listed EPA HWNs are required.

1.6.2 Hazardous Determination

Ignitability: The solidified acid/caustic waste does not meet the definition of *ignitability* as defined in 40 CFR 261.21. This waste is not liquid, does not contain explosives, non-radionuclide pyrophoric materials or compressed gases. The waste is not a U.S. Department of Transportation (DOT) oxidizer as defined in 49 CFR 173. Only WIPP compliant drums will be considered candidates for shipment to WIPP. This waste stream does not exhibit the characteristic of ignitability (D001). [2, 16, 17]

Corrosivity: The solidified acidic/caustic waste is not a liquid and does not meet the definition of *corrosivity* in 40 CFR 261.22. Only WIPP compliant drums will be considered candidates for shipment to WIPP. The waste stream does not exhibit the characteristic of corrosivity (D002).

Reactivity: The materials in this waste stream do not meet the definition of *reactivity* as defined in 40 CFR 261.23. The materials are stable and will not undergo violent chemical change. The materials will not react violently with water, form potentially explosive mixtures with water, or generate toxic gases, vapors or fumes when mixed with water. Only WIPP compliant drums will be considered candidates for shipment to WIPP. The waste stream is not reactive (D003).

Toxicity Characteristic: The materials in this waste stream meet the definition of *toxicity* for metals as defined in 40 CFR 261.24. Trace amounts of tantalum, molybdenum, iron, chromium, nickel, mercury, and lead have been identified as waste constituents in low-risk acidic and caustic liquid wastes. These metals may also be expected in trace amounts in the high-risk acidic and caustic liquid wastes. [16, 17] AK documentation indicates that plutonium was leached from leaded (D008) glovebox gloves as part of the plutonium recovery process and this acidic leachate potentially entered this waste stream. AK documentation indicates that chromium (D007), lead (D008), and mercury (D009) were present in some facilities from which this waste stream was generated and therefore could potentially be present in the waste. [17, 36, 41, 42] For these reasons, D007, D008 and D009 are conservatively assigned to this waste stream.

Listed Waste

F–Listed Codes: This waste stream was conservatively characterized as a listed waste because F-listed solvents were used in the same processing areas as this waste. [16, 17, 36, 33] Some of this waste was generated prior to the RCRA and no controls were in place to prohibit these spent solvents from being mixed with acidic or caustic liquid waste.

Carbon tetrachloride, trichloroethylene and 1,1,1-trichloroethane were used for their degreasing and solvent properties in the PP Building and the laboratory section of the SW/R Complex. [16, 17] AK identifies that 1,1,1-trichloroethane was used for degreasing in the PP Building and in various extraction processes performed in both the PP Building and the SW/R. [16, 17, 36, 33] Carbon tetrachloride and trichloroethylene were potentially used in laboratory or production processes. [16, 17, 32, 48] In addition, headspace gas analysis detected 1,1,1-trichloroethane (F001, F002) and trichloroethylene (F001, F002) in concentrations exceeding the PRQL which supports AK. F001 and F002 have been conservatively applied to the waste.

Acetone, methanol and xylene were used in the R and PP Buildings and could have been commingled with this waste. [11, 16, 17, 32, 33, 41, 46] Because the solidified acid/caustic waste is not ignitable (i.e., not assigned D001), EPA hazardous waste number F003 is not assigned to this waste.

P, U and K Listed Codes: Beryllium was identified in AK source documents as a potential contaminant of this waste stream. Small amounts of beryllium metal may have been discharged into the wastewater treatment system. [16 17] The amount of beryllium in the waste is not expected to exceed 1%. This assertion is confirmed by the results of the six containers identified in Table 2 of the CIS. The beryllium concentration is maximum 1.723 mg/kg, UCL_{90} 1.612 mg/kg, and RTL 4.61." The maximum beryllium concentration identified in Table 2 of the CIS 1.723 mg/kg does not exceed 1% by weight Be (per 50 kg drum). Beryllium was not disposed at the Mound site as an unused commercial chemical product, therefore P015 is not assigned. The materials in this waste stream do not meet the definition of a P-listed waste.

The acidic liquid waste consists of spent nitric and trace amounts of spent hydrofluoric acid absorbed onto a clay material (Florco). [16, 17, 18] Solidified Acid/Caustic Waste is not liquid waste. The hydrofluoric acid constituent was not a discarded commercial chemical product, an off-specification species, or a container residue as identified in 40 CFR 261.33. Therefore, the materials in this waste stream are not U-listed hazardous waste.

The materials in this waste stream are not hazardous waste from specific sources because they were not generated from any of the processes listed in 40 CFR 261.32. The materials in this waste stream are not K-listed hazardous waste.

TSCA Regulated Contaminants

There is no AK documentation indicating the disposal of PCBs as regulated by the Toxic Substances Control Act (TSCA), 40 Code of Federal Regulations, Part 761 into the acid or caustic liquid wastes. Therefore, the waste stream is not classified as TSCA regulated.

1.7 Radionuclides

The primary radionuclides contained in Mound transuranic waste stored at the Idaho National Laboratory (INL) are those identified for plutonium metal production (heat source) material (e.g., ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, and ^{242}Pu). Americium-241 (^{241}Am), ^{234}U, and neptunium-237 (^{237}Np) are also expected in most of the containers of transuranic waste due to ingrowth. This waste may also contain weapons grade plutonium containing primarily ^{239}Pu as well as enriched uranium (EU), depleted uranium (DU), and small quantities of other isotopes (209-Polonium, 228-Thorium (Th), ^{229}Th, ^{230}Th, and 231-Protactinium), generated during research activities. ^{234}U is expected in wastes with aged plutonium. ^{233}U may also be detected in some containers of Mound Waste. Cesium-137 (^{137}Cs) may be present in some production glovebox waste containers. Strontium-90 (^{90}Sr) although not reported in the Mound AK, would be expected to be present where ^{137}Cs is observed. The solidified acid/caustic waste stream does not contain concentrations of plutonium in excess of 20% by weight for the aggregate of any material category. [7, 29, 30]

The primary product from heat source plutonium processing for use at the Mount Plant contained plutonium isotopes in the following weight percents: 80% ^{238}Pu, 16% ^{239}Pu, 3% ^{240}Pu, 0.8% ^{241}Pu, and 0.2% ^{242}Pu. The range of expected activities/concentrations is related to waste generation date (e.g., earliest possible generation date, 1961, and latest possible generation date, 1988). ^{234}U is expected in the waste due to aged plutonium as well as part of DU and EU. [7]

AMWTP will employ payload management practices in accordance with the Waste Acceptance Criteria (WAC) for waste stream BN835. [8] The estimated total waste volume for BN835 is 515 m^3. The estimated percentage of the waste above 100 nCi/g is 60%. The estimated percentage of waste less than 100 nCi/g is 40%. [7]

1.8 Defense Determination

The atomic energy defense activities that apply to TRU wastes generated by Mound operations are defense nuclear materials productions and defense research and development. The following are examples of these defense activities:

- Transit program heat sources (Pu-238) used in U.S. Navy navigational satellites beginning in 1961.
- Half-watt heat sources (Pu-238) for the U.S. Navy were produced from 1974 to 1976.
- Multi-hundred watt (MHW) heat sources for the Lincoln Experimental Satellites (LES 8/9), which are U.S. Air Force communications satellites, were fabricated in 1974 and 1975.
- High Performance Generator (HPG) Mod 3 for the Department of Defense in 1976 and 1977.
- Milliwatt Generator (MWG) heat source (Pu-238) capsules for a power supply used in weapons by the U.S. military were fabricated from 1974 and continued into the 1980s.
- Pu-238 heat sources were also produced for non-defense applications, such as weather satellites, the Apollo moon missions, and planetary missions (e.g., Mars, Jupiter, and Saturn); however, Pu-238 contaminated waste from non-defense activities was not separated from the waste from defense work and is therefore commingled.

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

Each 55-gallon drum was lined with a 90-mil rigid polyethylene drum liner. Typically, the rigid liners were lined with a polyethylene drum bag. Typically, plywood spacers were placed between the rigid liner lid and the drum lid before the drum lid was installed. Any combination of plastic bags that does not exceed five layers of confinement (of which no more than three are inner bags) is acceptable for shipment to WIPP. Containers with excess layers of confinement or packaging configurations not addressed by an approved TRUCON code for this waste stream will be segregated and vented or rejected, as appropriate. [1, 19, 26]

2.2 Flammability Considerations

The payload containers in the waste stream must comply with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with the flammable gas limits will be performed for VOCs, hydrogen and methane. Headspace gas sampling and analysis is performed when required by the Waste Analysis Plan (WAP) and/or CH-TRAMPAC. At a minimum, the headspace gas analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with headspace gas results exceeding 500 ppm 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). [9, 13, 14]

3.0 REFERENCES

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3. RPT-TRUW-06, Acceptable Knowledge Baseline Document for AMWTP Waste [P400A]

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6. DOE/LLW-217, DOE Waste Treatability Group Guidance, T. D. Kirkpatrick, INEL, January 1995 [P670A]

7. RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge [P398A]

8. DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, U. S. Department of Energy, Carlsbad Field Office, Waste Isolation Pilot Plant, May 30, 2008

9. NM4890139088-TSDF, Waste Isolation Pilot Plant Hazardous Waste Facility Permit, New Mexico Environment Department, Current Revision

10. Material Safety Data Sheets (MSDSs) for Calcined Attapulgite Products and FLORCO® X, Engelhard Corporation, February 19, 2004 and July 31, 2000 and E-mail from Engelhard National Accounts Representative, regarding Florco and Auto Dri constituents, November 15, 2004 [P457A]

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19. RPT-TRUW-05, Waste Matrix Code Reference Manual [P399A]

20. Mound Site Waste Management Reports and Site Plans 1972 to 1976 [P523A]

21. Mound Site Waste Management Reports and Site Plans 1977 to 1980 [P522A]

22. Mound Site Waste Management Reports and Site Plans 1981 to 1989 [P524A]

23. Memorandum from T. L. Clements to R. K. Blauvelt, WIPP Immobilization Criterion Study, TLC-9-84, July 2, 1984 [C349A]

24. Memorandum from R. T. Braun to E. A. Walker, Radioactive Waste Shipped to INEL, January 28, 1976 [C359A]

25. Memorandum from F. A. Traino to D. A. Edling, Disposition of High Level Radioactive Caustic and Acid TRU Drums, February 21, 1975 [C362A]

26. MD-70205, Technical Manual – TRU Waste Management, various versions of Operation Sheets dated January 1, 1976 through December 19, 1988 [P510A]

27. Mound Laboratory Radioactive Waste Process Flow Sheets, March 19, 1975 and May 31, 1977 [U132A]

28. Memorandum to file, Waste Material Parameter (WMP) Weight Calculations and Supporting Data to Determine Waste Material Parameter Weight per Unit of Waste, TV-001-07, January 19, 2007 [C534A]

29. INEL-95/0412, Waste Description Information for Transuranically-Contaminated Wastes Stored at the Idaho National Engineering Laboratory, B. D. Raivo, G. K Becker, T. H. Smith, and G. L. Anderson, December 1995 [P365A]

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Appendix A

Process Flow Diagrams

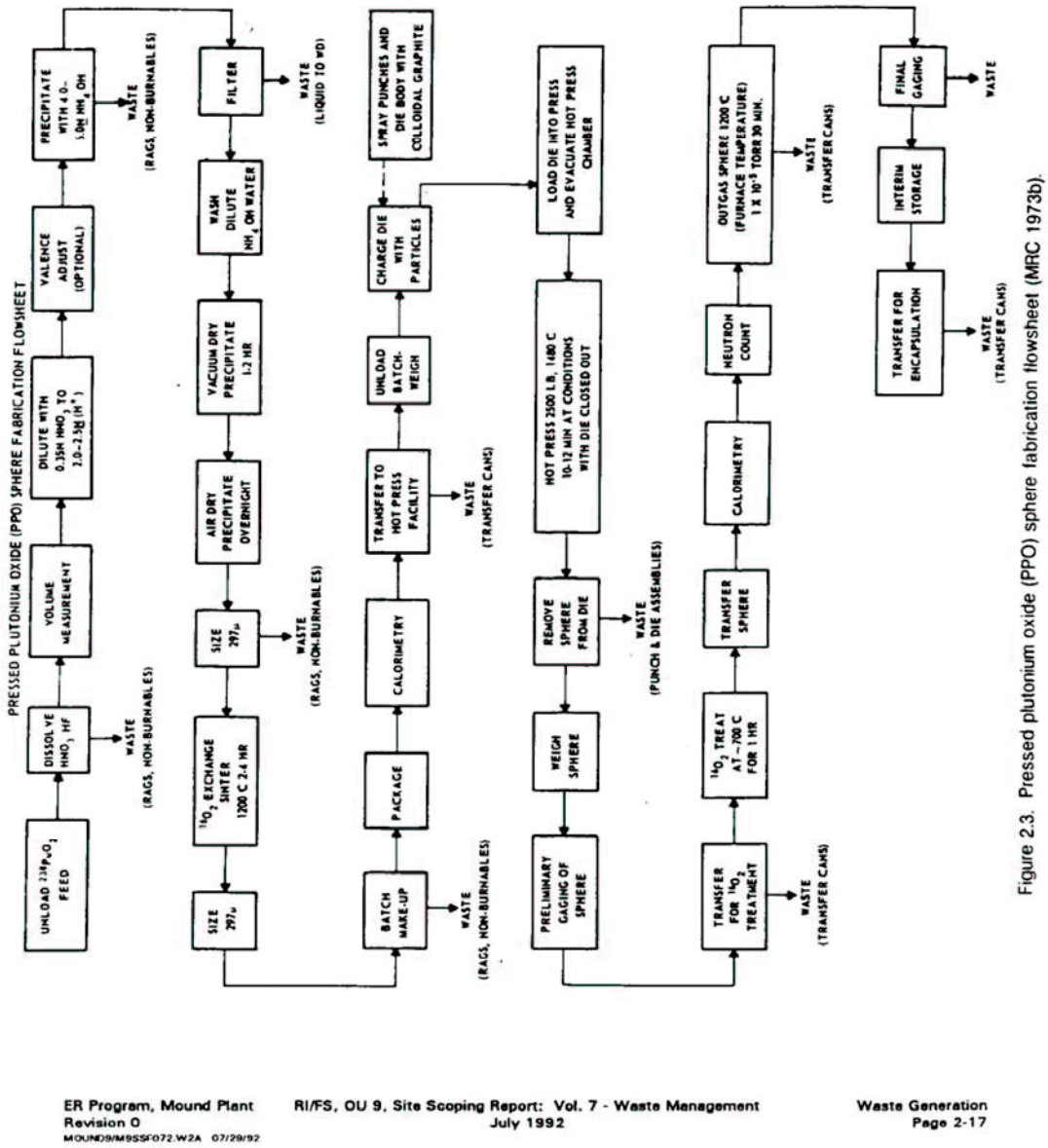

Figure 2.3. Pressed plutonium oxide (PPO) sphere fabrication flowsheet (MRC 1973b).

Figure A-1. Mound pressed plutonium oxide (PPO) sphere fabrication flowsheet.

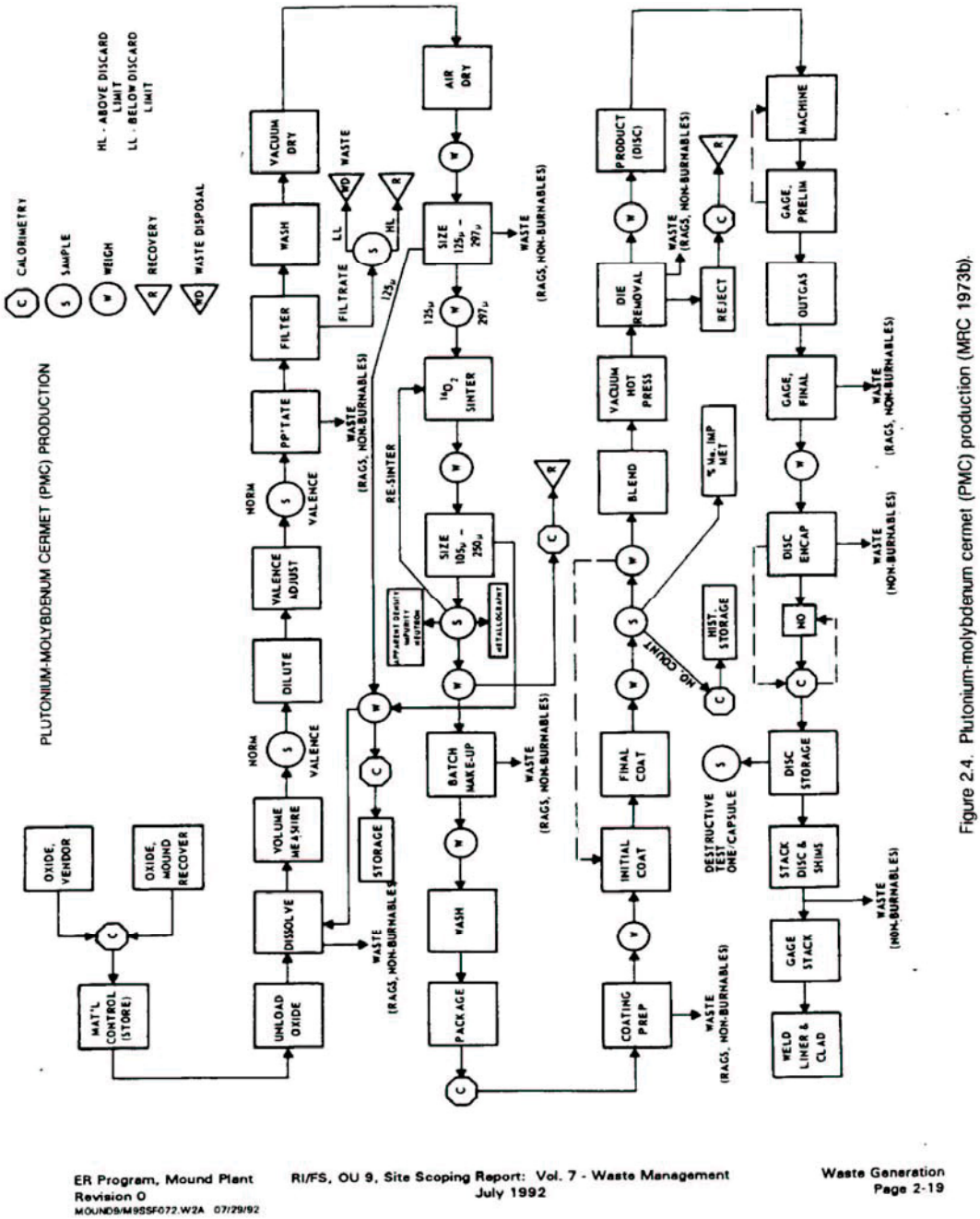

Figure A-2. Mound plutonium-molybdenum cermet (PMC) production.

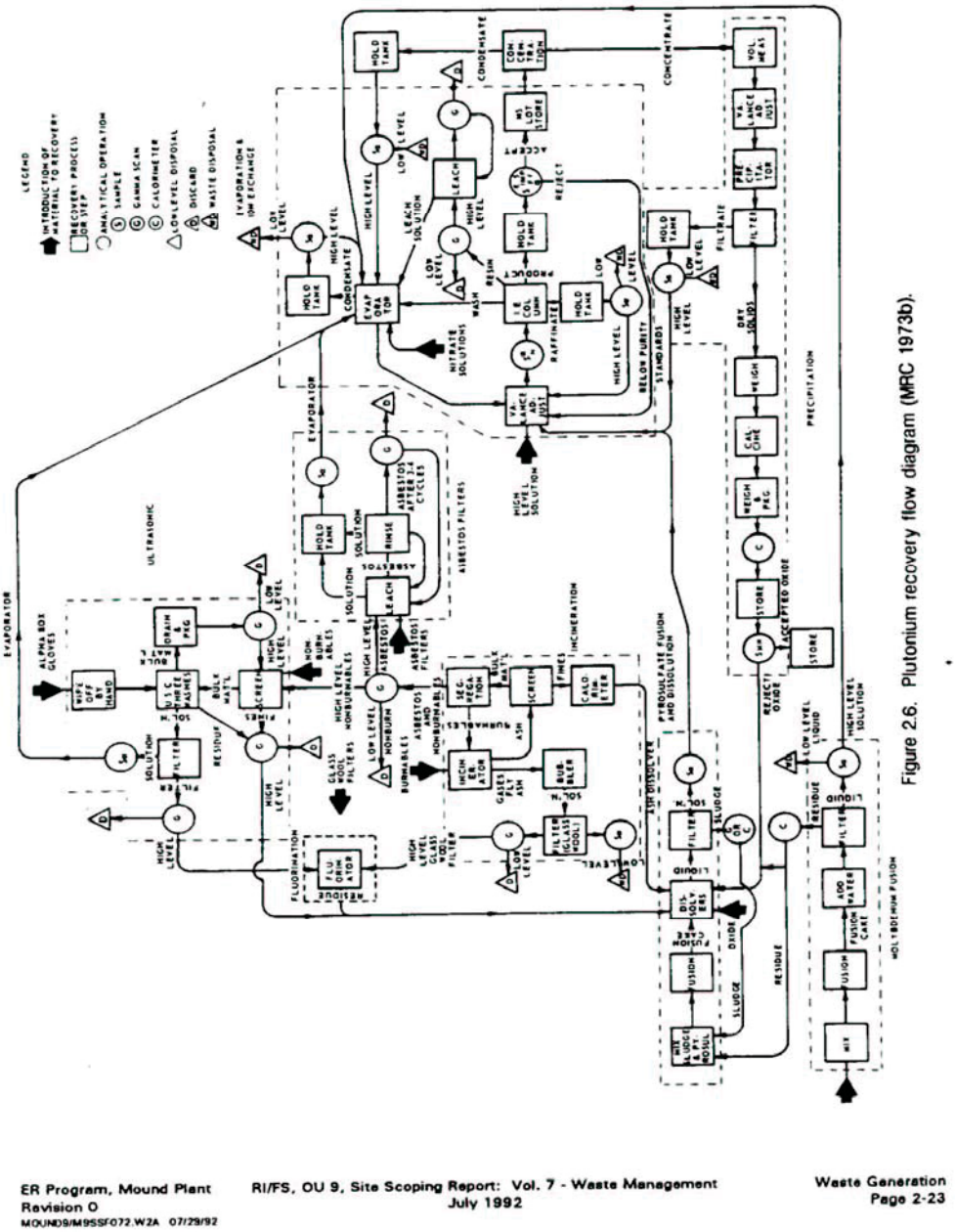

Figure A-3. Mound plutonium recovery flow diagram.

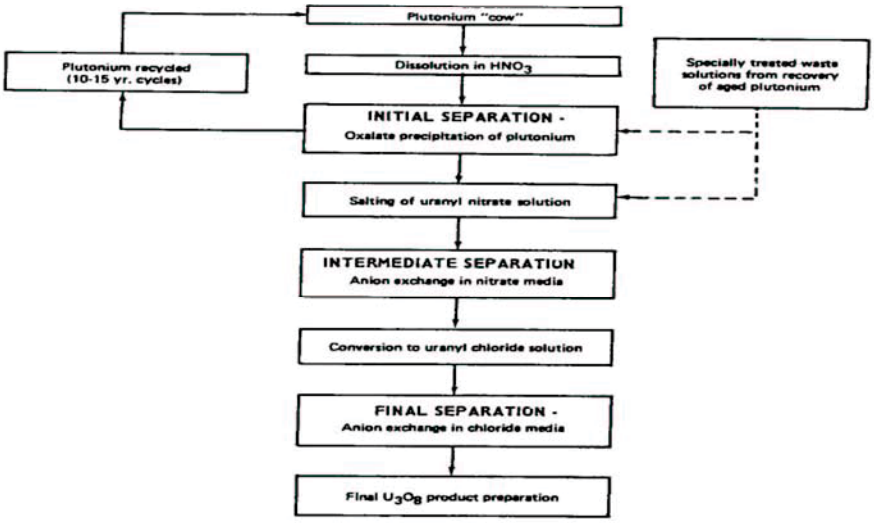

Figure 2.11. Chemical separation steps for recovery and purification of uranium-234 from plutonium-238 (Keister et al. 1978).

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Figure A-4. Mound chemical separation steps for recovery and purification of uranium-234 from plutonium-238.

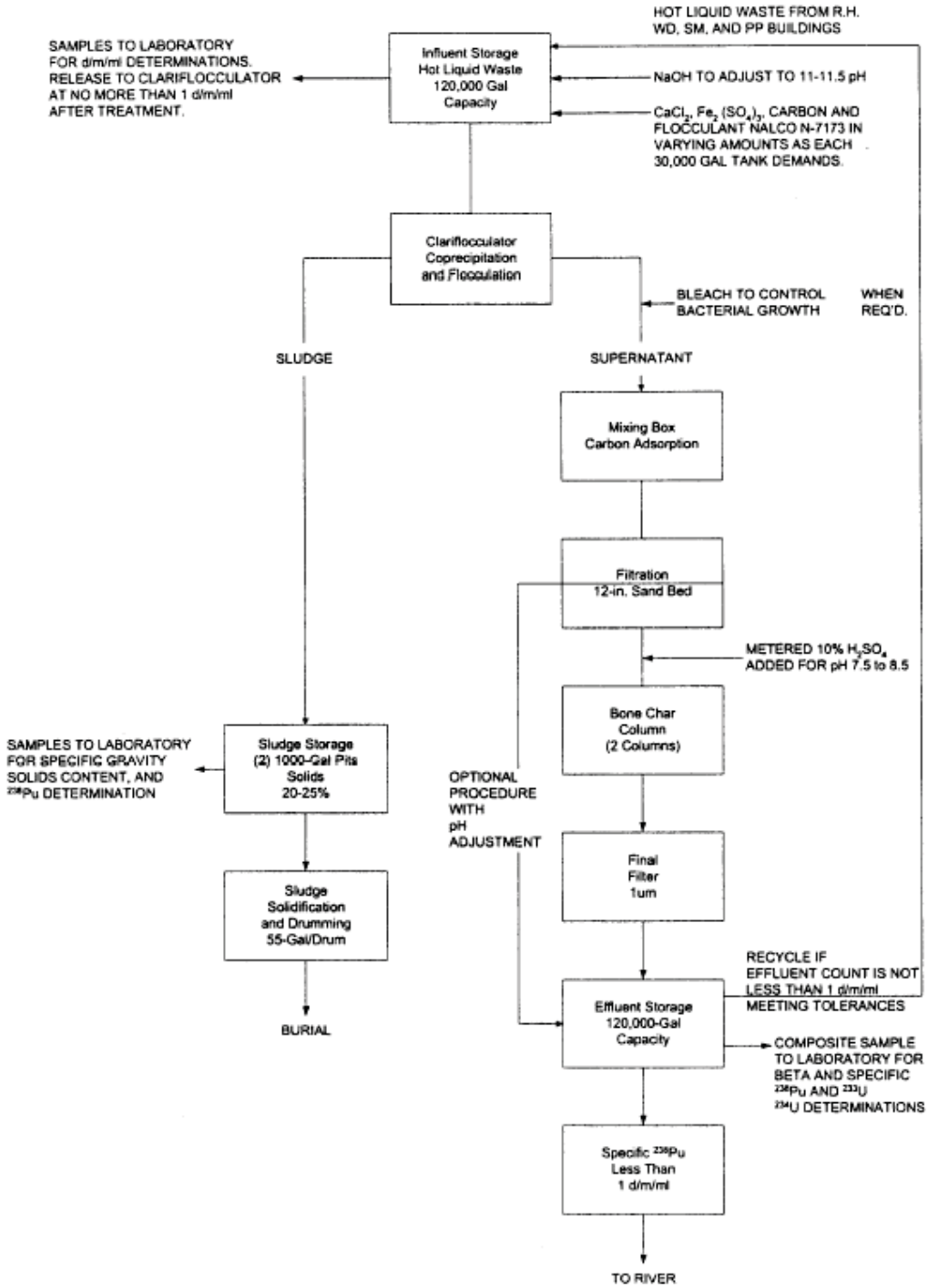
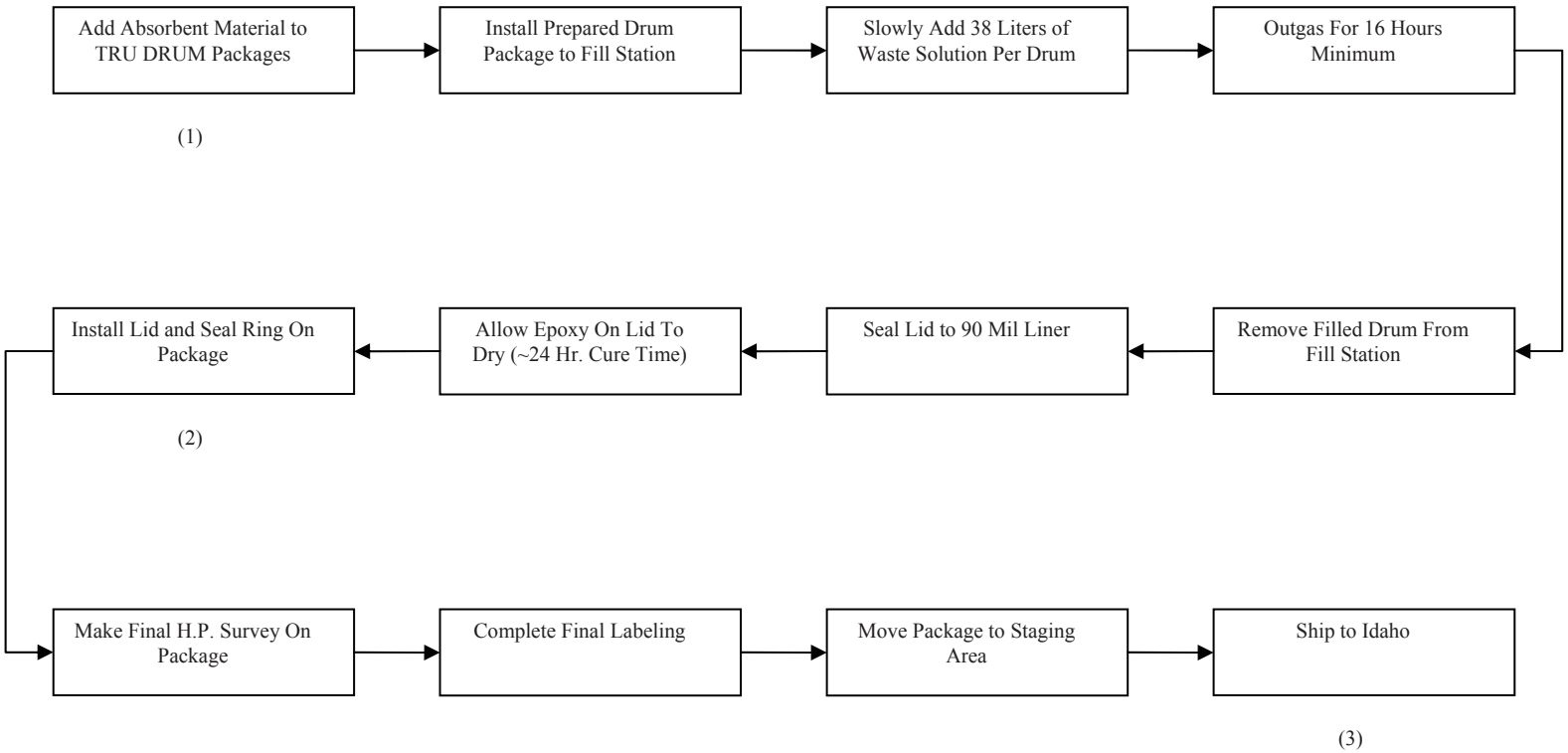


Figure A-5. Process flow for the Alpha Wastewater Treatment System in the WD Building.



(1) Three 50 lb. bags (150 lbs total) Florco (approximately 75% excess for 38 liters.
(2) Raycohesive – two coats on liner and lid.

Figure A-6. Plutonium-238 Acid-Caustic TRU Waste flowsheet.

AMWTP Advanced Mixed Waste Treatment Project	Waste Stream Profile Form HWN Assignment Worksheet	AMWTP Form 1187 Effective Date: ~~DOE Approves Retrieval Operations Start-up~~07/17/02, Rev. 10 MP-TRUW-8.13 Page 1 of 1

WSPF Number: BN835 (MD IDCs 834 and 835)

AK Source Document / Rev. Number : P380A and U126A

hwn	(1) AK ASSIGNED	(2) STORAGE	(3) RECONC.	(4) DELETE RECONC.	(5) ITEMS/ CONST.	(6) FINAL	(7) PERMIT-TED
F001	X	X	X			X	✔
F002	X	X	X			X	✔
F003							✔
F004							✔
F005							✔
F006							✔
F007							✔
F009							✔
D004							✔
D005							✔
D006							✔
D007	X	X				X	✔
D008	X	X				X	✔
D009	X	X				X	✔
D010							✔
D011							✔
D022							✔
D032							✔

KATHRYN ZBRYK

AK Expert: Kathryn Zbryk Print/Sign **Date:** 8/30/05

Site Project Manager: Steve Carpenter Print/Sign **Date:** 8.30.05

Implementing Document: MP-TRUW-8.13

Waste Stream Description: Solidified Acid/Caustic Waste **Rev. 3**

Waste Stream Number: BN835

AK Information	(1)AK#	Source Document Reference Number
Required generator site TRU waste stream (WS) - specific information		
Information identifying the building(s) and/or area(s) from which TRU waste was or is generated.	**WS1**	C344A, C351A, C358A, C361A, C378A, C381A, C385A, C386A, C387A, C388A, C389A, C390A, C391A, C393A, C394A, C395A, C396A, C397A, C398A, C399A, C400A, C401A, C402A, C403A, C405A, C406A, C408A, C409A, C410A, C412A, C413A, C414A, C417A, C418A, C419A, C420A, C421A, C422A, C423A, C424A, C425A, C429A, C430A, C431A, C433A, C434A, C435A, C436A, C437A, C438A, C439A, C443A, C444A, C445A, C446A, C447A, C448A, C449A, C450A, C461A, C462A, C463A, C464A, C465A, C466A, C467A, C468A, C470A, C472A, C473A, C488A, C490A, P024A, P319A, P380A, P381A, P418A, P423A, P437A, P463A, P469A, P475A, P477A, P478A, P479A, P480A, P481A, P482A, P484A, P485A, P492A, P493A, P503A, P504A, P505A, P506A, P507A, P509A, P510A, P511A, P518A, P519A, P522A, P523A, P524A, P526A, P527A, P540A, P544A, P545A, P546A, P550A, P551A, U126A, U145A, U146A, U148A, U149A, U150A, U151A, U153A, U154A, U155A, U156A, U157A, U158A, U159A, U160A, U161A, U162A, U167A, U168A, U169A, U173A, U187A, U190A, U195A, U198A, U202A, U203A, U204A, U207A
Waste stream volume and time period of generation.	**WS2**	C348A, C359A, C363A, C364A, C365A, C366A, C372A, C379A, C424A, C461A, C463A, C465A, C467A, C472A, C485A, C534A, C535A, D040A, P024A, P364A, P365A, P380A, P400A, P418A, P437A, P463A, P469A, P482A, P505A, P506A, P507A, P509A, P511A, P519A, P522A, P523A, P524A, P567A, U122A, U126A, U127A, U134A, U142A, U146A, U148A, U149A, U150A, U154A, U159A, U166A, U167A, U187A, U197A, U198A, U202A, U207A
Waste generating process description for each building, including processes with U134 waste generation, if applicable and process flow diagrams. See instructions if process flow diagrams are not available.	**WS3**	C361A, C444A, C466A, C473A, P024A, P319A, P364A, P380A, P381A, P418A, P423A, P437A, P463A, P469A, P482A, P483A, P485A, P492A, P493A, P504A, P505A, P507A, P510A, P511A, P518A, P519A, P522A, P523A, P524A, P526A, P527A, P546A, P558A, U126A, U132A, U155A, U156A, U157A, U158A, U168A, U170A
Material inputs or other information identifying chemical content, (e.g., event or process that may have modified the chemical properties after generation. Include data for newly generated waste obtained through VE and/or radiography, information demonstrating neutralization of U134 waste) and chemical composition that could affect the isotopic distribution.	**WS4**	C269A, C303A, C304A, C318A, C324A, C342A, C344A, C349A, C354A, C356A, C359A, C361A, C363A, C385A, C409A, C419A, C423A, C430A, C443A, C446A, C447A, C449A, C450A, C451A, C452A, C461A, C463A, C464A, C465A, C466A, C467A, C468A, C470A, C471A, C472A, C473A, C479A, C480A, C481A, C484A, C488A, C490A, C493A, C513A, P024A, P207A, P307A, P310A, P319A, P365A, P380A, P381A, P418A, P423A, P437A, P457A, P458A, P463A, P469A, P471A, 475A, P485A, P492A, P493A, P497A, P503A, P504A, P505A, P506A, P509A, P510A, P518A, P519A, P521A, P522A, P523A, P524A, P527A, P534A, P545A, P546A, P552A, U126A, U132A, U140A, U149A, U156A, U157A, U159A, U164A, U167A, U172A, U185A, U189A, U195A, U197A, U202A, U204A, U205A, U208A

Implementing Document: MP-TRUW-8.13

Waste Stream Number: BN835

Material inputs or other information identifying physical waste form, (e.g., event or process that may have modified the physical properties after generation. Include data obtained through RTR or VE of newly generated waste) and physical composition that could affect the isotopic distribution.	**WS5**	C302A, C348A, C349A, C360A, C362A, C363A, C370A, C376A, C378A, C379A, C383A, C409A, C419A, C426A, C429A, C430A, C440A, C446A, C447A, C448A, C449A, C450A, C452A, C457A, C461A, C463A, C464A, C465A, C466A, C467A, C468A, C470A, C472A, C473A, C479A, C485A, C490A, C534A, C535A, D039A, P024A, P207A, P319A, P365A, P380A, P381A, P393A, P399A, P418A, P423A, P437A, P463A, P465A, P469A, P475A, P492A, P493, P502A, P503A, P504A, P505A, P506A, P507A, P509A, P510A, P511A, P518A, P519A, P521A, P522A, P523A, P524A, P527A, P544A, P545A, P546A, P553A, P556A, P567A, U126A, U145A, U146A, U149A, U153A, U154A, U156A, U157A, U159A, U166A, U167A, U187A, U189A, U190A, U191A, U195A, U197A, U198A, U204A, U205A, U206A, U207A, U208A
EPA hazardous waste constituents in the waste stream and Hazardous Waste Numbers assigned.	**WS6**	C354A, C493A, P207A, P307A, P310A, P418A, P437A, P492A, P503A, P505A, P506A, P509A, P519A, P527A, U142A, U167A, U185A, U190A, U199A, U205A, U206A, U208A
Specification of the isotopic ratios for the 10 WIPP-tracked radionuclides (^{241}Am, ^{238}PU, ^{239}Pu, ^{240}PU, ^{242}Pu, ^{233}U, ^{234}U, ^{238}U, ^{90}Sr, and ^{137}Cs) and the radionuclides comprising 95% of the hazard.	**WS7**	C291A, C389A, C348A, C351A, C354A, C358A, C368A, C370A, C371A, C378A, C379A, C380A, C381A, C383A, C384A, C385A, C387A, C388A, C390A, C391A, C393A, C394A, C396A, C400A, C401A, C402A, C404A, C405A, C406A, C408A, C409A, C410A, C412A, C413A, C414A, C416A, C417A, C418A, C419A, C420A, C421A, C422A, C423A, C425A, C426A, C427A, C428A, C429A, C430A, C431A, C432A, C433A, C434A, C435A, C436A, C437A, C438A, C439A, C440A, C441A, C442A, C445A, C446A, C447A, C448A, C449A, C450A, C452A, C464A, C465A, C466A, C467A, C468A, C469A, C470A, C471A, C472A, C479A, C485A, C488A, C490A, C494A, C508A, C517A, P024A, P319A, P381A, P380A, P398A, P418A, P423A, P437A, P463A, P467A, P469A, P472A, P482A, P492A, P493A, P502A, P503A, P504A, P505A, P506A, P507A, P509A, P510A, P511A, P513A, P514A, P518A, P519A, P521A, P522A, P523A, P524A, P526A, P527A, P540A, P543A, P544A, P545A, P546A, P548A, P549A, P550A, P551A, P553A, P554A, P555A, P558A, P611A, P622A, U126A, U137A, U142A, U147A, U149A, U153A, U154A, U155A, U156A, U157A, U158A, U159A, U160A, U161A, U162A, U166A, U167A, U168A, U169A, U170A, U172A, U173A, U185A, U187A, U189A, U190A, U195A, U198A, U199A, U202A, U203A, U205A, U208A
Documentation identifying the presence of prohibited items listed in Section B-1c of the WIPP-WAP.	**WS8**	C362A, C369A, C376A, C392A, C415A, C416A, C466A, C470A, C473A, C516A, P024A, P319A, P418A, P437A, P465A, P492A, U126A
(1) The AK#s are to be used in the Acceptable Knowledge Source Document Summary to aid in the identification of program and waste stream-specific elements within a given document.		

All required AK information has been compiled and tracking numbers assigned.

AK Expert: M. L. Johnson M L Johnson Date: 8/21/08
Print/Sign

Site Project Manager: Steve Carpenter Date: 8.21.08
Print/Sign

LDR NOTIFICATION- IDCs 834, 835

WASTE STREAM BN835

The mixed waste identified on manifest number _____ and bearing the EPA hazardous waste numbers D007, D008, D009, F001, F002 are designated as transuranic (TRU) mixed waste and have been exempted from the land disposal prohibitions of 40 CFR 268 by the Land Withdrawal Act Amendments (Public Law 104-201). This amendment exempts WIPP waste from treatment standards promulgated pursuant to section 3004(m) of the Solid Waste Disposal Act [42 U.S. C. 6924(m)] and are not subjected to the Land Disposal Prohibitions in section 3004(d), (e), (f), and (g) of the Solid Waste Disposal Act. This waste is not prohibited from land disposal.

Container Identification numbers	Hazardous waste number(s)	Land Disposal Prohibition effective date
	D007	May 26, 2000
	D008	May 26, 2000
	D009	May 26, 2000
	F001	Nov 8, 1988
	F002	Nov 8, 1988

BNFL Inc.

765 Lindsay Blvd
Idaho Falls, ID 83402
Tel: (208) 524-8484
Fax: (208) 524-4442

December 20, 2004

Kerry Watson
US Department of Energy
Carlsbad Field Office
4021 National Parks Highway
Carlsbad, NM 88220

Subject: Waste Stream Profile, BNINW835 - EPS-087-2004

Dear Mr. Watson:

Attached is Waste Stream Profile (WSPF), BNINW835, Solidified Acid/Caustic Waste, and RPT-TRUW-23, *Acceptable Knowledge Summary for Solidified Acid/Caustic* Waste, for your review and approval. We have evaluated and reviewed the profile, and believe it is compliant with the WAP.

The sampling plan and inventory of containers associated with this waste stream are also included in this transmittal as document titled, "Sampling Plan for BN835."

If you have any questions feel free to call me at (208) 557-7164 or Steve Carpenter at (208) 557-7304.

Sincerely,

Eric P. Schweinsberg, TRU Program Manager
Advanced Mixed Waste Treatment Project

attachment

cc:
J. Wells, DOE-ID *ED
R. Chavez, WRES *ED
S. Carpenter, Weston Solutions, Inc. *ED
P. Daly, BNFL Inc. *ED
A. Dobson, BNFL Inc. *ED
D. Swale, BNFL Inc.*ED
AMWTP Document Control

*ED denotes electronic distribution

AMWTP

BNFL Inc.

765 Lindsay Blvd
Idaho Falls, ID 83402
Tel: (208) 557-7000
Fax: (208) 528-9154

February 23, 2005

Kerry Watson
US Department of Energy
Carlsbad Field Office
4021 National Parks Highway
Carlsbad, NM 88220

Subject: Container List for Waste Stream BN835, Lot 1 – EPS-008-2005

Dear Mr. Watson:

Attached is the container list for Waste Stream BN835, Lot 1. It consists of 504 drums of mixed transuranic waste.

This list is submitted in conjunction with the Waste Stream Profile Form for BN835. If you have any questions or concerns feel free to contact me at 208-557-7164.

Sincerely,

Eric P. Schweinsberg, TRU Program Manager
Advanced Mixed Waste Treatment Project

attachment

cc:
M. Italiano, CBFO *ED
R. McCallister, CBFO *ED
J. Wells, DOE-ID *ED
E. Dumas, BNFL Inc. *ED
D. Swale, BNFL Inc. *ED
S. Stewart, SM Stoller Corp. *ED
S. Carpenter, Weston Solutions, Inc. *ED
AMWTP Document Control

*ED denotes electronic distribution

APPENDIX 10

BN836 CEMENTED SLUDGE
WASTE STREAM PROFILE PACKAGE

Date: 10/2/12

B-2012-0203
RECORD
JMC 10/02/12

AMWTP Advanced Mixed Waste Treatment Project	AK Source Document Review Summary	Form-1068, Rev. 4 Effective: 01/08/09 Page 1 of 2

Implementing Document: MP-TRUW-8.13

1. **Source Document Tracking Number:** P646A	2. **Revision:** 8

3. **Category**

- [x] Published Documentation
- [ ] Unpublished Documentation
- [ ] Correspondence
- [ ] Discrepancy

4. **Title/Description Information:** BN836 Cemented Sludge Waste Stream Profile Package, April 28, 2006
Change Notice #1, January 24, 2007 Change Notice #2, April 2, 2008

Document Number: N/A

Revision: N/A

Author: AMWTP
CBFO

Date: 04/28/2006

5. AK Element	6. Generator Or Waste Type(s)	7. Location in Source Doc.	8. AK Information Summary:
WM2, WM3, WM5, WM6, WM7	MD	all	The package includes characterization information for waste stream profile BN836 (cemented sludge from Mound) submitted to and approved by CBFO. The AK summary provides a summary of the information that addresses all of the waste stream (WS) AK elements as well as the waste management (WM) program AK elements associated with facility mission, operations description, type and quantity of TRU waste generated, correlation of waste streams generated from the same process, and defense determination. The package includes references to the documents that address the remaining WM elements.
WS1, WS2, WS3, WS4, WS5, WS6, WS7, WS8	MD-836	all	The package includes characterization information for waste stream profile BN836 (cemented sludge from Mound) submitted to and approved by CBFO. The AK summary provides a summary of the information that addresses all of the waste stream (WS) AK elements as well as the waste management (WM) program AK elements associated with facility mission, operations description, type and quantity of TRU waste generated, correlation of waste streams generated from the same process, and defense determination. The package includes references to the documents that address the remaining WM elements.

9. Document Summary:

The package includes characterization information for waste stream profile BN836 (cemented sludge from Mound) submitted to and approved by CBFO. The AK summary provides a summary of the information that addresses all of the waste stream (WS) AK elements as well as the waste management (WM) program AK elements associated with facility mission, operations description, type and quantity of TRU waste generated, correlation of waste streams generated from the same process, and defense determination. The package includes references to the documents that address the remaining WM elements.
This revision includes the following documents:

- CBFO Approval letter of CN #2 for WSPF BN836, April 2, 2008
- Change Notice # 2 for WSPF BN836, March 27, 2008
- CBFO Approval letter of CN #1 for WSPF BN836, January 24, 2007
- Change Notice # 1 for WSPF BN836, January 24, 2007
- CBFO Approval letter for WSPF BN836, April 28, 2006
- Waste Stream Profile Form-1195, DQO Form-1597, and CIS Form-1598 for BN836, Rev. 0, April 28, 2006
- Acceptable Knowledge Summary, RPT-TRUW-63, Rev. 6, June 27, 2012
- Waste Stream Profile Form HWN Assignment Worksheet Form-1187 for BN836, April 27, 2006
- TRU Waste Management AK Documentation Checklist Form-1067 for BN836, July 22, 2009
- LDR Notification – MD836, Waste Stream BN836
- AMWTP transmittal letter WSP BN836, JDM 023-2006, April 25, 2006
- E-mail correspondence from CBFO to AMWTP document services. CBFO approval RPT-TRUW-63, Revision 5A, July 14, 2009

P646A Revision 8 updates the record to include revised AK Summary Report RPT-TRUW-63, Rev. 6, June 27, 2012

10. Source Document Data Limitations (if any):

The characterization only applies to containers certified for disposal at WIPP.

11. AK Expert:	Julie Collins	Julie Collins	10/2/2012
	Print	Sign	Date

P646A Rev 8

Washington
TRU Solutions LLC

WRES:08:145
UFC:5822.00

April 2, 2008

Mr. Richard Provencher, Deputy Manager
U.S. Department of Energy
Idaho Clean-up Project
Idaho Operations Office (NE.ID)
1955 Fremont Avenue
Idaho Falls, ID 83401-1222

Subject: UPDATE FOR WIPP OPERATING RECORD (CHANGE NOTICE #2) CEMENTED SLUDGE (BN836, REV. 0)

Dear Mr. Provencher:

Washington TRU Solutions LLC, on behalf of the Permittees, has approved the Change Notice Number 2 for Advanced Mixed Waste Treatment Project (AMWTP) Waste Stream Profile Form (WSPF) BN836, Rev. 0, Cemented Sludge. We have concluded that the WSPF is complete and that the waste stream determination was made in accordance with applicable procedures and guidance.

We therefore approve the Change Notice as submitted. Using the methods approved at AMWTP, AMWTP may enter the data into the certification and shipping modules of the WIPP Waste Information System.

If you have any questions on this matter, please contact me at (505) 234-7545.

Sincerely,

W. M. Wierzbicki, Manager
Regulatory Compliance

KSG:ks

Enclosure

P.O. Box 2078 • Carlsbad, New Mexico USA 88221-2078
Phone: (575) 234-7200 • Fax: (575) 234-7083

Update for WIPP Operating Record (Change Notice # 2)

Cemented Sludge (BN836, Rev. 0)

Please add the following information to the WIPP Operating Record for Waste Stream Profile Form (WSPF) BN836, Revision 0. This waste stream is Cemented Sludge and was approved by DOE/CBFO on April 28, 2006. Change Notice #1 was approved January 24, 2007.

This WSPF is being revised. The WSPF components are bolded. The updates are:

1. **WSPF Form-1195, Date of audit report approval by NMED**

   Add additional audit approval dates January 23, 2007 and January 18, 2008.

2. **WSPF Form-1195, Title, version, number, and date of documents used for WAP Certification**

   Update the following procedures:

   Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Rev. 14, 12/27/07.

   Quality Assurance Project Plan, MP-TRUW-8.2, Rev. 10, 10/25/07.

   Delete the following procedure:

   Contact-Handled Transuranic Waste Authorized Methods for Payload Control, MP-TRUW-8.3, Rev. 6, 7/01/06.

   Add the following procedure:

   CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC), CCP-PO-003, Rev. 10, 11/16/06

3. **AK Summary, Cemented Sludge (RPT-TRUW-63), Report Number**

   Revise report number from AMWTP-RPT-TRUW-63 to RPT-TRUW-63.

4. **AK Summary, Cemented Sludge (RPT-TRUW-63), Section 1.2.6, Transuranic Waste Baseline Inventory Report (TWBIR) Information**

   Revise section as follows:

   WIPP Identification Number IN-W179.158 [8]

5. **AK Summary, Cemented Sludge (RPT-TRUW-63), Section 1.5, Prohibited Items**

   Add the following bullets to the first paragraph:

   - Waste that has ever been managed as high-level waste and waste from tanks specified in Table B-8 of MP-TRUW-8.2, Quality Assurance Plan, unless specifically approved through a Class 3 permit modification. [60]

- Any waste container from a waste stream (or waste stream lot) that has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment, as describe in Attachment B7 of MP-TRUW-8.2, Quality Assurance Project Plan. [60]

Revised first sentence of last paragraph as follows:

The absence of prohibited items is determined and documented through acceptable knowledge (AK) and characterization activities.

6. **AK Summary, Cemented Sludge (RPT-TRUW-63), Section 1.7, Radionuclides**

Revise last sentence to first paragraph as follows:

The cemented sludge waste stream does not contain concentrations of plutonium in excess of 20% by weight for the aggregate of any material category. [2, 27, 28, 42, 54, 61]

7. **AK Summary, Cemented Sludge (RPT-TRUW-63), Section 2.2, Flammability Considerations**

Revise last sentence as follows:

Payloads containing flammable VOCs are managed in accordance with CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC). [59]

8. **AK Summary, Cemented Sludge (RPT-TRUW-63), Section 3.0, References**

Revise existing references as follows:

5. DOE/WIPP 02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, U.S. Department of Energy, Carlsbad Field Office, October 29, 2007

7. DOE/WIPP-01-3194, CH-TRU Waste Content Codes (CH-TRUCON), February 2008

8. DOE/TRU-2006-3344, Transuranic Waste Baseline Inventory Report-2004, U. S. Department of Energy, Carlsbad Field Office

9. DOE/LLW-217, DOE Waste Treatability Group Guidance, T. D. Kirkpatrick, Prepared for DOE Idaho Operations Office, January 1995

10. NM4890139088-TSDF, Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Current Revision

Update for WIPP Operating Record (Change Notice # 2)

Cemented Sludge (BN836, Rev. 0)

Add the following references:

59. CCP-PO-003, CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC). [P672A]

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

61. MP- TRUW-8.1, Certification Plan for INL Transuranic Waste

Reason/Justification for the Changes

The audit report approval dates were updated to reflect the most recent approval date.

The documents used for WAP certification were revised to reflect the most recent revisions and to identify new TRAMPAC procedure required to support change in shipping contractor at AMWTP.

The AK Summary report number was changed to reflect changes in document control protocols.

AK Summary Section 1.2.6, Transuranic Waste Baseline Inventory Report (TWBIR) Information, was changed to update the TWBIR number to reflect the current TWBIR.

AK Summary Section 1.5, Prohibited Items was changed to add two prohibited items to reflect the requirements of the updated Quality Assurance Project Plan, MP-TRUW-8.2, Section B-1c.

AK Summary Section 1.7, Radionuclides was updated to clarify statement concerning compliance with requirement in Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Section 3.1.6.

AK Summary Section 2.2, Flammability Consideration was updated to reflect new TRAMPAC procedure.

AK Summary Section 3, References were updated or added to identify references that support the information revised or updated in the AK Summary.

Update for the WIPP Operating Record (BN836) certification:

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

Signature of Site Project Manager	Printed Name and Title	Date
Eric P. Schweinsberg	Eric P. Schweinsberg, SPM	3/27/08

Washington
TRU Solutions LLC

WRES:07:023
UFC:5822.00

January 24, 2007

Mr. Richard Provencher, Deputy Manager
U.S. Department of Energy
Idaho Clean-up Project
Idaho Operations Office (NE.ID)
1955 Fremont Avenue
Idaho Falls, ID 83401-1222

Subject: UPDATE FOR WIPP OPERATING RECORD (CHANGE NOTICE #1) CEMENTED SLUDGE (BN836, REV. 0)

Dear Mr. Provencher:

Washington TRU Solutions, on behalf of the Permittees, has approved the Change Notice Number 1 for Advanced Mixed Waste Treatment Project (AMWTP) Waste Stream Profile Form (WSPF) BN836, Rev. 0, Cemented Sludge. We have concluded that the WSPF is complete and that the waste stream determination was made in accordance with applicable procedures and guidance.

We therefore approve the Change Notice as submitted. Using the methods approved at AMWTP, AMWTP may enter the data into the certification and shipping modules of the WIPP Waste Information System.

If you have any questions on this matter, please contact me at (505) 234-7545.

Sincerely,

Steven C Kahn

for W. M. Wierzbicki, Manager
Regulatory Compliance

WMW:ks

Enclosure

P.O. Box 2078 • Carlsbad, New Mexico USA 88221-2078
Phone: (505) 234-7200 • Fax: (505) 234-7083

cc.	F. Marcinowski, DOE HQ	ED
	A. Holland, CBFO	ED
	R. McCallister, CBFO	ED
	M. Navarrete, CBFO	ED
	K. Watson, CBFO	ED
	G. Girard, DOE-ID	ED
	J. Ziemianski, DOE-ID	ED
	T. Jenkins, DOE-ID	ED
	J. Wells, DOE-ID	ED
	E. Schweinsberg, BNG	ED
	S. Carpenter, AMWTP	ED
	R. Chatfield, WTS	ED
	D. Hofer, WTS	ED
	G. Johnson, WTS	ED
	D. Kump, WTS	ED
	D. Speed, WTS	ED
	D. Standiford, WTS	ED
	M. Strum, WTS	ED
	R. Chavez, WRES	ED
	R. Kehrman, WRES	ED
	V. Waldram, LANL	ED
	P. Gilbert, LANL	ED
	CBFO M&RC	

Update for WIPP Operating Record (Change Notice # 1)

Cemented Sludge (BN836, Rev. 0)

Please add the following information to the WIPP Operating Record for Waste Stream Profile Form (WSPF) BN836, Revision 0. This waste stream is Cemented Sludge and was approved by DOE/CBFO on April 28, 2006.

This WSPF is being revised. The WSPF components are bolded. The updates are:

1. **WSPF Form-1195, Date of audit report approval by NMED**

   Revise the audit approval dates to the following: 12/23/03, 4/1/05, and 12/9/05.

2. **WSPF Form-1195, Title, version, number, and date of documents use for WAP Certification**

   Update the following procedures:

   Certification Plan for INL Transuranic Waste, MP-TRUW-8.1, Rev. 12, 1/24/07.

   Contact-Handled Transuranic Waste Authorized Methods for Payload Control, MP-TRUW-8.3, Rev. 6, 7/01/06.

   Quality Assurance Project Plan, MP-TRUW-8.2, Rev. 8, 1/24/07.

3. **WSPF Form-1195, Required Waste Stream Information, new item entitled Waste material parameter weight estimates per unit of waste**

   Add the new item. See Section 1.4.6, Table 1.3 of the AK summary. This is listed as Item 5 in the Change Notice.

4. **AK Summary, Cemented Sludge (AMWTP-RPT-TRUW-63), TABLES**

   Revise Table of Contents per the following:

   Delete Table 1-3 Estimated percentage of various materials in BN836

   Change Table 1-4 Waste material parameters for cemented sludge waste (BN836) to Table 1-3 Estimated waste material parameter weights per unit of waste for cemented sludge waste (BN836).

5. **AK Summary, Cemented Sludge (AMWTP-RPT-TRUW-63), Section 1.4, Process Description**

   Section 1.4.5 Material Inputs, delete last paragraph and delete Table 1-3, Estimated percentages of various materials in BN836.

   Delete Section 1.4.6 and Table 1-4.

   Add Section 1.4.6 Waste Material Parameters:

Update for WIPP Operating Record (Change Notice # 1)

Cemented Sludge (BN836, Rev. 0)

1.4.6 Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for BN836, waste material parameter data from 100% of the completed RTR and VE of Mound cemented sludge drums were obtained from the AMWTP Waste Tracking System (WTS) database on October 11, 2006. This represents 69% of the estimated number of drums for this waste stream. Drums evaluated were generated from 1974 through 1985 and are representative of the waste stream. WTS is AMWTP's comprehensive, DOE-audited waste tracking database in which all waste containers are tracked cradle-to-grave and all related characterization data are stored. A statistical analysis of the RTR and VE data was performed to estimate waste material parameter weights (by percent) for Mound cemented sludge, excluding packaging, in accordance with the requirements of MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documents and are summarized in Table 1-3. [34, 58]

Table 1-3. Estimated waste material parameter weights per unit of waste for cemented sludge waste (BN836).

Waste Material Parameters	Weight per Unit Waste by Percent
Inorganic Matrix	100
Other Inorganic Materials	<1
Cellulosics	<1
Rubber	<1
Plastics (waste materials)	<1
Iron-based Metals	<1
Other metals	<1

Although individual drums in this waste stream may contain other homogenous solid waste and debris materials, the waste stream as a whole will be greater than 50%, by volume, inorganic sludge. [21]

6. **AK Summary, Cemented Sludge (AMWTP-RPT-TRUW-63), Section 2.0, Shipping Considerations**

Section 2.2 Flammability Considerations, change to read as follows:

The payload containers in the waste stream must comply with the Contact Handled Transuranic Waste Authorized Methods for Payload Control (CH TRAMPAC) requirements. As specified in the CH TRAMPAC, a determination of compliance with the flammable gas limits will be performed for volatile organic compounds (VOCs), hydrogen and methane. Headspace gas sampling and analysis is performed when required by the WAP and/or CH TRAMPAC. At a minimum, the headspace gas analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with headspace gas results exceeding 500 ppm flammable VOCs, are evaluated for compliance with applicable

CH-TRAMPAC requirements prior to shipment. Payloads containing flammable VOCs are managed in accordance with MP TRUW 8.3, Contact Handled Transuranic Waste Authorized Methods for Payload Control (CH TRAMPAC).

7. **AK Summary, Cemented Sludge (AMWTP-RPT-TRUW-63), Section 3.0, References**

Update reference number 34 to read Memorandum to File from Tim Venneman, "Waste Material Parameter Weight Calculations and Supporting Data to Determine Waste Material Parameter Weight per Unit of Waste." TV-001-07, January 19, 2007 (C534A)

Add the following as reference number 58: MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge, Rev. 15, January 2007.

Reason/Justification for the Change

The audit report approval dates were revised and updated to reflect the most recent approval date.

The documents used for WAP certification were revised to reflect the most recent revisions.

Table 1-3 and the last paragraph have been deleted from section 1.4.5 because cellulosic, plastic, and rubber information was incorporated into Section 1.4.6, Waste Material Parameters.

Waste material parameter weight estimates per unit of waste and method for determining those estimates have been incorporated into Section 1.4.5 to meet the revised WIPP Hazardous Waste Facility Permit requirements as described in the Quality Assurance Project Plan, MP-TRUW-8.2, Section B3-12b.

Flammability consideration has been changed to clarify the method used for determining flammability as described in Quality Assurance Project Plan, MP-TRUW-8.2, Section B3-11a.

Update for the WIPP Operating Record (BN836) certification:

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

Signature of Site Project Manager	Printed Name and Title	Date
Eric P. Schweinsberg	Eric P. Schweinsberg, SPM	1/24/07

Washington
TRU Solutions LLC

WRES:06:036
UFC:5822.00

April 28, 2006

Mr. Richard Provencher, Deputy Manager
U.S. Department of Energy
Idaho Clean-up Project
Idaho Operations Office (NE.ID)
1955 Fremont Avenue
Idaho Falls, ID 83401-1222

Subject: TRANSMITTAL OF APPROVED ADVANCED MIXED WASTE TREATMENT PROJECT WASTE STREAM PROFILE FORM NUMBER BN836, CEMENTED SLUDGE

Dear Mr. Provencher:

Washington TRU Solutions LLC, on behalf of the Permittees, has evaluated the Advanced Mixed Waste Treatment Project (AMWTP) Waste Stream Profile Form (WSPF) BN836, Cemented Sludge. We have concluded that the WSPF is complete and that the waste stream determination was made in accordance with applicable procedures and guidance.

The Permittees therefore approve the WSPF as submitted. Using the methods approved at AMWTP, the AMWTP may enter the data into the certification and shipping modules of the WIPP Waste Information System.

If you have any questions, please contact me at (505) 234-7545 or (505) 706-0055.

Sincerely,

D. T. Bignell, Manager
Regulatory Compliance

DTB:rdr

P.O. Box 2078 • Carlsbad, New Mexico USA 88221-2078
Phone: (505) 234-7200 • Fax: (505) 234-7053

AMWTP Advanced Mixed Waste Treatment Project	Waste Stream Profile Form	AMWTP Form-1195 Rev. 3 Effective Date: 1/26/06 MP-TRUW-8.14 Page 1 of 3

WASTE STREAM PROFILE FORM

Waste Stream Profile Number: BN836, Rev. 0
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 of Audit report approval by NMED: 12/23/03, 7/03/04, 10/25/05
Title, version number, and date of documents used for WAP certification:
Certification Plan for INEEL Contact-Handled (CH-TRU) Transuranic Waste, MP-TRUW-8.1, Rev. 10, 1/3/06
Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC), MP-TRUW-8.3, Rev. 5, 1/3/06
Quality Assurance Project Plan (QAPjP), MP-TRUW-8.2, Rev. 5, 1/3/06

Did your facility generate this waste? ☐Yes ☒No *If no, provide the name and EPA ID of the original generator:* Mound, OH6890008984

Waste Stream Information[1]
WIPP ID: IN-W179
Summary Category Group: 83000
Waste Matrix Code Group: Solidified Inorganics
Waste Stream Name: Cemented Sludge
Description from the WTWBIR: This waste, generated at the Mound Plant, consists of shower water, decontamination water, cooling water, and some acids and caustics which have been solidified in Portland cement.

Defense TRU Waste: (Ref. 1) ☒Yes ☐No Check One: ☒CH ☐RH
Number of SWBs 0 Number of Drums 4,323 (55-gallon drums) Number of Canisters 0
Batch Data report numbers supporting this waste stream characterization: See Characterization Information Summary, Table 5
List applicable EPA Hazardous Waste Codes:[3] D004, D005, D006, D007, D008, D009, D010, D011, F001, F002, F005

Applicable TRUCON Content Codes: ID111/ID211

Accentable Knowledge Information[1]
[For the following, enter the supporting documentation used (i.e., references and dates)]

Required Program Information
Map of site: See Reference List No. 1 (Appendix A) and No. 2
Facility mission description: See Reference List No. 1 (Section 3) and No. 3
Description of operations that generate waste: See Reference List No. 1 (Sections 3 and 5) and No. 9
Waste identification/categorization schemes: See Reference List Nos. 1 and 4
Types and quantities of waste generated: See Reference List No. 9
Correlation of waste streams generated from the same building and process, as appropriate: See Reference List Nos. 1 and 9
Waste certification procedures: See Reference List Nos. 7 and 8

Required Waste Stream Information
Area(s) and building(s) from which the waste stream was generated: See Reference List No. 1 (Sections 3 and 5) and No. 9
Waste stream volume and time period of generation: See Reference List No. 9
Waste generating process description for each building: See Reference List No. 1 (Sections 3 and 5) and No. 9
Process flow diagrams: See Reference List No. 1 (Figure 3-6)
Material inputs or other information identifying chemical/radionuclide content and physical waste form: See Reference List No. 9

Which Defense Activity generated the waste: (check one)

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

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Supplemental Documentation

Process design documents: None
Standard operating procedures: See Reference List No. 1
Safety Analysis Reports: See Reference List No. 1
Waste packaging logs: None
Test plans/research project reports: See Reference List No. 1
Site databases: See Reference List No. 1
Information from site personnel: See Reference List No. 1
Standard industry documents: See Reference List No. 1
Previous analytical data: See Reference List No. 1
Material safety data sheets: See Reference List No. 1
Sampling and analysis data from comparable/surrogate Waste: See Reference List No. 1
Laboratory notebooks: None

Sampling and Analysis Information

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

Radiography: See Reference List No. 10
Visual Examination: See Reference List No. 11

Headspace Gas Analysis

VOCs: See Reference List Nos. 12 and 21
Flammable: See Reference List Nos. 12 and 21
Other gases (specify): N/A

Homogeneous Solids/Soils/Gravel Sample Analysis

Total metals: See Reference List Nos. 13, 14, 15, and 20
PCBs: N/A
VOCs: See Reference List Nos. 16 and 20
Nonhalogenated VOCs: See Reference List Nos. 17 and 20
Semi-VOCs: See Reference List Nos. 18, 19, and 20
Other (specify): N/A

Waste Stream Profile Form Certification:

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

D Eschenbaum for E.S.	D A Eschenbaum, Alt. SPM	4/28/06
Signature of Site Project Manager	Printed Name and Title	Date

NOTE: (1) Use back of sheet or continuation sheets, if required.
(2) If radiography, visual examination, headspace gas analysis, and/or homogeneous solids/soils/gravel sample analysis were used to determine EPA Hazardous Waste Codes, attach signed Characterization Information Summary documenting this determination.

Waste Stream Profile Continuation Sheet

Reference List

1. Acceptable Knowledge Document for INEEL Stored Transuranic Waste – Mound Plant Waste, AMWTP-RPT-TRUW-13, Rev. 4, March 2006.
2. Site Plan of the Advanced Mixed Waste Treatment Facility, DWG-5232-52-0101, Rev. 0, April 1999.
3. AMWTP TRU Waste Management Acceptable Knowledge Elements, AMWTP-RPT-TRUW-06, Rev. 6, April 2006.
4. AMWTP Waste Stream Designations, AMWTP-RPT-TRUW-12, Rev. 6, March 2006.
5. Waste Isolation Pilot Plant Hazardous Waste Facility Permit, New Mexico Environment Department, NM4890139088-TSDF, March 2006.
6. Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, U. S. Department of Energy, Carlsbad Field Office, Waste Isolation Pilot Plant, DOE/WIPP 02-3122, Rev. 4, December 2005.
7. Certification Plan for INEEL Contact-Handled Transuranic Waste, MP-TRUW-8.1, Rev. 10, January 2006.
8. TRU Waste Certification, MP-TRUW-8.5, Rev. 17, February 2006.
9. Acceptable Knowledge Summary for Cemented Sludge (BN836), AMWTP-RPT-TRUW-63, Rev. 0, April 2006.
10. Real-Time Radiography Operations (Drum), INST-OI-12, Rev. 25, February 2006.
11. Visual Examination Operating Procedures and Data Reporting, INST-OI-34, Rev. 15, March 2006.
12. Drum Vent/Headspace Gas Sample Operations, INST-OI-13, Rev. 21, March 2006.
13. Microwave Assisted Digestion of Homogeneous Solids, Soil and Gravel, ACMM-8909, Rev. 10, January 2006.
14. Determination of Mercury by CVAA for TRU Waste Characterization, ACMM-2810, Rev. 3, January 2005.
15. Determination of Metals by ICP-AES for TRU Waste Characterization, ACMM-2901, Rev. 3, January 2005.
16. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, ACMM-9260, Rev. 14, December 2005.
17. Determination of Nonhalogenated Volatile Organics by Gas Chromatography, ACMM-9441, Rev. 12, March 2006.
18. Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, ACMM-9270, Rev. 8, January 2005.
19. Sample Preparation for Semi-Volatile Organic Compounds and Polychlorinated Biphenyls, INEEL Analytical Laboratories Department, Analytical Chemistry Methods Manual, ACMM-9500, Rev. 11, December 2004.
20. RCRA Statistical Sampling, MP-TRUW-8.25, Rev. 12, January 2006.
21. HGAS Sampling and Analysis Operations, INST-OI-43, Rev. 12, September 2005.

Characterization Information Summary

Introduction

Advanced Mixed Waste Treatment Project (AMWTP) has compiled Acceptable Knowledge (AK) information for waste stream BN836 as required by the Waste Isolation Pilot Plant (WIPP) Waste Analysis Plan (WAP) and the Contact-Handled Transuranic Waste Acceptance Criteria (CH-WAC). [5,6] To confirm AK, AMWTP has characterized BN836 waste using real-time radiography (RTR) or visual examination (VE), headspace gas sampling and analysis, solid sampling and analysis, and radioassay.

This Characterization Information Summary (CIS) presents analytical data from six containers for total solids analysis and 19 additional containers for headspace gas analysis. The headspace gas analytical data includes results from the six containers that were solid sampled and from 19 containers that were sampled for headspace gas only. These data meet the necessary requirements for confirmatory characterization. Headspace gas data from the 25 containers are presented in Tables 1A and 1B. Solid sampling data from six containers are presented in Tables 2, 3A, 3B, 4A, and 4B. Table 5 correlates container numbers to characterization data packages. Table 6 presents the RTR/VE summary of prohibited items and AK confirmation. Table 7 correlates the container number to the headspace gas and the solid sample numbers.

Solid sampling was performed on randomly selected containers obtained from BN836–Lot 1, Cemented Sludge from the Mound Plant. BN836–Lot 1 consists of 637 drums of mixed transuranic waste.

Data Results

The data in this CIS are obtained from the required ("n") samples from solid sampling and analysis, and headspace gas analysis from 25 containers. The data consist of analyte maximum and mean concentrations, standard deviation, and the 90% upper confidence level (UCL_{90}). The data are used to assign and/or confirm U.S. Environmental Protection Agency (EPA) hazardous waste numbers (HWNs) for the BN836 waste stream by comparing the UCL_{90} to the program-required quantitation limit (PRQL).

HWNs are applied to the waste stream even if headspace gas and solid sampling analytical results for the assigned compounds are less than the program required quantitation limit (PRQL) for those analytes identified by AK and detected in solid or headspace gas sampling. Barium is the only toxicity characteristic metal analyte with a UCL_{90} result above its associated RTL value. There were no volatile organic compounds (VOCs) with UCL_{90} values above the PRQL for either the headspace gas or solid sampling results. The AK indicates that there are no semi-volatile organic compounds (SVOCs) present in the waste, and there were no solid sampling results above the PRQL for SVOCs. The EPA HWN assignment for this waste stream includes:

- Toxicity characteristic metals –D004 (arsenic), D005 (barium), D006 (cadmium), D007 (chromium), D008 (lead), D009 (mercury), D010 (selenium), and D011 (silver)

Characterization Information Summary

- Listed HWNs for organics – F001 and F002 (1,1,1-trichloroethane and trichloroethylene), F002 (tetrachloroethylene), and F005 (benzene and toluene)

Solid sampling and headspace gas results confirm AK that the above analytes are present in the waste stream. The HWN D005 is required to be applied based on the detection of barium at concentrations above the RTL. The HWNs D004, D006, D007, D008, D009, D010, D011, F001, F002, and F005 are conservatively applied based on the detection of corresponding analytes at concentrations less than the associated RTL/PRQL.

AMWTP Advanced Mixed Waste Treatment Project	Reconciliation with Data Quality Objectives	AMWTP Form-1597 Rev. 0 MP-TRUW-8.11 Effective Date: 12/06/04 Page 1 of 1

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

WSPFW BN836, Rev. 0 (Lot 1)

Data Quality Objective	Yes	No	N/A	Comment
1. Have all containers in the lot been assigned an appropriate Waste Matrix Code?	✓			
2. Have waste material parameter weights been established for each container in the lot?	✓			
3. Does each container of waste contain TRU radioactive waste?	✓			
4. Have mean concentrations, UCL_{90} values for the mean concentration, standard deviations, and the number of samples collected for each VOC in the headspace gas of waste containers in the waste stream lot been evaluated against the constituent hazardous waste number assignments?	✓			
5. Has the potential flammability of TRU waste headspace gases been evaluated for the lot?	✓			Containers will be evaluated on an individual basis using headspace gas analysis and WWIS.
6. Have mean concentrations, UCL_{90} for the mean concentrations, standard deviations, and number of samples collected for VOCs, SVOCs, and metals in the waste stream (if applicable) lot been evaluated against the constituent hazardous waste number assignments?	✓			
7. Does the waste stream exhibit a toxicity characteristic (TC) under 40 CFR Part 261, Subpart C?	✓			
8. Can the waste stream be classified as hazardous or nonhazardous at the 90-percent confidence level?	✓			
9. Have a sufficient number of waste containers been visually examined (as a QC check on radiography) to determine with a reasonable level of certainty that the UCL_{90} for the miscertification rate is less than 14 percent for the summary category group?	✓			
10. Was an appropriate packaging configuration and Drum Age Criteria (DAC) applied and documented in the headspace gas sampling documentation and was the drum age criteria met prior to sampling?	✓			
11. Have all TICs been appropriately identified and reported in accordance with the requirements of Section B3-1 for the lot?	✓			
12. Have the overall completeness, comparability, and representativeness QAOs been met for each of the analytical and testing procedures as specified in Sections B3-2 through B3-9 for the lot?	✓			
13. Have the PRQLs for all analyses been met for the lot?	✓			

PRotschenbaum for ES — Signature of Site Project Manager

PRotschenbaum — Printed Name

4/28/06 — Date

AMWTP Advanced Mixed Waste Treatment Project	Characterization Information Summary Report	AMWTP Form-1590 Rev. 0 MP-TRU/W-8.14 Effective Date: 11/30/04 Page 1 of 17

WSPF Number: BN836, Rev. 0 (Lot 1)

SQAO Lyle Ryman Date: 4/28/06
SQAO signature indicates that the information presented in this package is consistent with analytical batch reports.

SPM R Kischenbaum Date: 4/28/06
SPM signature indicates concurrence with all information presented in this report.

Characterization Information Summary

Characterization Description:

Drum selection and quantity of drums for Totals Analysis, Reduced Headspace Gas Sampling, and/or Newly Generated Soils/Gravel have been evaluated and meet the requirements established in MP-TRUW-8.25, *RCRA Statistical Sampling.* [20]

Y ☒ N☐ NA ☐

L Bischenbaum 4/28/06

SPM Signature Date

For "N" or "NA" provide rationale.

Table 1A. Headspace gas summary data. BN836 Lot 1

ANALYTE	Number of Samples	# Samples above MDL [a]	Transformation Used [a]	Maximum (ppmv)	Mean (ppmv)	Standard Deviation (ppmv)	Upper 90 % confidence limit (ppmv)	Transformed PRQL	PRQL (ppmv)	EPA Code
1,1-Dichloroethane [c]	25	1	Natural log	3.83	0.28	0.82	0.50	2.30	10	N/A
1,1-Dichloroethylene	25	0	None	2.45	1.34	0.30	[b]	-	10	N/A
1,1,1-Trichloroethane [c]	25	14	Natural log	4.39	1.55	1.44	1.93	2.30	10	F001, F002 [d]
1,1,2-Trichloro-1,2,2-trifluoroethane	25	0	None	2.35	1.46	0.24	[b]	-	10	N/A
1,1,2,2-Tetrachloroethane	25	0	None	2.35	1.23	0.62	[b]	-	10	N/A
1,2-Dichloroethane	25	0	None	2.35	1.19	0.32	[b]	-	10	N/A
1,2,4-Trimethylbenzene [f]	25	0	None	2.35	1.14	0.62	[b]	-	10	N/A
1,3,5-Trimethylbenzene [f]	25	0	None	2.30	1.19	0.57	[b]	-	10	N/A
Acetone	25	0	None	25.50	11.90	5.52	[b]	-	100	N/A
Benzene [e]	25	1	Natural log	2.64	0.21	0.72	0.40	2.30	10	F005 [d]
Bromoform	25	0	None	2.00	1.20	0.53	[b]	-	10	N/A
Butanol	25	0	None	27.50	17.80	5.95	[b]	-	100	N/A
Carbon disulfide [f]	25	0	None	2.50	1.45	0.29	[b]	-	10	N/A
Carbon tetrachloride	25	0	None	2.45	1.27	0.31	[b]	-	10	N/A
Chlorobenzene	25	0	None	2.10	1.22	0.52	[b]	-	10	N/A
Chloroform	25	0	None	2.30	1.14	0.43	[b]	-	10	N/A
Chloromethane [g]	25	0	None	2.60	1.31	0.31	[b]	-	10	N/A
cis-1,2-Dichloroethylene	25	0	None	2.25	1.19	0.47	[b]	-	10	N/A
Cyclohexane [f]	25	0	None	2.20	1.16	0.51	[b]	-	10	N/A
Ethyl benzene	25	0	None	2.15	1.22	0.53	[b]	-	10	N/A
Ethyl ether	25	0	None	2.30	1.47	0.30	[b]	-	10	N/A
m&p-Xylene [c]	25	1	Natural log	5.01	0.25	1.09	0.54	2.30	10	N/A [h]
Methanol [c]	25	1	Natural log	3.60	3.19	0.33	3.27	4.61	100	N/A [h]
Methyl ethyl ketone	25	0	None	24.50	13.10	5.85	[b]	-	100	N/A
Methyl isobutyl ketone	25	0	None	19.50	14.58	4.70	[b]	-	100	N/A
Methylene chloride	25	0	None	2.30	1.23	0.50	[b]	-	10	N/A
o-Xylene	25	0	None	2.20	1.31	0.53	[b]	-	10	N/A
Tetrachloroethylene [c]	25	1	Natural log	1.36	0.11	0.46	0.23	2.30	10	F002 [d]
Toluene [e]	25	2	Natural log	2.83	0.32	0.76	0.52	2.30	10	F005 [d]
trans-1,2-Dichloroethylene [c]	25	1	Natural log	2.48	0.24	0.67	0.42	2.30	10	N/A
Trichloroethylene [c]	25	7	Natural log	2.83	0.57	0.83	0.78	2.30	10	F001, F002 [d]

a. When a measurement is reported as below detection, one-half the analysis method detection limit (MDL) is used. Note that the MDL for a given analyte may vary from sample to sample.

b. The mean and standard deviation presented are the mean and standard deviation of the MDL after dividing by 2. All measurements are below detection; therefore, the upper 90% confidence limit is not calculated.

c. The maximum, mean, standard deviation, UCL_{90}, and PRQL are presented as transformed values

d. This analyte is identified based on AK. The HWN is conservatively applied to the waste stream because the analyte was detected in the headspace gas even though the UCL_{90} result for the constituent is less than the PRQL.

e. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and PRQL.[20]

f. Cyclohexane (CAS No. 110-82-7), 1,2,4-trimethylbenzene (CAS No. 95-63-6), 1,3,5-trimethylbenzene (CAS No. 108-67-8) and carbon disulfide (CAS No. 75-15-0) are not target analytes for this waste stream but will be reported because they have been added as target compounds on the Agilent system at the AMWTP [reference Section 2.2 of the AK Summary for Cemented Sludge (BN836)].[9]

g. Chloromethane (CAS No. 74-87-3) is not a target analyte for this waste stream but will be reported because it has been added as a target compound for other waste streams at AMWTP.

h. Although this analyte is identified based on AK, the waste is not ignitable; therefore, HWN F003 was not applied.

Did the Data verify the Acceptable Knowledge? Yes__X__ No_____

The detection of these analytes in the headspace gas confirms their presence in the waste (which were identified based on AK) and the EPA HWNs are being applied conservatively even though the UCL_{90} result for the constituents are less than the associated PRQL values.

If no, describe the basis for assigning the EPA Hazardous Waste Codes. N/A

Statistics performed by: Geoff Byrne Date: 4/27/06
Signature

Table 1B. Headspace gas summary data – tentatively identified compounds. BN836 Lot 1

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
2-Propanol, 2-methyl[a]	98.0	8	25	32.0%	25	32.0%

a. Although 2-propanol, 2-methyl (CAS No. 75-65-0) was detected in greater than 25% of the samples for this waste stream, it is not a 40 CFR 261, Appendix VIII listed analyte and will, therefore, not be added as a target analyte for this waste stream

Did the Data verify the Acceptable Knowledge? Yes: X No: _____

If no, describe the basis for assigning the EPA Hazardous Waste Codes. N/A

Verification of % Detected Calculation: George Byr Date: 4/27/06
Signature

Table 2. Metals summary data. BN836 Lot 1

ANALYTE	# Samples	# Samples above MDL [a]	Trans-formation Used [d]	Maximum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Trans-formed RTL	RTL [c] (mg/kg)	EPA Code
Arsenic [b]	6	6	Natural log	1.72	1.60	0.076	1.65	4.61	100	D004 [i]
Barium [b]	6	6	Natural log	8.67	8.04	0.330	8.23	7.60	2000	D005 [h]
Cadmium [b]	6	6	Natural log	2.08	0.517	1.11	1.19	3.00	20	D006 [i]
Chromium [b]	6	6	Natural log	4.11	3.82	0.195	3.94	4.61	100	D007 [i]
Lead [b]	6	6	Natural log	4.79	4.11	0.374	4.34	4.61	100	D008 [i]
Mercury [b]	6	6	Natural log	1.41	0.885	0.438	1.15	1.39	4	D009 [i]
Selenium	6	6	None	1.90	1.52	0.366	1.74	–	20	D010 [i]
Silver [b]	6	6	Natural log	1.19	0.704	0.327	0.902	4.61	100	D011 [i]
Antimony [b]	6	4	Natural log	1.41	0.097	1.03	0.718	4.61	100	N/A [f]
Beryllium [b]	6	6	Natural log	0.182	-0.400	0.303	-0.217	4.61	100	N/A [f, g]
Nickel [b]	6	6	Natural log	3.78	3.30	0.330	3.50	4.61	100	N/A [f]
Thallium [b]	6	6	Natural log	1.41	0.911	0.351	1.12	4.61	100	N/A [f]
Vanadium	6	6	None	44.0	24.8	16.1	34.5	–	100	N/A [f]
Zinc [b]	6	6	Natural log	5.39	5.08	0.196	5.20	4.61	100	N/A [f]

a. When a measurement is reported as below detection, one-half the analysis MDL is used. Note that the MDL for a given analyte may vary from sample to sample.
b. The maximum, mean, standard deviation (SD), UCL_{90}, and RTL are presented as transformed values.
c. To determine whether a HWN should be added, the UCL_{90} is compared against the appropriate limit. For toxicity characteristic constituents that do not have a PRQL in the permit, the TC limit (mg/L) multiplied by 20 is used to calculate the RTL. RTLs correspond to the analyte PRQL for analytes that are not characteristic hazardous waste constituents.
d. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and PRQL.
f. There are no associated toxicity characteristic HWNs with these analytes.
g. P015 for beryllium as defined in 40 CFR 261 and addressed in AMWTP-RPT-TRUW-63 is not applied to the waste.
h. This analyte is identified based on AK. HWN D005 is applied to the waste stream because the UCL_{90} result for the constituent is above the RTL.
i. This analyte is identified based on AK. The HWN is conservatively applied to the waste stream even though the UCL_{90} result for the constituent is not above the RTL.

Did the Data verify the Acceptable Knowledge? Yes X No ____

The detection of these analytes confirms their presence in the waste (which were identified based on AK) and the EPA HWNs are being applied conservatively for those constituents with UCL_{90} less than the RTL.

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

Statistics performed by: Tamara E Shlen Date: 4/28/06
Signature

Table 3A. Total VOC summary data. BN836 Lot 1

ANALYTE	# Samples	# Samples above MDL [a]	Trans-formation Used [e]	Maxi-mum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Trans-formed PRQL	PRQL [c] (mg/kg)	EPA Code
1,1-Dichloroethylene	6	0	None	0.185	0.178	0.005	[b]	–	10	N/A
Trans-1,2-dichloroethylene	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
1,1,1-Trichloroethane	6	0	None	0.090	0.089	0.002	[b]	–	10	F001, F002 [d]
1,1,2,2-Tetrachloroethane	6	0	None	0.185	0.178	0.005	[b]	–	10	N/A
1,1,2-Trichloro-1,2,2-trifluoroethane	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
1,1,2-Trichloroethane	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
1,2-Dichloroethane	6	0	None	0.185	0.178	0.005	[b]	–	10	N/A
Acetone	6	0	None	0.600	0.550	0.045	[b]	–	100	N/A
Benzene	6	0	None	0.185	0.178	0.005	[b]	–	10	F005 [d]
Bromoform	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
Butanol	6	0	None	1.20	1.09	0.066	[b]	–	100	N/A
Carbon disulfide	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
Carbon tetrachloride	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
Chlorobenzene	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
Chloroform	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
Ethyl benzene	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
Ethyl ether	6	0	None	0.600	0.550	0.045	[b]	–	100	N/A
Isobutanol	6	0	None	1.20	1.00	0.253	[b]	–	100	N/A
Methanol	6	4	None	6.30	2.78	2.21	4.11	–	100	N/A [f]
Methyl ethyl ketone	6	0	None	0.600	0.550	0.045	[b]	–	100	N/A
Methylene chloride	6	0	None	0.185	0.178	0.005	[b]	–	10	N/A
Pyridine	6	0	None	0.600	0.550	0.045	[b]	–	100	N/A
o-Xylene	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
m&p-Xylene	6	0	None	0.185	0.178	0.005	[b]	–	10	N/A
Tetrachloroethylene	6	0	None	0.185	0.178	0.005	[b]	–	10	F002 [d]
Toluene	6	0	None	0.090	0.089	0.002	[b]	–	10	F005 [d]
Trichloroethylene	6	0	None	0.090	0.089	0.002	[b]	–	10	F001, F002 [d]
Trichlorofluoromethane	6	0	None	0.090	0.089	0.002	[b]	–	10	N/A
Vinyl chloride	6	0	None	0.185	0.178	0.005	[b]	–	4	N/A

a. *When a measurement is reported as below detection, one-half the analysis MDL is used. Note that the MDL for a given analyte may vary from sample to sample.*
b. All measurements are below detection; therefore, the UCL_{90} is not calculated.
c. To determine whether a HWN should be added, the UCL_{90} is compared against the appropriate limit. For toxicity characteristic (TC) wastes, the TC limit expressed as the RTL is used if compounds do not have a PRQL in the permit. For listed wastes, the PRQL is used.
d. These analytes were identified by AK and detected in the headspace gas. The HWNs are conservatively applied to the waste stream even though the associated analytes were not detected in solid samples.
e. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{90}, and PRQL.
f. Although this analyte is identified based on AK, the waste is not ignitable; therefore, HWN F003 was not applied.

Did the Data verify the Acceptable Knowledge? Yes__X__ No____

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

Statistics performed by: Tamara D Stokes Date: 4/28/06
Signature

Table 3B. Total VOC summary data – tentatively identified compounds. BN836 Lot 1

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
None	N/A	N/A	N/A	N/A	N/A	N/A

Did the Data verify the Acceptable Knowledge? Yes__X__ No____

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

Verification of % Detected Calculation: N/A Date: _____
Signature

Table 4A. Total SVOC summary data. BN836 Lot 1

Analyte	# Samples	# Samples Above MDL [a]	Transformation Used [c]	Maximum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{95} (mg/kg)	Transformed PRQL	PRQL (mg/kg)	EPA code
1,2-Dichlorobenzene (o-Dichlorobenzene)	6	0	None	0.100	0.100	0.000	[b]	–	40	N/A
1,4-Dichlorobenzene (p-Dichlorobenzene)	6	0	None	0.100	0.100	0.000	[b]	–	40	N/A
2,4-Dinitrophenol	6	0	None	0.100	0.100	0.000	[b]	–	40	N/A
2,4-Dinitrotoluene	6	0	None	0.100	0.100	0.000	[b]	–	2.6	N/A
bis(2-Ethylhexyl) phthalate [d, e]	6	2	Natural log	-0.916	-1.93	0.606	-1.56	3.69	40	N/A
Fluoranthene [f]	6	1	None	0.460	0.160	0.147	0.249	–	40	N/A
Hexachlorobenzene	6	0	None	0.100	0.100	0.000	[b]	–	2.6	N/A
Hexachloroethane	6	0	None	0.100	0.100	0.000	[b]	–	40	N/A
2-Methylphenol (o-Cresol)	6	0	None	0.100	0.100	0.000	[b]	–	40	N/A
3- & 4-Methylphenol (m- & p-Cresol)	6	0	None	0.200	0.200	0.000	[b]	–	40	N/A
Nitrobenzene	6	0	None	0.100	0.100	0.000	[b]	–	40	N/A
Pentachlorophenol	6	0	None	0.100	0.100	0.000	[b]	–	40	N/A
Phenol [g]	6	0	None	0.100	0.100	0.000	[b]	–	40	N/A

a. When a measurement is reported as below detection, one-half the analysis MDL is used. Note that the MDL for a given analyte may vary from sample to sample.

b. All measurement are below detection; therefore, the UCL_{95} is not calculated.

c. The Shapiro-Wilk test for normality was applied to data prior to determination of the maximum, mean, SD, UCL_{95}, and PRQL.

d. The maximum, mean, standard deviation (SD), UCL_{95}, and RTL are presented as transformed values

e. Bis(2-Ethylhexyl) phthalate was detected as a TIC in BNINW216-Lot 1 in over 25% of the samples analyzed and was added to the target analyte list as required by the WAP. Bis(2-Ethylhexyl) phthalate was detected in >25% of the samples and even though it is not a TIC, it will be added as a target analyte for the BN836 waste stream. The CAS # for bis(2-Ethylhexyl) phthalate is 117-81-7.

f. Fluoranthene was detected as a TIC in BNINW216-Lot 1 in over 25% of the samples analyzed and was added to the target analyte list as required by the WAP. Fluoranthene is not a target analyte for the BN836 waste stream, but the data will be reported for this analyte. The CAS # for fluoranthene is 206-44-0.

g. Phenol was detected as a TIC in BNINW218-Lot 2 in over 25% of the samples analyzed and was added to the laboratory target analyte list as required by the WAP. Phenol is not a target analyte for the BN836 waste stream, but the data will be reported for this analyte. The CAS # for phenol is 108-95-2.

Did the Data verify the Acceptable Knowledge? Yes X No_____

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

Statistics performed by: Tamara Stokes Date: 4/28/06

Signature

Table 4B. Total SVOC summary data – tentatively identified compounds. BN836 Lot 1

Tentatively Identified Compound	Maximum Observed Estimated Concentrations (ppmv)	# Samples Containing TIC	# Containers in Lot	% Detected	# Containers in Waste Stream to Date	% Detected
None	N/A	N/A	N/A	N/A	N/A	N/A

Did the Data verify the Acceptable Knowledge? Yes__X__ No____

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

Verification of % Detected Calculation: N/A Date: _____

Signature

Table 5. Correlation of container identification numbers to data package. BN836 Lot 1

Container Number	Headspace Gas Sampling Data Package	RTR Data Package	RA Data Package	Visual Examination Data Package	Solid Sampling Data Package	Solid Analysis Data Packages
10001015	HS206_00047	RTR06-00119	ASY06-00521	N/A	SSC06-00002	ALD06012S ALD06011V ALD06005N ALD06020M
10001175	HS505_00108	RTR05-06363	ASY04-00490	N/A	N/A	N/A
10002218	HS106_00040	RTR04-00237	ASY04-00620	N/A	N/A	N/A
10008841	HS106_00033	RTR06-00072	ASY06-00196	N/A	N/A	N/A
10008842	HS406_00051	RTR06-00072	ASY06-00197	N/A	N/A	N/A
10008843	HS406_00051	RTR06-00072	ASY06-00196	N/A	N/A	N/A
10008846	HS206_00032	RTR06-00072	ASY06-00197	N/A	N/A	N/A
10008847	HS406_00051	RTR06-00072	ASY06-00205	N/A	N/A	N/A
10008848	HS206_00036	RTR06-00072	ASY06-00196	N/A	N/A	N/A
10016469	HS205_00205	RTR05-06365	ASY05-11364	N/A	SSC06-00002	ALD06012S ALD06011V ALD06005N ALD06020M
10019189	HS406_00098	RTR06-00109	ASY06-00487	N/A	SSC06-00002	ALD06012S ALD06011V ALD06005N ALD06020M
10019228	HS406_00082	RTR06-00110	ASY06-00488	N/A	N/A	N/A
10039602	HS206_00029	RTR05-06399	ASY06-00022	N/A	N/A	N/A
10040145	HS106_00044	RTR05-06395	ASY05-11587	N/A	N/A	N/A
10040454	HS206_00036	RTR06-00079	ASY06-00261	N/A	N/A	N/A
10040884	HS106_00044	RTR05-06396	ASY05-11587	N/A	N/A	N/A
10042479	HS206_00032	RTR06-00072	ASY06-00197	N/A	N/A	N/A
10052726	HS406_00098	RTR05-06375	ASY05-11495	N/A	SSC06-00002	ALD06012S ALD06011V ALD06005N ALD06020M
10055339	HS106_00032	RTR05-06388	ASY06-00194	N/A	SSC06-00002	ALD06012S ALD06011V ALD06005N ALD06020M
10056273	HS206_00018	RTR05-06376	ASY05-11505	N/A	N/A	N/A
10056699	HS106_00031	RTR05-06390	ASY05-11564	N/A	N/A	N/A
10058305	HS106_00031	RTR06-00061	ASY06-00130	N/A	SSC06-00002	ALD06012S ALD06011V ALD06005N ALD06020M
10059091	HS406_00051	RTR06-00041	ASY06-00124	N/A	N/A	N/A
10061136	HS206_00018	RTR05-06381	ASY05-11526	N/A	N/A	N/A
10062890	HS206_00017	RTR05-06380	ASY05-11535	N/A	N/A	N/A

NOTE: *For headspace gas sampling data packages, the HSG prefix represents use of the DVS system and the HS prefix represents use of the HGAS system.*

Table 6. RTR/VE summary of prohibited items and AK confirmation. BN836 Lot 1 [a]

Container Number	RTR Prohibited Items	Visual Examination Prohibited Items [c]	AK Confirmation [b]
10001015	None	N/A	Complete
10001175	None	N/A	Complete
10002218	None	N/A	Complete
10008841	None	N/A	Complete
10008842	None	N/A	Complete
10008843	None	N/A	Complete
10008846	None	N/A	Complete
10008847	None	N/A	Complete
10008848	None	N/A	Complete
10016469	None	N/A	Complete
10019189	None	N/A	Complete
10019228	None	N/A	Complete
10039602	None	N/A	Complete
10040145	None	N/A	Complete
10040454	None	N/A	Complete
10040884	None	N/A	Complete
10042479	None	N/A	Complete
10052726	None	N/A	Complete
10055339	None	N/A	Complete
10056273	None	N/A	Complete
10056699	None	N/A	Complete
10058505	None	N/A	Complete
10059091	None	N/A	Complete
10061136	None	N/A	Complete
10062890	None	N/A	Complete

Notes:

a. See Table 5 for the associated RTR and visual examination data packages. None of the listed containers contains prohibited items as defined by Section B-1c of the Advanced Mixed Waste Treatment Project Quality Assurance Project Plan (QAPJP), MP-TRUW-8.2. The absence of prohibited items is determined and documented through acceptable knowledge and confirmation activities. Radiography or visual examination is performed on each container in this waste stream as a confirmation activity.

b. Acceptable Knowledge confirmations for RTR and visual examinations are conducted by an Acceptable Knowledge Expert on every drum by completing a checklist for each RTR and visual batch. This checklist can be accessed through the batches listed in Table 5.

c. None of these drums have a VE in lieu of RTR examination. N/A indicates that containers have not been selected for visual examination by AMWTP.

Table 7. Sample identification number cross-correlation table. BN836 Lot 1

Container Number	Headspace Gas Sample Number	Solid Sample Number(s)
10001015	HS206_00047B-11	10089448, 10089450, 10089453
10001175	HS505_00108B-11	N/A
10002218	HS106_00040B-05	N/A
10008841	HS106_00033B-10	N/A
10008842	HS406_00051B-11	N/A
10008843	HS406_00051B-14	N/A
10008846	HS206_00032B-21	N/A
10008847	HS406_00051B-04	N/A
10008848	HS206_00036B-16	N/A
10016469	HS205_00205B-13	10089407, 10089408, 10089411
10019189	HS406_00098B-01	10089848, 10089896, 10089949
10019228	HS406_00082B-01	N/A
10039602	HS206_00029B-18	N/A
10040145	HS106_00044B-10	N/A
10040454	HS206_00036B-08	N/A
10040884	HS106_00044B-07	N/A
10042479	HS206_00032B-13	N/A
10052726	HS406_00098B-03	10089674, 10089675, 10089678
10055339	HS106_00032B-01	10089384, 10089385, 10089388
10056273	HS206_00018B-14	N/A
10056699	HS106_00031B-01	N/A
10058505	HS106_00031B-09	10089635, 10089636, 10089639
10059091	HS406_00051B-10	N/A
10061136	HS206_00018B-20	N/A
10062890	HS206_00017B-19	N/A

Attachment A
Evaluation of required number of samples. BN836 Lot 1

Analyte	# Samples	# Samples above MDL [a]	Trans-formation Used	Maxi-mum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{90} (mg/kg)	Trans-formed PRQL	PRQL [b] (mg/kg)	Required number of samples [c, h, g]	Comments
Arsenic [f]	6	6	Natural log	1.72	1.60	0.076	1.65	4.61	100	5	HWN D004 applied per AK [k]
Barium [f]	6	6	Natural log	8.67	8.04	0.330	8.23	7.60	2000	5	HWN D005 required to be applied [j]
Cadmium [f]	6	6	Natural log	2.08	0.517	1.11	1.19	3.00	20	5	HWN D006 applied per AK [k]
Chromium [f]	6	6	Natural log	4.11	3.82	0.195	3.94	4.61	100	5	HWN D007 applied per AK [k]
Lead [f]	6	6	Natural log	4.79	4.11	0.374	4.34	4.61	100	5	HWN D008 applied per AK [k]
Mercury [f]	6	6	Natural log	1.41	0.885	0.438	1.15	1.39	4	5	HWN D009 applied per AK [k]
Selenium	6	6	None	1.90	1.52	0.366	1.74	–	20	5	HWND010 applied per AK [k]
Silver [f]	6	6	Natural log	1.19	0.704	0.327	0.902	4.61	100	5	HWN D011 applied per AK [k]
Antimony [f]	6	4	Natural log	1.41	0.097	1.03	0.718	4.61	100	5	No associated HWN [d]
Beryllium [f]	6	6	Natural log	0.182	-0.400	0.303	-0.217	4.61	100	5	HWN not required to be applied [h, i]
Nickel [f]	6	6	Natural log	3.78	3.30	0.330	3.50	4.61	100	5	No associated HWN [d]
Thallium [f]	6	6	Natural log	1.41	0.911	0.351	1.12	4.61	100	5	No associated HWN [d]
Vanadium	6	6	None	44.0	24.8	16.1	34.5	–	100	5	No associated HWN [d]
Zinc [f]	6	6	Natural log	5.39	5.08	0.196	5.20	4.61	100	5	No associated HWN [d]
1,1-Dichloroethene (1,1-Dichloroethylene)	6	0	None	0.185	0.178	0.005	–	–	10	–	No samples above MDL
trans-1,2-Dichloroethene (trans-1,2-Dichloroethylene)	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
1,1,1-Trichloroethane	6	0	None	0.090	0.089	0.002	–	–	10	–	HWNs F001/F002 applied per AK [l]
1,1,2,2-Tetrachloroethane	6	0	None	0.185	0.178	0.005	–	–	10	–	No samples above MDL
1,1,2-Trichloro-1,2,2-trifluoroethane	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
1,1,2-Trichloroethane	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
1,2-Dichloroethane	6	0	None	0.185	0.178	0.005	–	–	10	–	No samples above MDL

Analyte	# Samples	# Samples above MDL [a]	Trans-formation Used	Maxi-mum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{95} (mg/kg)	Trans-formed PRQL	PRQL [b] (mg/kg)	Required number of samples [c, e, g]	Comments
Acetone	6	0	None	0.600	0.550	0.045	–	–	100	–	No samples above MDL
Benzene	6	0	None	0.185	0.178	0.005	–	–	10	–	HWN F005 applied per AK [i]
Bromoform	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
Butanol	6	0	None	1.20	1.09	0.066	–	–	100	–	No samples above MDL
Carbon disulfide	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
Carbon tetrachloride	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
Chlorobenzene	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
Chloroform	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
Ethyl benzene	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
Ethyl ether	6	0	None	0.600	0.550	0.045	–	–	100	–	No samples above MDL
Isobutanol	6	0	None	1.20	1.00	0.253	–	–	100	–	No samples above MDL
Methanol	6	4	None	6.30	2.78	2.21	4.11	–	100	5	HWN not required to be applied [i]
Methyl ethyl ketone	6	0	None	0.600	0.550	0.045	–	–	100	–	No samples above MDL
Methylene chloride	6	0	None	0.185	0.178	0.005	–	–	10	–	No samples above MDL
Pyridine	6	0	None	0.600	0.550	0.045	–	–	100	–	No samples above MDL
o-Xylene	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
m&p-Xylene	6	0	None	0.185	0.178	0.005	–	–	10	–	No samples above MDL
Tetrachloroethene (Tetrachloroethylene)	6	0	None	0.185	0.178	0.005	–	–	10	–	HWN F005 applied per AK [i]
Toluene	6	0	None	0.090	0.089	0.002	–	–	10	–	HWN F005 applied per AK [i]
Trichloroethene (Trichloroethylene)	6	0	None	0.090	0.089	0.002	–	–	10	–	HWNs F001/F002 applied per AK [i]
Trichlorofluoromethane	6	0	None	0.090	0.089	0.002	–	–	10	–	No samples above MDL
Vinyl chloride	6	0	None	0.185	0.178	0.005	–	–	4	–	No samples above MDL
1,2-Dichlorobenzene (o-Dichlorobenzene)	6	0	None	0.100	0.100	0.000	–	–	40	–	No samples above MDL

Analyte	# Samples	# Samples above MDL [a]	Transformation Used	Maximum (mg/kg)	Mean (mg/kg)	SD (mg/kg)	UCL_{95} (mg/kg)	Transformed PRQL	PRQL [b] (mg/kg)	Required number of samples [c, d, g]	Comments
1,4-Dichlorobenzene (p-Dichlorobenzene)	6	0	None	0.100	0.100	0.000	–	–	40	–	No samples above MDL
2,4-Dinitrophenol	6	0	None	0.100	0.100	0.000	–	–	40	–	No samples above MDL
2,4-Dinitrotoluene	6	0	None	0.100	0.100	0.000	–	–	2.6	–	No samples above MDL
bis(2-Ethylhexyl) phthalate [f]	6	2	Natural log	-0.916	-1.93	0.606	-1.56	3.69	40	5	HWN not required to be applied [i]
Fluoranthene	6	1	None	0.460	0.160	0.147	0.249	–	40	5	HWN not required to be applied [i]
Hexachlorobenzene	6	0	None	0.100	0.100	0.000	–	–	2.6	–	No samples above MDL
Hexachloroethane	6	0	None	0.100	0.100	0.000	–	–	40	–	No samples above MDL
2-Methylphenol (o-Cresol)	6	0	None	0.100	0.100	0.000	–	–	40	–	No samples above MDL
3- & 4-Methylphenol (m- & p-Cresol)	6	0	None	0.200	0.200	0.000	–	–	40	–	No samples above MDL
Nitrobenzene	6	0	None	0.100	0.100	0.000	–	–	40	–	No samples above MDL
Pentachlorophenol	6	0	None	0.100	0.100	0.000	–	–	40	–	No samples above MDL
Phenol	6	0	None	0.100	0.100	0.000	–	–	40	–	No samples above MDL

a. The mean and standard deviation presented are the mean and standard deviation of the method detection limits (after dividing by 2). If all measurements are below detection, the UCL_{95} is not calculated.

b. For analytes that have both an RTL and a PRQL, the PRQL is used to calculate the required number of samples.

c. The required number "n" of samples pertains only to toxicity characteristic or listed waste analytes and only to those analytes where the associated EPA HWN is not applied (i.e., it only applies to those cases where a site intends to establish that the constituent is less than the regulatory threshold and the associated EPA HWN does not apply).

d. If there is no HWN associated with an analyte, then that analyte is not used to define the number of required samples.

e. If there are no samples above the MDL for a given analyte, then that analyte is not used to define the number of required samples.

f. If a transformation is applied to the distribution to improve normality prior to calculating the mean and variance, then this same transformation is applied to the PRQL / RTL for that analyte.

g. If the calculated sample size is less than 5, then the number of required samples is set to the program-defined minimum of 5.

h. P015 for beryllium as defined in 40 CFR 261 and addressed in AMWTP-RPT-TRUW-63 is not applied to the waste.

i. The HWN for characteristic or listed hazardous waste is not assigned based on AK, and the UCL_{95} is less than the RTL or PRQL.

j. This analyte is identified as being present in this waste stream based on AK. HWN D005 is applied to the waste stream because the UCL_{95} result for the constituent is above the RTL.

k. This analyte is identified based on AK. The HWN is conservatively applied to the waste stream even though the UCL_{95} result for the constituent is less than the RTL.

l. These analytes were identified by AK and detected in the headspace gas. The HWNs are conservatively applied to the waste stream even though the associated analytes were not detected in solid samples.

Acceptable Knowledge Summary for Cemented Sludge (BN836)

Advanced Mixed Waste Treatment Project

(Signature on file. See DCR-11342.) 06/27/12

Susan Peterman Date

TRU Programs Manager

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Table 1-3. Estimated Waste Material Parameter Weights Per Unit of Waste for Cemented Sludge Waste (BN836). 11

ACRONYMS AND ABBREVIATIONS

AK	Acceptable Knowledge
AMWTP	Advanced Mixed Waste Treatment Project
BN	BNFL Inc.
CAO	Carlsbad Area Office
CCP	Central Characterization Project
CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
CFR	Code of Federal Regulations
D&D	decontamination and decommissioning
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
HWN	hazardous waste number
IDC	item description code
INL	Idaho National Laboratory
MD	Mound
MDL	method detection limit
nCi/g	nanocuries per gram
PCB	polychlorinated biphenyl
ppm	parts per million
PPO	pressed plutonium oxide
PRQL	program-required quantitation limit
RCRA	Resource Conservation and Recovery Act
R&D	research and development
RTG	radioisotopic thermoelectric generator
RTL	regulatory threshold limit
RTR	real-time radiography
TRU	transuranic
TSCA	Toxic Substances Control Act
TWBIR	Transuranic Waste Baseline Inventory Report
UCL90	90% upper confidence limit
VE	visual examination
VOCs	Volatile Organic Compounds
WAC	Waste Acceptance Criteria

WD	Waste Disposal [building at Mound]
WDA	WD Annex
WIPP	Waste Isolation Pilot Plant
WIPP-WAP	Waste Isolation Pilot Plant Waste Analysis Plan
WMC	waste matrix code
WMP	waste material parameter

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BN836 [1]

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

Cemented Sludge [1]

1.2.2 Point of Generation

Mound (MD) –Waste Disposal (WD) Building. [2, 3]

1.2.3 Waste Stream Volume

4,323 55-gallon drums (908 m^3) – current volume [4]
0 55-gallon drums (0 m^3) – projected volume

The above is an estimate of the number of candidate containers for waste stream BN836. The estimated percentages (by number of containers) of transuranic (TRU) activity are 50% greater than 100 nCi/g and 50% less than 100 nCi/g. [4]

Advanced Mixed Waste Treatment Project (AMWTP) will employ payload management practices in accordance with the Waste Acceptance Criteria (WAC) for waste stream BN836. [5]

1.2.4 Generation Dates

AMWTP stores containers of Mound cemented sludge waste generated from 1974 to 1985. Wastes stored at AMWTP with generation dates (i.e., pack date) later than 1985 are the result of repackaging (e.g., waste characterization activities). [2, 3, 6]

1.2.5 TRUCON Codes

ID111/ID211 [7]

1.2.6 Transuranic Waste Baseline Inventory Report (TWBIR) Information

Waste Stream ID: IN-BN836 (previously identified as IN-W179.158) [8]

1.2.7 Summary Category Group

S3000- Homogeneous Solids [9]

1.2.8 Waste Matrix Code Group

Solidified Inorganics [1, 10]

1.2.9 Waste Matrix Code (WMC)

S3121 – Wastewater Treatment Sludges [1, 9]

Mound cemented sludge waste consists of at least 50 volume percent sludge from a wastewater treatment process that was solidified with cement.

1.2.10 Description from the TWBIR

This waste, generated at the Mound Plant, consists of shower water, decontamination water, cooling water, and some acids and caustics which have been solidified in Portland cement. [8]

1.2.11 AMWTP Defense-Related Determination

Mound wastes were generated during defense-related operations conducted for a variety of customers, including Lawrence Livermore National Laboratory, Hanford Site, 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 Department of Defense (DOD) or in support of DOD missions. One of the major space programs supported by the Mound Plant was the Space Nuclear Auxiliary Power system which was sponsored by the DOD. Operations at the facility included plutonium processing and recovery, development of reactor fuels, performance of reactor fuel waste studies, and production 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 cemented sludge is the result of commingling of wastes from both defense and domestic related activities. Defense wastes are identified as those wastes generated during work involving only defense activities or during work in which defense and non-defense wastes were inadvertently mixed in the past and from which the non-defense portion cannot be segregated. The cemented sludge waste stream, therefore, meets the definition of defense waste from defense nuclear materials production and defense research and development (R&D). [2, 11, 12, 13, 20, 37, 38, 39, 40]

1.3 Waste Stream Description

1.3.1 Description

This waste stream consists of drums containing Mound cemented sludge (Item Description Code [IDC] MD-836). The sludge waste was generated from the treatment of alpha-contaminated wastewaters at the Waste Disposal (WD) Building. The wastewater originated outside process gloveboxes from sources such as floor drains, laboratory sinks, and sumps, as well as the old alpha waste line. The wastewaters were generated from decontamination, laundry, research and analytical operations from several facilities at Mound including the Laundry

(H Building), Plutonium Processing (PP building) /Special Metallurgy (SM building) Complex, Semi-Works (SW building)/Research (R building) Complex, Technical (T building), WD, and the annex on the WD Building (WDA), and Buildings 23, 50, and 51. The wastewater was generated primarily from the decontamination of equipment, buildings, clothing and personnel and contains detergents, cleansers, soaps, janitorial wastes, cooling water, acids, caustics, paint, and trace amounts of organics. The sludge was solidified with Portland cement. Florco, a non-hazardous absorbent, may have also been added to this waste stream. [2, 3, 11, 14, 15, 16, 17, 18, 19, 20, 21]

This waste was generated from similar activities and is similar in material, physical form, and hazardous constituents and is a single waste stream. The waste is primarily an inorganic matrix. Individual drums may also contain small amounts of debris including plastic, rubber and paper items. [2, 3, 21, 22] Each container in this waste stream contains at least 50% by volume sludge waste.

1.4 Process Description

1.4.1 Areas of Operation

Mound cemented sludge waste was generated by treating alpha-contaminated wastewater generated from the following operations conducted in H, PP/SM, SW/R, T, WD and WDA Buildings and Buildings 23, 50 and 51: [2, 3, 11, 14, 15, 16, 17, 18, 19, 20]

- Laboratory and Research and Development Operations
- Waste Treatment
- Decontamination and Decommissioning (D&D).

1.4.2 Process Flow Diagram

Process flow diagrams for Mound Sludge generating process are provided in Figures 3-6 and 3-8 of RPT-TRUW-13, Acceptable Knowledge Document for INL Stored Transuranic Waste – Mound Plant Waste. [2] Process flow diagrams of the sludge generating and solidifying processes are also provided in the Mound radioactive waste management site plans and status reports. [14, 15, 16]

1.4.3 Wastewater Generation

The TRU Mound cemented sludge waste stored at the Idaho National Laboratory (INL) was generated from the treatment of alpha-contaminated wastewater collected from various facilities at Mound that housed defense operations related to the design and development of heat sources using ^{238}Pu for spacecraft, generators, and satellites. These operations and facilities included plutonium processing operations, plutonium and other isotope recovery, and other activities supporting these operations including laboratory and R&D operations, maintenance operations, and waste treatment operations. The wastewater was generated primarily from the decontamination of equipment, buildings, clothing, and personnel and contains detergents,

cleansers, soap, janitorial wastes, cooling water, acids, caustics, paint, and trace amounts of organics. [2, 3, 11, 18, 19, 20]

The drain systems from all radioactive areas terminated in the WD Building. [53] Alpha-contaminated wastewater was collected from H, PP/SM, SW/R, WD, and WDA Buildings. Alpha-contaminated wastewater was also received from T Building prior to 1976, from the Building 23 sump if it became contaminated, from Building 50 after 1977, and from Building 51 between 1980 and 1983. Floor drains in these buildings, as well as laboratory sink drains, shower water, and sumps contributed to this waste. During the period of time that the waste to be dispositioned by the AMWTP was generated, the primary inputs to the WD included the following: [2, 3, 11, 14, 15, 16, 17, 18, 19, 20]

- Wastewater from laundry drains in H Building
- Wastewater from SM/PP complex transferred by pipeline (until 1976)
- Wastewater from SM/PP complex transported by tanker truck (after 1976)
- Wastewater from drains, sumps, showers, and laboratory sinks in SW/R complex
- Wastewater from drains, sumps, and laboratory sinks in WD Building and WDA.

The alpha-contaminated wastewater also includes liquids collected from the old, alpha waste line which was connected to the SW/R complex and the laundry in the H Building. Although these connections were believed to be plugged, a small amount of water from this waste line was received at the WD, mainly after rain. [3, 11]

Demolition of the SM/PP and R Building plutonium processing facilities began in the 1970s; however, the cemented sludge included in this waste stream was generated from 1974 to 1985. These activities included D&D of gloveboxes, conveyor housing, piping, process equipment, and structures. [3, 11, 20, 22] Gloveboxes, process equipment in gloveboxes, and hoods were decontaminated using water, detergent, and hypochlorite. Until 1980, D&D of some of the process equipment used acid solution rinses to recover plutonium. [11] A detergent and paint remover in a high pressure washer was also used to decontaminate building interiors and equipment. [12, 43]

1.4.3.1 SM/PP Complex

Plutonium was processed at the Mound site in the SM Building and PP Building (Building 38), otherwise known as the SM/PP Complex. The primary processes were pressed plutonium oxide (PPO) sphere production and plutonium-molybdenum cermet (PMC) production. The ^{238}Pu was used as the heat source in radioisotopic thermoelectric generators (RTGs), and the RTG units themselves were manufactured at Mound. The alpha-contaminated wastewater that was transferred from the SM/PP complex to the WD included wastewaters from floor drains, shower water, sinks, and a laboratory located in the PP Building. Small quantities of chemicals used in the plutonium production and recovery operations became constituents of the wastewater and include cooling water, trace amounts of alcohols (methanol, ethanol, isopropanol), detergents, shower water, janitorial wastes (wax, wax stripper, and bowl cleaner),

paint, and trace amounts of acetone and trichloroethane. Wastewater from these sources drained into two 500-gallon sumps. The wastewater was transferred to WD via a pipeline until 1976, when the pipeline was sealed and wastewater was pumped from the sumps to a storage tank outside the building. The wastewater was then pumped from the tank to a tanker truck and transported to WD Building for treatment. [3, 11, 18, 19, 20, 44, 48, 49, 50, 51, 62, 63, 64, 65, 70]

A variety of analytical procedures were performed in PP Building laboratory, such as mass spectrometry, calorimetry, ion exchange, radiochemical separations, liquid scintillation, gamma spectroscopy, and plating of alpha samples for counting. With the exception of liquid scintillation vials, all spent chemicals used in the laboratory were assumed to be radioactively contaminated and were poured down the sink drains into the wastewater system. Scintillation vials and spent cocktail were bagged and sent to Building 23 for dispositioning. Chemicals used in the laboratory included acetone, nitric acid, sulfuric acid, sodium hydroxide, and acetic acid. Trichloroethane and methanol also were used in the SM/PP complex as a degreaser for metal parts. [3, 11, 19, 20, 22, 43, 45, 49, 50, 51, 52]

1.4.3.2 SW/R Complex

SW, R, and related facilities are considered as the SW/R complex because they are physically joined. Historically, R Building housed tritium recovery, plutonium development work, and analytical support. The SW Building housed tritium recovery and purification; tritium component development, component evaluation, and materials analysis; and research on plutonium actinium, radium, uranium, thorium, and protactinium. During decommissioning, several gloveboxes in the R-140 laboratory area were characterized as TRU waste. Encapsulation was conducted in the R Building and involved welding a machined metal cover over a sphere of PPO spheres. Encapsulation materials included iridium, graphite, tantalum, titanium, hastelloy (an alloy of cobalt, molybdenum, chromium, tungsten, and iron), inconel, platinum-rhodium, and yttrium. Encapsulation operations in the R Building at Mound were conducted until 1979. In addition to encapsulation, several processes in the R Building supported SM/PP production operations, including encapsulation research, shaping and pressing heat sources, and other research. [3, 11, 20]

The SW/R Building complex also included a small laboratory section that handled alpha-emitting radionuclides such as ^{238}Pu and ^{239}Pu. This laboratory was used for R&D, mostly involving solvent extraction processes. The sink and floor drains from these laboratories were connected to a sump equipped with a steam lift pump that pumped the wastewater to the R Building and then to the alpha influent tanks in WD Building. Chemicals used in the laboratory included carbon tetrachloride, dichloromethane, organophosphate, nitric acid, boric acid, and sulfuric acid. Yearly estimates of waste materials sent to the WD Building from the R Building laboratories included hydrogen peroxide; ammonium hydroxide; and hydrochloric, hydrofluoric, nitric, sulfuric, and lactic acids (approximately 7 pints total); methanol, propanol, mineral oil, ethanol, acetone, xylene, trichloroethylene (approximately 5 pints total), and sodium sulfite solution (approximately 1 pint); and 86 lb of various chemicals, including potassium and copper sulfates and carbonates and sodium hydroxide (lime). [3, 11, 12, 18, 19, 20, 29, 44, 45, 46, 47, 48, 52, 63, 64, 65]

1.4.3.3 H Building

The H Building housed the laundry facilities for both uncontaminated (cold) and contaminated (hot) clothing for Mound. All of the water generated at the H Building from the laundry, the floor drains, and a sink was collected in a holding tank on the "hot side" of the building. The wastewater was pumped to the WD Building alpha wastewater influent tanks. Products used in the H Building included liquid soap that contains ethylene glycol monobutyl ether and sodium hydroxide, powdered soap that contains ammonium bicarbonate and sodium hexametaphosphate, and fabric softener. [3, 11, 16]

1.4.3.4 WD and WDA Buildings

WD Building was the central facility for the treatment of radioactive liquid wastes at Mound, and historically included alpha and beta wastewater treatment systems. An addition to WD Building (WDA) was constructed, including the Waste Treatment System (WTS) pipeline, which carried acidic and caustic wastewater from SM and PP to WDA, and began accepting alpha-contaminated wastewater in August 1967. The high-risk portion of the pipeline was not operational until April 1968 and was abandoned in 1974. The WDA alpha-contaminated wastewater treatment was moved to WD, and the WDA alpha influent tanks were converted to use in the beta wastewater treatment system which began treating tritiated wastewater in 1973. Cemented sludge included in this waste stream was generated from 1974 to 1985. [2, 3, 6, 11, 12]

All floor and sink drains in the WD and WDA Buildings were connected to sumps located in the basement of the buildings. Wastewater from the sumps was transferred either by pipeline or by pumping to storage tanks for transfer to the WD alpha influent tanks. There was a small laboratory in WD Building where alpha and beta waste streams were analyzed. This laboratory was not used on a routine basis, but the sink was connected to the WD sumps. Sludge moisture and pH analyses and scintillation counts of influent and effluent wastes were performed. Hazardous compounds used in the WD laboratory included Instagel, which has a xylene base. Spent liquid scintillation cocktail and used scintillation vials, were bagged and dispositioned as mixed waste and sent to Building 23 for storage. The liquid scintillation waste was not sent to INL. [3, 11]

1.4.3.5 Other Buildings

The T Building housed a multitude of research, development, and production programs. The two major radionuclide programs were the polonium and tritium programs. From 1949 to 1973, ^{210}Po programs included a processing and separation program, a fuels R&D program, and a production program with polonium. Decontamination work was done from 1971 through 1973 on the ^{210}Po processing areas. A variety of other activities were performed in the T Building such as nondestructive testing, environmental testing, gamma and mass spectroscopy, calorimetry, neutron activation analysis, and safeguards R&D. Tritium contaminated waste was drummed and sent to the beta contaminated wastewater system. [11, 27]

Building 23 is adjacent to the WD. Drummed radioactive and mixed wastes were stored in Building 23 prior to shipment of the wastes to off-plant disposal facilities. Several floor drains connected to a sump were used to collect any spills or leaks from the stored drums. Liquid wastes in the sump were sampled prior to dispositioning. Nonradioactive or clean material was released to the sanitary sewer system. Contaminated liquid wastes were transported in drums to the WD alpha wastewater influent tanks. [3, 11]

Building 50 housed plutonium operations, including production of heat sources using ^{238}Pu. Building 51 housed an incinerator that was used to burn non-radioactive waste prior to 1974. [11]

1.4.4 Wastewater Treatment Process

The alpha wastewater treatment system in the WD consisted of four influent tanks, two clariflocculators, two sand filters, two bone char columns (after 1977), four effluent storage tanks, two sludge tanks (pits) , and a sludge solidification/drumming unit. All liquid wastes were collected in the influent tanks and sampled for radioactivity and then prepared for treatment. [11, 14, 15, 16]

Chemicals such as activated carbon, calcium chloride, and ferric sulfate; barium chloride aluminum sulfate, and sulfuric acid (before 1976); and sodium hydroxide (after 1975) were added in varying but pre-determined amounts to provide the desired adsorption, phosphate precipitation, flocculation, and scavenging. After 1974, the flocculating agents Nalco C-627 (before 1982) and Nalco N-7173 (after 1981) were also used to improve the quality of the effluent and to reduce the volume of sludge generated. A major portion of the radioisotopes present was retained by the flocculated solids. Each of the four influent tanks was agitated by two mixers to prevent settling of the solids. [11, 14, 15, 16, 19, 20, 23, 53]

The mixture was then pumped into two clariflocculators where the precipitate (sludge) and liquid were separated after the flocculated solids were allowed to settle. Aluminum sulfate (prior to 1976) or sodium hydroxide (after 1976) was added to control the pH between 11.0 and 11.5 and to maximize the precipitation and settling. The supernatant liquid was removed by siphoning the liquid above the settled sludge. Prior to 1977 the supernatant liquid was acidified (using sulfuric acid) and treated with activated carbon and sodium hypochlorite (after 1975 for bacteria control), and then filtered through sand beds prior to being pumped into four effluent tanks. After 1977, the supernatant liquid was treated with activated carbon, filtered through sand beds, neutralized with sulfuric acid to 7.0 to 8.0 pH, and/or passed through a bone char filter (and 1 micron filter after 1979) prior to being pumped into the effluent tanks. If the effluent met the applicable requirements governing discharge of radioactive materials to the environment, it was released to the Great Miami River. If the effluent did not meet the requirements, it was recycled through the process. [11, 14, 15, 16, 19, 23, 53]

The dewatered sludge (approximately 15 to 30 % solids) was then pumped from the clariflocculators into two sludge holding tanks. [20, 24, 25, 26, 44] The principal non-radioactive constituents of the sludge are carbon and ferric hydroxide with minor amounts of calcium

carbonate, calcium phosphate, and calcium oxalate. [26] Prior to 1977, the sludge was treated with caustic soda (sodium hydroxide) to reduce bacterial action. The sludge was sampled on a batch basis to determine activity level prior to solidifying in 55-gallon drums containing 90-mil rigid polyethylene liners. In some cases a drum bag liner may have been used. [11, 14, 15, 16, 21] Two to 2-1/2 bags (about 190 to 240 pounds) of Portland cement were slowly added to approximately 40 gallons of sludge in a waste drum while working the mixer up and down through the sludge-cement mixture and then mixing for about 7 to 10 minutes. After the mixer blades were removed from the drum, unmixed cement was typically added to the top of the sludge-cement mixture. The sludge-cement mixture was allowed to cure overnight before the rigid drum liner lid or drum lid was installed. The drums of cemented sludge typically weigh between 575 and 650 pounds. [20, 22, 24, 25, 26] Based on real-time radiography (RTR) examinations, a bag liner was used in some drums of cemented sludge waste. [21]

1.4.5 Material Inputs

The principal non-radioactive constituents of the sludge (prior to mixing with cement) are carbon and ferric hydroxide with minor amounts of calcium carbonate, calcium phosphate, and calcium oxalate. [26] The chemicals presented in Table 1-1 were used in the Mound plutonium production and recovery, laboratory, R&D, and D&D activities and may have contaminated the alpha-contaminated wastewaters. The chemicals presented in Table 1-2 were used to treat the wastewaters, as well as identified as being in the wastewater (typically in trace amounts) or added to the sludge without treatment (sodium carbonate and sodium chloride). [19, 44] The alpha-contaminated wastewaters were treated in the WD Building, resulting in the cemented sludge waste.

Table 1-1. Chemicals used in Production, Recovery, Laboratory, R&D, and D&D Activities.

Chemical Types	Chemical Compounds
Halogenated solvents used for cleaning/degreasing	Benzene, carbon tetrachloride, methylene chloride, 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane (Freon TF), and trichloroethylene. (2, 11, 12, 29, 45, 50, 51)
Nonhalogenated solvents used for cleaning/degreasing	Acetone, methanol, toluene, and xylene. (3, 11, 12, 18, 19, 20, 29, 45, 48, 49, 50, 51, 52, 62)
Organic solvents used in production processes or laboratories	Acetone, benzene, carbon disulfide, carbon tetrachloride, chloroform, dichloromethane, ethanol, methanol, methyl ethyl ketone, methylene chloride, propanol, tetrachloroethylene, 1,1,1-trichloroethane, trichloroethylene, toluene, 1,1,2-trichloro-1,2,2-trifluoroethane (Freon TF), and InstaGel (contains xylenes). (2, 3, 11, 12, 20, 29, 30, 48, 49, 50, 52, 70)
Chemicals used in plutonium processing and recovery operations	Acids (nitric, sulfuric, acetic, hydrochloric, hydrofluoric, and oxalic) ammonium hydroxide, aluminum nitrate, dimethyloxalate ferrous sulfamate, hydroxylamine nitrate, sodium carbonate, sodium hydroxide, and tri-n-octylphosphine (TOPO). (2, 3, 11, 20, 22, 43, 47, 50, 70)
Chemicals used in laboratory operations	Acids (acetic, boric, hydrochloric, hydrofluoric, lactic, nitric, and sulfuric), ammonium hydroxide, carbon tetrachloride, copper sulfate, hydrogen peroxide, metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver), mineral oil, organophosphate, potassium carbonate, potassium sulfate, sodium hydroxide, sodium sulfite. (2, 3, 11, 20, 22, 29, 52, 70)
Chemicals used in D&D operations	Acid solutions, detergent (e.g., Micro® detergents, nonsolvent based cleaners with no identified RCRA regulated hazardous constituents), hypochlorite, polyurethane foam, RTV rubber, and paint remover (e.g., methylene chloride or methyl ethyl ketone). (11, 12, 20, 31, 32)
Absorbents used in packaging	Florco (Montmorillonite and Attapulgite clay with no identified RCRA regulated hazardous constituents), Auto-Dri and Dri-Rite (calcium carbonate). (2, 11, 20, 22, 33)

Table 1-2. Chemical Contaminants that may be present in the Cemented Sludge Waste.

Chemical Types	Chemical Compounds
Chemicals used in wastewater treatment processes	Activated carbon, calcium chloride, ferric sulfate, barium chloride, aluminum sulfate, sulfuric acid, sodium hydroxide , sodium hypochlorite, Nalco C-627 and Nalco N-7173 (organic polymers, polyelectrolyte flocculants), and bone char. [14, 15, 16, 17]
Chemicals identified in liquids sent to the wastewater treatment process.	Acetone, acids (acetic, hydrochloric, hydrofluoric, lactic, nitric, oxalic, sulfuric), alcohols (methanol, ethanol, and propanol), ammonia, ammonium bicarbonate and sodium hexamethaphosphate (powdered soap), ammonium hydroxide, asbestos fiber, beryllium, calcium carbonate, caustic soda and lime, chromium, copper sulfate, cyanides, ethylene glycol monobutyl ether and sodium hydroxide (liquid soap), fabric softeners [a], hydrogen peroxide, lead, lithium chloride, mercury, methylene blue, mineral oil, nickel sulfate, paint, potassium bromide, potassium carbonate, potassium pyrosulfate, potassium sulfate, sodium carbonate, sodium chloride, sodium hydroxide, sodium sulfite, trichloroethylene, and zirconium oxide.[11, 18, 19, 20, 44, 63, 64, 65]
Materials used in waste solidification processes	Cement and Florco absorbent (Montmorillonite and Attapulgite clay with no identified RCRA regulated hazardous constituents). [2, 11, 33]

a. Fabric softeners may include chemicals such as alchohols (e.g, benzyl alcohol, ethanol, isopropyl) alpha-terpineol, benzyl acetate, camphor, chloroform, ethyl acetate, limonene, linalool, and pentane. [55, 56, 57]

1.4.6 Waste Material Parameters

To estimate the waste material parameter (WMP) weight percentages for BN836, WMP data from 100% of the completed RTR and VE (visual examination) of Mound cemented sludge drums were obtained from the AMWTP Waste Tracking System (WTS) database on October 11, 2006. This represents 69% of the estimated number of drums for this waste stream. Drums evaluated were generated from 1974 through 1985 and are representative of the waste stream. WTS is AMWTPs comprehensive, DOE-audited waste tracking database in which all waste containers are tracked cradle-to-grave and all related characterization data are stored. A statistical analysis of the RTR and VE data was performed to estimate WMP weights (by percent) for Mound cemented sludge, excluding packaging, in accordance with the requirements of MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation, and are summarized in Table 1-3. [34, 58]

Table 1-3. Estimated Waste Material Parameter Weights Per Unit of Waste for Cemented Sludge Waste (BN836).

Waste Material Parameters	Weight per Unit Waste by Percent
Inorganic Matrix	100
Other Inorganic Materials	<1
Cellulosics	<1
Rubber	<1
Plastics (waste materials)	<1
Iron-based Metals	<1
Other metals	<1

Although individual drums in this waste stream may contain other homogenous solid waste and debris materials, the waste stream as a whole will be greater than 50%, by volume, inorganic sludge. [21]

1.5 Prohibited Items

The following items are prohibited at the Waste Isolation Pilot Plant (WIPP) in accordance with Section B-1c of the WIPP Waste Analysis Plan (WIPP-WAP): [10]

- Liquid waste
- Non-radionuclide pyrophoric materials
- Hazardous wastes not occurring as co-contaminants with TRU mixed wastes
- Wastes incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Wastes containing explosives or compressed gases
- Wastes with polychlorinated biphenyls (PCBs) not authorized under an Environmental Protection Agency (EPA) PCB waste disposal authorization
- Wastes exhibiting the characteristics 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 B-8 of MP-TRUW-8.2, Quality Assurance Project Plan, unless specifically approved through a Class 3 permit modification. [60]
- Any waste container from a waste stream (or waste stream lot) that has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment, as described in Attachment B7 of MP-TRUW-8.2. [60]

- Sealed inner containers greater than four liters.

The absence of prohibited items is determined and documented through acceptable knowledge (AK) and characterization activities. RTR or VE is performed on each container to verify the absence of prohibited items. [35, 36] Drums with prohibited items are treated or rejected as appropriate. Drums containing prohibited items will not be shipped to WIPP.

1.6 Resource Conservation and Recovery Act (RCRA) Determination

1.6.1 EPA Hazardous Waste Numbers

Mound cemented sludge is characterized as mixed-TRU waste. Toxicity characteristic HWNs assigned to the cemented sludge waste are D004, D005, D006, D007, D008, D009, D010, and D011. Listed HWNs assigned to this waste stream are F001, F002, and F005. [41]

1.6.2 Hazardous Determination

The hazardous waste determination for cemented sludge waste is described in the following subsections.

Ignitability

The materials in this waste stream do not meet the 40 CFR 261.21 definition of *ignitability*. The cemented sludge is not a liquid. Additionally, absorbents (e.g., cement, Florco) were added during packaging of this waste. The waste materials are not compressed gases, nor does the waste contain compressed gases. The waste does not meet the U.S. Department of Transportation (DOT) definition of an oxidizer as defined in 49 CFR 173 and is not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change. Trace quantities of hypochlorite solutions, hydrogen peroxide, nitric acid, and other potential DOT oxidizers in the wastewater were treated in the WD Building, and trace contamination in the cemented sludge does not meet the definition of a DOT oxidizer. [11, 19, 22, 25, 44] Therefore, this waste stream does not exhibit the characteristic of ignitability (D001).

Corrosivity

The materials in this waste stream do not meet the 40 CFR 261.22 definition of *corrosivity*. The cemented sludge waste is not liquid. In addition, absorbents (e.g., cement, Florco) were added during packaging of this waste. [25, 44] Therefore, this waste stream does not exhibit the characteristic of corrosivity (D002).

Reactivity

The materials in this waste stream do not meet the 40 CFR 261.23 definition of *reactivity*. The cemented sludge waste 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 materials may contain trace quantities of sulfides

or cyanides but would not generate toxic gas in sufficient quantity to pose a threat to human health or the environment. The materials are neither forbidden explosives nor Division 1.1, 1.2, or 1.3 (Class A or B) explosives as defined in 49 CFR 173, and the drums do not contain explosive materials. Explosives were produced and tested at Mound Plant, but wastes generated from explosives were managed in waste groups entirely separate from radioactive wastes. [2, 11, 19, 44] Therefore, this waste stream does not exhibit the characteristic of reactivity (D003).

Toxicity

The materials in the cemented sludge waste have been conservatively assigned the toxicity characteristic for metals as defined in 40 CFR 261.24. Based on AK, cemented sludge waste may contain RCRA toxicity constituents due to mixture with toxicity characteristic metals and organics.

AK for cemented sludge waste indicates the presence of toxicity characteristic metals arsenic (D004), barium (D005), cadmium (D006), chromium (D007), lead (D008), mercury (D009), selenium (D010), and silver (D011). [11, 28, 29, 66, 67] Based on process descriptions, sources of toxicity characteristic metals were used in the R Building laboratory operations (reference Table 1-1). Arsenic, cadmium, selenium and silver are attributed to chemicals used in laboratory operations. [29] Barium chloride was one of the chemicals used in the WD facility to treat the alpha-contaminated wastewater. [14] The cemented sludge may contain paint contaminated with chromium or lead. [18, 19, 20,44, 63, 64] Mercury was used in analytical and production operations. [11, 20, 28, 29, 48, 52, 67, 68, 69] Chromium and lead were detected in historical sampling of the alpha-contaminated sludge. [18, 19, 20, 28, 44, 63, 64]

Solid samples were analyzed for total metal. Statistics were calculated based on using one-half the method detection limit (MDL) for less than detectable observations with data transformation applied where appropriate. The 90 percent upper confidence limit (UCL_{90}) exceeded the regulatory threshold limit (RTL) for the toxicity characteristic metal barium; consequently, the EPA characteristic HWN D005 assigned by AK is retained for the cemented sludge waste. Although the calculated UCL_{90} did not exceed the associated RTL based on totals for the toxicity characteristic metals arsenic, cadmium, chromium, lead, mercury, selenium and silver, the corresponding EPA characteristic HWNs D004, D006, D007, D008, D009, D010 and D011 are also conservatively assigned to the cemented sludge waste. [41, 66]

Carbon tetrachloride, chloroform, methyl ethyl ketone, benzene, tetrachloroethylene, and trichloroethylene were identified as chemicals used at Mound for their solvent properties and may be present in the alpha-contaminated wastewater. [2, 3, 11, 12, 29, 45, 48, 51] Carbon tetrachloride, benzene, and trichloroethylene were used for cleaning/degreasing. [2, 3, 11, 12, 29, 45, 51] None of these constituents were detected in the solid sampling; therefore, the toxicity codes for these constituents are not applied.

Listed Waste

F-Listed HWNs

F001, F002, and F005 listed HWNs are conservatively assigned to the Mound cemented sludge waste for spent solvents. [28, 41]

Solid samples were analyzed for volatile organic compounds (VOCs) and semivolatile organic compound constituents and only methanol was detected above the MDL. The calculated UCL_{90} of the mean concentration did not exceed the associated program required quantitation limit (PRQL) for the RCRA characteristic solvents or F-listed solvents. Headspace gas (HGAS) sampling and analysis detected nine VOCs (benzene, 1,1-dichloroethane, trans-1,2-dichloroethylene, methanol, tetrachloroethylene, toluene, 1,1,1-trichloroethane, trichloroethylene, and xylene); however, the calculated UCL_{90} did not exceed the associated PRQL for these constituents.

Minor amounts (approximately 5 pints total organics per year) of organics, including trichloroethylene, were disposed of in the alpha-contaminated wastewater. [2, 11, 19, 20] Trace amounts of organics were discharged into a wastewater treatment system regulated by a Clean Water Act point source discharge permit and were eligible for RCRA regulatory exclusions identified in 40 CFR 261.3. Nevertheless, the listed HWNs F00l F002, and F005 were conservatively assigned.

Trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, methylene chloride, and methyl ethyl ketone were identified in AK documents as solvents used in cleaning/degreasing and laboratory operations in SM, PP, SW, and R Buildings. [2, 3, 11, 28, 29] 1,1,2-Trichloro-1,2,2-trifluoroethane was used for cleaning/degreasing in other operations. [2, 11, 28, 29] Benzene, tetrachloroethylene, carbon disulfide, and toluene were used as solvents in laboratory and production operations. [2, 11, 29, 48, 52] Paint removers containing methylene chloride or methyl ethyl ketone may have been used in the D&D process. [11, 43] These chemicals were not identified as constituents in the alpha-contaminated wastewater. The wastewater may have been contaminated with trace quantities of these constituents during decontamination operations. EPA HWNs F001, F002, and F005 are conservatively assigned to this waste stream. 1,1,1-Trichloroethane, trichloroethylene, tetrachloroethylene, benzene and toluene were detected in HSG analysis, which support AK. [41]

Acetone, methanol, and xylene (non-chlorinated solvents) were also used as solvents in laboratory and production operations and acetone and methanol were identified as constituents in this wastewater. [11, 18, 19, 20, 28, 29, 44, 48, 49, 50, 51, 52, 62, 63, 64, 65, 70] Cemented sludge is not a liquid waste but may be contaminated with residuals from these solvent operations. If a waste no longer exhibits the characteristic of ignitability, the F003 hazardous waste number can be removed [40 CFR 261.3(g)(1)]. Because the waste is not ignitable, the EPA HWN F003 is not assigned to this waste stream.

Although 2-methyl-2-propanol, (CAS No. 75-65-0) was detected in greater than 25% of the samples for this waste stream, it is not a 40 CFR 261, Appendix VIII listed analyte and will, therefore, not be added as a target analyte for this waste stream.

P-, U- and K-Listed HWNs

Although hydrofluoric acid was identified as a chemical used (for its intended purpose) during plutonium processing and recovery operations at Mound, only spent forms of hydrofluoric acid would have contaminated the alpha wastewater. [11, 18, 19, 20, 22, 44, 45, 50, 63, 64] This waste stream does not contain and was not derived from an unused commercial product, an off specification species thereof, or a manufacturing intermediate that would be classified as U134 HWN. Based on this information, the U134 HWN does not apply to this waste stream.

Beryllium was identified in AK as a potential contaminant from analysis of weapon components. Typically, less than 50 grams of beryllium waste was generated annually. Based on a review of AK and the solid sampling results, it was determined that the cemented sludge waste contains less than one percent beryllium by weight. [2, 3, 11, 19, 65] If beryllium is present, it is a contaminant of the process and not as an unused commercial chemical product, an off-specification species, a container residue, or a spill residue thereof. Therefore, the P-listed waste code for beryllium, as defined in 40 CFR 261.33, is not assigned to the waste.

The materials in this waste stream are not discarded, unused, commercial chemical products, off-specification species, container residues, or spills thereof (40 CFR 261.33). No P- or U-listed hazardous waste numbers apply to the materials in this waste stream.

The materials in this waste are not hazardous waste from specific sources since they were not generated from any of the processes listed in 40 CFR 261.32. The materials in this waste stream are, therefore, not K-listed hazardous waste.

TSCA Regulated Contaminants

PCBs are not expected to be present in the cemented sludge waste stream in concentrations greater than 50 parts per million (ppm). If any containers are identified during RTR/VE as containing PCB items (e.g., light ballasts) greater than 50 ppm, the drums containing the PCB items will be managed and shipped in accordance with the WAC. [2, 5, 11, 19, 20, 29, 35, 36]

1.7 Radionuclides

The primary radionuclides contained in Mound TRU waste stored at INL are those identified for "heat source" materials (^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, and ^{242}Pu). Mound TRU waste is also expected to contain ^{241}Am, ^{235}U, and ^{237}Np, due to ingrowth. Weapons-grade material composed primarily of ^{239}Pu is also expected to be present, as well as small quantities of other isotopes from research activities. Uranium-234 is an expected constituent in aged plutonium. Other radioisotopes that have been measured in Mound wastes are ^{227}Ac, ^{233}U, ^{238}U, ^{137}Cs, and ^{60}Co. Although ^{90}Sr was not detected, it is expected to be present in waste where ^{137}Cs is

observed. The cemented sludge waste stream does not contain concentrations of plutonium in excess of 20% by weight for the aggregate of any material category. [2, 27, 28, 42, 54, 61]

The ratios of the two most prevalent radionuclides in the container are compared to confirm existing AK data in compliance with WAC requirements. The two most prevalent radionuclides anticipated in the cemented sludge waste are ^{238}Pu and ^{239}Pu. [42]

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

Each 55-gallon drum was lined with a 90-mil rigid polyethylene drum liner. Some of the rigid liners were lined with a polyethylene drum bag. After being filled with waste, the drum bag, if present, was sealed with tape and the rigid drum liner lid was installed. Based on RTR/VE examination, a cement cap may be present on top of the cemented sludge and the sludge may exhibit variable layers of solidification. Absorbents (such as Florco) may also be present on top of the cemented sludge. Plywood spacers were placed between the rigid liner lid and the drum lid before the drum lid was installed. Any combination of plastic bags that does not exceed five layers of confinement (of which no more than three are inner bags) is acceptable for shipment to WIPP. Containers with excess layers of confinement or packaging configurations not addressed by an approved TRUCON code for this waste stream will be segregated and vented or rejected as appropriate. [21, 24, 25, 26]

2.2 Flammability Consideration

The payload containers in the waste stream must comply with the Contact Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC) requirements. As specified in the CH-TRAMPAC, a determination of compliance with the flammable gas limits will be performed for VOCs, hydrogen and methane. Headspace gas sampling and analysis is performed when required by the WAP and/or CH-TRAMPAC. At a minimum, the HGAS analytical results are evaluated to determine the total concentration of flammable VOCs present in the waste. Payload containers, including those with HGAS results exceeding 500 ppm 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). [59]

3.0 REFERENCES

NOTE: *References are cited per the style guide provided by AMWTP Document Control. AMWTP documents such as procedures, AK Reports, and operating instructions are cited without revision numbers or dates. The most recent revisions of these documents are available through the AMWTP Electronic Data Management System. Previous revisions are available upon request through Document Services.*

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AMWTP Advanced Mixed Waste Treatment Project	Waste Stream Profile Form HWN Assignment Worksheet	AMWTP Form 1187 Effective Date: 07/17/02, Rev. 1 MP-TRUW-8.13 Page 1 of 1

WSPF Number: BN836, Cemented Sludge ~~Waste~~ MOJ 4/28/06

AK Source Document / Rev. Number : AMWTP Waste Stream Designations, AMWTP-RPT-TRUW-12, Rev. 6 and Discrepancy Report D056A – Assessment of Hazardous Waste Numbers Assigned to Cemented Sludge (BN836)

HWN	(1) AK ASSIGNED	(2) STORAGE	(3) RECONC.	(4) DELETE RECONC.	(5) ITEMS/ CONST.	(6) FINAL	(7) PERMIT-TED
F001	X	X	x		X	X	✔
F002	X	X	x		X	X	✔
F003	X	X			X	N/A	✔
F004							✔
F005	X		x		X	X	✔
F006							✔
F007							✔
F009							✔
D004	X		x	o	X	X	✔
D005	X		X		X	X	✔
D006	X	X	x	o	X	X	✔
D007	X	X	x	o	X	X	✔
D008	X	X	x	o	X	X	✔
D009	X	X	x	o	X	X	✔
D010	X	X	x	o	X	X	✔
D011	X	X	x	o	X	X	✔
D022							✔
D029							✔
D032							✔
D001							✔
D002		X				N/A	✔

For column 3, "X" indicates UCL_{95} above the associated PRQL/RTL and "x" indicates detected but UCL_{95} below the PRQL/RTL.
For column 4, AMWTP retained all characteristic toxicity codes even if UCL_{95} was below the RTL value.
For column 6, "N/A" applies because only containers verified to meet WIPP CH-WAC criteria will be included in this waste stream (i.e. not liquid waste); therefore, D002 and F003 are not applicable to containers that can be assigned to this waste stream (reference AMWTP-TRUW-63).

AK Expert: M L Johnson, ML Johnson Date: 4/27/06
Print/Sign

Site Project Manager: Steve Carpenter Date: 4.27.06
Print/Sign

Implementing Document: MP-TRUW-8.13

Waste Stream or Waste Type Description: Cemented Sludge

Waste Stream or IDC Number: BN836

AK Information	AK#<1>	Source Document Reference Number
Generator site TRU waste stream (WS) - specific information		
Information identifying the building(s) and/or area (s) from which TRU waste was or is generated.	WS1	C343A, C344A, C351A, C358A, C378A, C381A, C385A, C386A, C387A, C388A, C389A, C390A, C391A, C393A, C394A, C395A, C396A, C397A, C398A, C399A, C400A, C401A, C402A, C403A, C405A, C406A, C408A, C409A, C410A, C411A, C412A, C413A, C414A, C417A, C418A, C419A, C420A, C421A, C422A, C423A, C424A, C425A, C429A, C430A, C431A, C433A, C434A, C435A, C436A, C437A, C438A, C439A, C443A, C444A, C445A, C446A, C447A, C448A, C449A, C450A, C458A, C461A, C462A, C463A, C464A, C465A, C466A, C467A, C468A, C470A, C472A, C473A, C488A, C490A, P024A, P319A, P380A, P381A, P385A, P418A, P423A, P463A, P469A, P474A, P475A, P477A, P478A, P479A, P480A, P481A, P482A, P484A, P485A, P492A, P493A, P503A, P504A, P505A, P506A, P507A, P509A, P510A, P511A, P512A, P518A, P519A, P522A, P523A, P524A, P525A, P526A, P527A, P536A, P540A, P544A, P545A, P546A, P550A, P551A, P646A, P744A, U126A, U145A, U146A, U148A, U149A, U151A, U153A, U154A, U155A, U156A, U157A, U158A, U159A, U160A, U161A, U162A, U168A, U169A, U173A, U187A, U190A, U195A, U196A, U198A, U202A, U203A, U204A, U207A
Waste stream volume and time period of generation.	WS2	C348A, C359A, C372A, C379A, C411A, C424A, C461A, C463A, C465A, C467A, C472A, C485A, C534A, C535A, D040A, D050A, P024A, P364A, P365A, P380A, P400A, P418A, P469A, P482A, P505A, P506A, P507A, P509A, P511A, P519A, P522A, P523A, P524A, P567A, P646A, P744A, U122A, U126A, U127A, U134A, U142A, U146A, U148A, U149A, U154A, U159A, U187A, U197A, U198A, U202A, U207A
Waste generating process description for each building, including processes with U134 waste generation, if applicable and process flow diagrams. See instructions if process flow diagrams are not available.	WS3	C444A, C458A, C466A, C473A, C481A, P024A, P319A, P379A, P380A, P381A, P385A, P418A, P423A, P463A, P464A, P469A, P474A, P482A, P483A, P485A, P492A, P493A, P504A, P505A, P507A, P510A, P511A, P518A, P519A, P522A, P523A, P524A, P525A, P526A, P527A, P536A, P546A, P558A, P646A, P744A, U126A, U132A, U155A, U156A, U157A, U158A, U168A, U170A, U196A

AK Information	AK#<1>	Source Document Reference Number
Generator site TRU waste stream (WS) - specific information		
Material inputs or other information identifying chemical content, and event or process that may have modified the chemical properties after generation. Include data for newly generated waste obtained through VE and/or radiography, information demonstrating neutralization of U134 waste and chemical composition that could affect the isotopic distribution.	WS4	C269A, C339A, C342A, C344A, C349A, C354A, C356A, C359A, C385A, C409A, C411A, C419A, C423A, C430A, C443A, C446A, C447A, C449A, C450A, C451A, C452A, C458A, C461A, C463A, C464A, C465A, C466A, C467A, C468A, C470A, C471A, C472A, C473A, C477A, C479A, C480A, C481A, C484A, C488A, C490A, C493A, C546S, D056A, D070A, P024A, P207A, P307A, P310A, P319A, P365A, P379A, P380A, P381A, P385A, P409A, P418A, P423A, P457A, P458A, P463A, P464A, P469A, P474A, P475A, P485A, P492A, P493A, P497A, P503A, P504A, P505A, P506A, P509A, P510A, P512A, P518A, P519A, P521A, P522A, P523A, P524A, P525A, P527A, P532A, P534A, P536A, P539A, P545A, P546A, P552A, P591A, P592A, P623A, P624A, P625A, P643A, P644A, P645A, P646A, P744A, U126A, U132A, U140A, U149A, U156A, U157A, U159A, U164A, U172A, U185A, U189A, U195A, U196A, U197A, U202A, U204A, U205A, U208A
Material inputs or other information identifying physical waste form, and event or process that may have modified the physical properties after generation. Include data obtained through RTR or VE of newly generated waste and physical composition that could affect the isotopic distribution.	WS5	C339A, C348A, C349A, C370A, C376A, C378A, C379A, C383A, C409A, C411A, C419A, C426A, C429A, C430A, C440A, C446A, C447A, C448A, C449A, C450A, C452A, C457A, C461A, C463A, C464A, C465A, C466A, C467A, C468A, C470A, C472A, C473A, C477A, C479A, C481A, C485A, C490A, C518A, C524A, C525A, C534A, C546S, P024A, P207A, P319A, P365A, P379A, P380A, P381A, P385A, P393A, P399A, P418A, P423A, P463A, P465A, P469A, P474A, P475A, P492A, P493A, P502A, P503A, P504A, P505A, P506A, P507A, P509A, P510A, P511A, P512A, P518A, P519A, P521A, P522A, P523A, P524A, P525A, P526A, P527A, P532A, P536A, P539A, P544A, P545A, P546A, P553A, P556A, P567A, P623A, P624A, P625A, P646A, P670A, P744A, U126A, U145A, U146A, U149A, U153A, U154A, U156A, U157A, U159A, U187A, U189A, U190A, U191A, U195A, U196A, U197A, U198A, U204A, U205A, U206A, U207A, U208A
EPA hazardous waste constituents in the waste stream and Hazardous Waste Numbers assigned.	WS6	C354A, C458A, C481A, C493A, D056A, D070A, P207A, P307A, P310A, P319A, P365A, P393A, P418A, P492A, P503A, P505A, P506A, P509A, P512A, P519A, P527A, P532A, P539A, P592A, P623A, P624A, P625A, P646A, P744A, P756A, U060A, U142A, U185A, U190A, U199A, U205A, U206A, U208A

Implementing Document: MP-TRUW-8.13

AK Information	AK#<1>	Source Document Reference Number
Generator site TRU waste stream (WS) - specific information		
Specification of the isotopic ratios for the 10 WIPP-tracked radionuclides (241Am, 238PU, 239 Pu, 240 PU, 242Pu, 233U, 234U, 238 U, 90 Sr, and 137Cs) and the radionuclides comprising 95% of the hazard.	WS7	C291A, C348A, C351A, C354A, C358A, C368A, C370A, C371A, C378A, C379A, C380A, C381A, C383A, C384A, C385A, C387A, C388A, C389A, C390A, C391A, C393A, C394A, C396A, C400A, C401A, C402A, C404A, C405A, C406A, C408A, C409A, C410A, C411A, C412A, C413A, C414A, C416A, C417A, C418A, C419A, C420A, C421A, C422A, C423A, C425A, C426A, C427A, C428A, C429A, C430A, C431A, C432A, C433A, C434A, C435A, C436A, C437A, C438A, C439A, C440A, C441A, C442A, C445A, C446A, C447A, C448A, C449A, C450A, C452A, C464A, C465A, C466A, C467A, C468A, C469A, C470A, C471A, C472A, C477A, C479A, C485A, C488A, C490A, C494A, C508A, C517A, C519A, C551A, C552S, D050A, P024A, P319A, P381A, P385A, P398A, P418A, P423A, P463A, P464A, P467A, P469A, P472A, P474A, P482A, P492A, P493A, P502A, P503A, P504A, P505A, P506A, P507A, P509A, P510A, P511A, P512A, P513A, P514A, P518A, P519A, P521A, P522A, P523A, P524A, P525A, P526A, P527A, P532A, P536A, P539A, P540A, P543A, P544A, P545A, P546A, P547A, P548A, P549A, P550A, P551A, P553A, P554A, P555A, P558A, P611A, P622A, P623A, P624A, P625A, P646A, P744A, U126A, U137A, U142A, U147A, U149A, U153A, U154A, U155A, U156A, U157A, U158A, U159A, U160A, U161A, U162A, U168A, U169A, U170A, U172A, U173A, U185A, U187A, U189A, U190A, U195A, U196A, U198A, U199A, U202A, U203A, U205A, U208A
Documentation identifying the presence of prohibited items listed in Section B-1c of the WIPP-WAP.	WS8	C321A, C376A, C392A, C415A, C416A, C466A, C470A, C473A, C516A, D070A, P024A, P385A, P418A, P465A, P474A, P492A, P525A, P536A, P646A, P744A, U126A, U196A

<1> The AK#'s are to be used in the Acceptable Knowledge Source Document Summary to aid in the identification of program and waste stream-specific elements within a given document.

All required AK information has been compiled and tracking numbers assigned.

AK Expert: TIM VENNEMAN Date: 7-22-09
Print/Sign Date

Site Project Manager: Steve Carpenter Date: 7.22.09
Print/Sign

LDR NOTIFICATION- IDC MD836

WASTE STREAM BN836

The mixed waste identified on manifest number _____ and bearing the EPA hazardous waste numbers D004, D005, D006, D007, D008, D009, D010, D011, F001, F002, and F005 are designated as transuranic (TRU) mixed waste and have been exempted from the land disposal prohibitions of 40 CFR 268 by the Land Withdrawal Act Amendments (Public Law 104-201). This amendment exempts WIPP waste from treatment standards promulgated pursuant to section 3004(m) of the Solid Waste Disposal Act [42 U.S. C. 6924(m)] and are not subjected to the Land Disposal Prohibitions in section 3004(d), (e), (f), and (g) of the Solid Waste Disposal Act. This waste is not prohibited for land disposal.

Container Identification numbers	Hazardous waste number(s)	Land Disposal Prohibition effective date
	D004	May 26, 2000
	D005	May 26, 2000
	D006	May 26, 2000
	D007	May 26, 2000
	D008	May 26, 2000
	D009	May 26, 2000
	D010	May 26, 2000
	D011	May 26, 2000
	F001	Nov 8, 1988
	F002	Nov 8, 1988
	F005	Nov 8, 1988
	F006	August 8, 1988

AMWTP
Advanced Mixed Waste Treatment Project

Bechtel BWXT Idaho, LLC

April 25, 2006

CCN 06-20231

Mr. Dale Bignell, Director
Washington Regulatory and Environmental Services
4021 National Parks Highway
Carlsbad, NM 88220

Subject: Contract No. DE-AC-07-99ID13727 – Waste Stream Profile, BN836 - JDM-023-06

Dear Mr. Bignell:

Attached is Waste Stream Profile (WSPF), BN836, Cemented Sludge, and AMWTP-RPT-TRUW-63, *Acceptable Knowledge Summary for Cemented Sludge (BN836)*, for your review and approval. We have evaluated and reviewed the profile and believe it is compliant with the Waste Acceptance Plan (WAP).

If you have any questions feel free to call me at 208-557-6404 or Eric Schweinsberg at 208-557-6425.

Sincerely,

Jeffrey D. Mousseau, P.E.

Jeffrey D. Mousseau, P.E.
Waste Programs Manager
Bechtel BWXT Idaho, LLC
Advanced Mixed Waste Treatment Project

Attachment

SC/skc

cc: Rod Arbon, BBWI
Steve Carpenter, BBWI
Rick Chavez, WRES
Elvin Dumas, BBWI
Tom Fallon, BBWI
Guy Girard, DOE-ID
Jim Jackson, BBWI
Scott Raish, BBWI
Ron Reeves, WRES
Frank Russo, BBWI
Eric Schweinsberg, BBWI
Ingrid Siddoway, BBWI
Jerry Wells, DOE-ID
WIPP Site Documents
AMWTP Correspondence Control

Venneman, Timothy E.

From: Schweinsberg, Eric
Sent: Tuesday, July 14, 2009 11:33 AM
To: Tedford, Gina; Carpenter, Steve; Johnson, Micky L.; Venneman, Timothy E.
Subject: FW: CBFO Approval RPT-TRUW-63, Revision 5A
Follow Up Flag: Follow up
Flag Status: Red

fyi

Eric P. Schweinsberg
SPM/TRU Programs
AMWTP - Idaho National Lab
208-557-6425 (Work)
208-351-9247 (Cell)
208-557-6561 (Fax)

We make a living by what we get. We make a life by what we give

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From: Sena, Gloria - DOE [mailto:Gloria.Sena@wipp.ws]
Sent: Tuesday, July 14, 2009 11:04 AM
To: Document Services
Cc: Brown, Gail L.; Schweinsberg, Eric; Wells, Jerry L; Gilbert, Patsy - LANL; Lyshik, Gwen - LANL
Subject: CBFO Approval RPT-TRUW-63, Revision 5A

As requested in the email from Sherrie Walker on July 2, 2009, the Carlsbad Field Office (CBFO) has reviewed RPT-TRUW-63, Revision 5A, *Acceptable Knowledge Summary for Cemented Sludge (BN836)*. There were no comments generated. We have determined that the report continues to meet CBFO requirements.

If you have any questions, please contact Norma Castaneda at (505) 234-7118.

Office of the National TRU Program
Carlsbad Field Office

cc:
WIPP Operating Record
CBFO M&RC

CBFO:NTP:GS:09-1056:UFC 5822.00

APPENDIX 11

WASTE DETERMINATION & DISPOSITION FORM (WDDF)
RWMC 15005 AMWTP DEBRIS REPACKAGING PROJECT –
BOXES WITH OVERSIZED ITEMS

Date: 11/5/2015

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

WDDF Number: RWMC15005

Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q. RL 11/17/15

SECTION I: PROCESS KNOWLEDGE EVALUATION (Completed by the generator with assistance from the Facility Representative)

1. Waste Generation Location: Facility: AMWTP Building/Room: WM-636 Area: Generator: Faye Srala | Facility Rep.:Randy Rice

2. Process and Waste Description:

General Materials and Process Description: CWI has been tasked with receiving boxes containing large, heavy debris items that cannot be readily processed through AMWTP's box line. The large, heavy items will be separated from the smaller items in the box. The smaller items will be placed back into boxes and returned to AMWTP with some level of remediation processing. For example, free liquids will be absorbed with Oil-Dri. The remediation will not add hazardous chemical constituents or waste material parameters to the waste stream. This waste stream describes the boxed waste as received from AMWTP and envelopes the smaller items from the boxes that will be returned to AMWTP. The smaller items will be returned under this waste stream. CWI will attempt to perform radiological decontamination on the large, heavy items such that they can be dispositioned as mixed low-level waste. Large, heavy items that have been decontaminated to less than TRU will be managed under a separate waste stream.

All of the debris waste coming from AMWTP falls under the Rocky Flats IDC of RF-480, Non-special Source Metal. The following in this paragraph is a general description of IDC 480 and IDC 050 (precursor to 480) as presented in the AMWTP AK Document, RPT-TRUW-56, Rev. 7. This waste consists of light metal generated by the plutonium production, recovery, treatment, laboratory, and maintenance operations at Rocky Flats. Light metal includes iron, copper, aluminum, brass, bronze, galvanized metal, stainless steel, carbon steel, and other metal alloys. The metals consist of mechanical and electrical parts, tools, containers, scrap metals, piping, wire, cable, gauges, valves, foil, planchets, lead and dry cell batteries, and a variety of other metal items. The metals may be contaminated with residual amounts of solvents, acids, bases, and other reagents used in the processes where they were generated. Solvent-contaminated metals were not sorted from non-solvent-contaminated metals. Beryllium, pyrophoric metals, and heavy non-special source metal are excluded from IDC 480. The waste may also contain limited amounts of combustible wastes and mercury.

The next 3 paragraphs are extracts from RPT-TRUW-56 that contain descriptions specific to box generation.

Some waste generated from plutonium recovery operations consisted of unneeded equipment and gloveboxes, such as the old metal leaching line, that were removed to allow space for new processes. The waste was in the form of cut up gloveboxes, 3- to 8-inch diameter ducting, pipelines, a washing machine, a shredder, drum filter, a crusher, grinding mill, and other miscellaneous equipment. Wastes were usually wrapped in plastic before being placed in prepared waste boxes. A small number of boxes were generated from renovation projects conducted in areas (primarily Building 881) operated by special recovery operations. The waste consisted of piping, ducting, furnaces, shelving, cabinets, tools, etc., removed from an old leaching line. Large waste items, such as gloveboxes and hoods, were transported to size reduction for processing. The wastes were either placed directly into prepared waste boxes or wrapped in plastic before being placed in a box, depending on contamination levels.

Advanced size reduction operations in Building 776 disassembled or cut plutonium-contaminated gloveboxes and miscellaneous large equipment into sizes that could be packaged in approved containers (drums or boxes). Wastes were usually reduced to pieces small enough for two men to handle. Heavier waste items (lathes, etc.) were limited in weight to 2,000 lb. Gloveboxes were usually cut into flat pieces to improve utilization of waste box space. Glovebox windows (Plexiglas, leaded glass, etc.) were usually removed from the glovebox and placed into the waste box. Any liquid waste, such as gearbox oil and lathe coolant, was drained from all equipment. Oil-Dri® absorbent was used when necessary. All metal wastes processed by the Size Reduction Facility were placed directly into prepared waste boxes or drums. Waste boxes packaged since 1973 and through 1980 generally contain large waste items. Starting in 1980, drums containing metal wastes generated by various plutonium operations were transported to the Size Reduction

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

WDDF Number: RWMC15005

Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q, R1 eml 11/17/15

Facility and emptied into waste boxes. This change, initiated to improve packaging efficiency and reduce the volume of waste shipped to the INL, resulted in smaller waste items in boxes as well as an increase in the organic content of a box, since any small, line-generated metal wastes were usually contained in plastic.

Non-special source metal waste such as ducting and equipment may have also originated from cleanup of the 1969 fire which spread through combustible materials in several hundred inter-connected gloveboxes in Building 776. In 1974, 214 boxes of non-special source metal waste were generated from final fire cleanup operations. The waste is believed to consist primarily of ducting from the Building 776 exhaust system. Other wastes may include parts or pieces of the Marform and Hydroform presses and the four-high rolling mill that were removed during final cleanup operations, and equipment (saws, scaffolds, etc.) used in the operation. Any liquids, such as press oils, were removed or drained from equipment. Oil-Dri® absorbent was used when necessary. Ductwork was usually crushed for volume reduction prior to packaging. Wastes were either placed directly into prepared waste boxes or wrapped in plastic before being placed in a waste box.

RPT-TRUW-44 lists possible additional items that may be encountered as silver solder, fluorescent bulbs containing mercury, dry cell nickel-cadmium or mercury batteries, mercury thermometers, mercury switches, and paint contaminated with chromium or lead may be present.

RF waste management and inspection protocol allowed containers of wastes to contain up to 10% of an IDC other than that assigned to the container. RTR and VE of other RF debris waste streams have identified debris items including combustibles (paper, rags, gloves, etc.), plastic (bottles, tubing bags, etc.), glass (bottles, Raschig rings, beakers, etc.), lead (glass, tape, gloves, scrap, etc.), metal (nuts, bolts, cans, welding rods, tools, wire, scrap, etc.), and other debris (concrete, light bulbs, etc.). Items identified in containers during the 3,100 m3 Project examinations of the non-special source metal waste include a variety of combustible, glass, concrete, lead, and plastic items including wipes, surgical gloves, paper, Raschig rings, beakers, vials, fluorescent bulbs, leaded gloves, lead tape, scrap lead, rubber gaskets, plastic bags, containers, and tubing. Other items identified included tantalum crucibles, asbestos tie-wraps, and light ballasts. Acceptable knowledge confirmation activities also identified numerous items in a small percentage of the non-special source metal waste containers, including small quantities of liquid, Raschig rings, beakers, vials, rubber gaskets, batteries, light bulbs, lead items (e.g., rubber gloves and aprons, tape, and sheeting), and miscellaneous cellulosic and plastic items.

Based on a review of the real-time radiography identified inventories of the potential candidate boxes, the following items of potential concern could also be present in the waste received from AMWTP: large concrete items, free liquids, liquid mercury, PCB items (light ballasts and transformers), soil, drums of sludge and concrete, and filter media.

Box Packaging: Boxes of IDC 480 generally contain larger items such as cut-up glove boxes, piping, ducting, etc. Each plywood box was lined with a polyethylene box bag, and the bag was then lined with a cardboard liner. After the box was filled with waste, the bag ends and sides were folded toward the box center, and tape was used to seal the folded edges. Before 1972, uncoated plywood boxes were used. Coating plywood boxes with FRP began in 1972. The AK document does not specifically address packaging protocols for TX-4 boxes or cake boxes.

RCRA Characterization: Based on RPT-TRUW-44, Rev 2, the following RCRA waste codes are associated with this waste stream: D004, D005, D006, D007, D008, D009, D010, D011, D022, D028, D029, F001, F002, F005, F006, F007, F009.

TSCA Characterization: PCBs greater than 50 ppm are not expected to be part of the waste. If PCB items are identified (light ballasts, transformers, etc.), specific containers will be characterized as containing PCBs.

This waste will be managed as mixed transuranic waste with PCB characterization determined on a case-by-case basis.

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

WDDF Number: RWMC15005

Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q R1 [illegible] 11/17/15

3. Were any waste minimization activities a part of this process: ☒ Yes ☐ No (If Yes, provide description or reference.)
DOE/ID-10333

4. Generation Status (check all that apply): ☒ INL ☐ ICP ☐ non-CERCLA DD&D/RCRA Closure Activities ☐ CERCLA ☒ Routine Operations

5. Physical Description (check all that apply): ☒ Solid ☐ Sludge ☒ Organic Liquid ☒ Aqueous Liquid ☐ Aerosol ☐ Multiphase ☐ Gas Cylinder ☐ Stabilized/Solidified ☒ Elemental Mercury

6. Sources used for process evaluation (e.g., MSDS, operational logs, procedures, analyses):
RPT-TRUW-56, Rev. 7, "Acceptable Knowledge Document for INL Stored Transuranic Waste-Rocky Flats Plant Waste"
RPT-TRUW-44, Rev. 2, "Acceptable Knowledge Summary for Non-Special Source Metal (BN296)"

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

WDDF Number: RWMC15005

Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q. R1 [illegible] 11/17/15

7. Waste composition (e.g., paper, plastic, metal, liquid) and percentages (if known):

Steel (packaging materials)
Fiberglass Reinforced Plywood –FRP (packaging materials)
Plastics (packaging materials)
Iron-based Metals/Alloys
Other Metals
Aluminum- based Metals/Alloys
Other Inorganic Materials (Glassware, raschig rings)
Absorbents (e.g. vermiculite, Oil-Dri®)
Cellulosics
Plastics
Rubber
Aqueous or Organic Liquid

8. Additional Items of Concern:

A. Are free liquids present? ☒ Yes ☐ No ☐ Unknown

A1. If free liquids are present, are there multiple layers/phases? ☐ Yes ☐ No ☒ Unknown ☐ NA

A2. If multiple layer/phases are present, identify the number of layers/phases and the percentage of each (e.g., 2 layers [50 vol% liquid and 50 vol% sludge]): N/A

A3. If free liquids are present, are the Total Suspended Solids (TSS) <1 wt%? ☐ Yes ☐ No ☒ Unknown ☐ NA

A4. If free liquids, are present, is the Total Organic Carbon (TOC) <1 wt%? ☐ Yes ☐ No ☒ Unknown ☐ NA

B. Is asbestos present? ☐ Yes ☒ No ☐ Unknown

B1. If asbestos is present, specify the form: ☐ Friable ☐ Non-friable ☐ Unknown ☒ NA

C. Is this a PCB waste? ☒ Yes ☐ No ☐ Unknown If Yes, complete Form 435.93, "PCB Waste Certification"

D. Is debris present (>60 mm, >50 vol% by visual inspection)? ☒ Yes ☐ No ☐ Unknown

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

WDDF Number: RWMC15005

Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q R1 Dmk 11/17/15

E.	Are classified items present?	☐ Yes	☒ No	☐ Unknown	
F.	Is elemental beryllium or insoluble beryllium compound or alloy containing ≥0.1% beryllium present?	☐ Yes	☒ No	☐ Unknown	
G.	Are animal carcasses present?	☐ Yes	☒ No	☐ Unknown	
G1.	If animal carcasses are present, was formaldehyde used as a preservative?	☐ Yes	☐ No	☐ Unknown	☒ NA
H.	Are chelating or complexing agents present at a volume >1% of the total volume of waste?	☐ Yes	☒ No	☐ Unknown	
I.	Are pathogens, infectious wastes, or other etiologic agents present?	☐ Yes	☒ No	☐ Unknown	
J.	Does the waste have >15 wt% of particles with a diameter <200 micrometers?	☐ Yes	☒ No	☐ Unknown	
K.	Does the waste contain >1 wt% of particles with a diameter <10 micrometers?	☐ Yes	☒ No	☐ Unknown	

9. Does the waste contain accountable nuclear material or source material, or is the waste originating from a nuclear accountable area (see DOE M 470.4-6, Table I-1)?
If Yes, list the isotopes: Pu-238, Pu-239, Pu-240, Pu-242, U-233,U-234, U-238, Am-241 and possibly Cs-137.

☒ Yes

☐ No ☐ Unknown

10. Radioisotopes: Are radioisotopes present? ☒ Yes ☐ No ☐ Unknown

A. If No, list references that justify the no-rad determination (e.g., Form 435.02, EDF, analytical data): If Yes, reference source term: Source Term from AMWTP assay

B. Are sealed sources present? ☒ Yes ☐ No ☐ Unknown

B1. If sealed sources are present, do any of them contain transuranic nuclides? ☐ Yes ☒ No ☐ Unknown ☐ NA

B2. If sealed sources are present, do any of them have an activity ≥100 uCi? ☐ Yes ☐ No ☒ Unknown ☐ NA

11. Waste Characteristics (check all that apply):

NOTE: *The waste characteristics may not be known at time of initial determination.*

Ignitability	Corrosivity	Reactivity
Flash point less than 60°C (140°F)? ☐ Yes ☐ No ☒ Unknown	pH less than or equal to 2? ☐ Yes ☒ No ☐ Unknown	It is normally unstable and readily undergoes violent change without detonating. ☐ Yes ☒ No ☐ Unknown
Ignitable compressed gas? ☐ Yes ☒ No ☐ Unknown	pH greater than or equal to 12.5? ☐ Yes ☒ No ☐ Unknown	It reacts violently with water. ☐ Yes ☒ No ☐ Unknown
It is not a liquid and is capable, under standard temperature and pressure, of causing fire through	It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year	It forms potentially explosive mixtures with water. ☐ Yes ☒ No ☐ Unknown

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

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Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q. R1 11/17/15

friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

☐ Yes ☒ No ☐ Unknown

It is an oxidizer as defined in 49 CFR 173.127

☐ Yes ☒ No ☐ Unknown

at a test temperature of 55°C (130°F).

☐ Yes ☒ No ☐ Unknown

When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

☐ Yes ☒ No ☐ Unknown

It is a cyanide or sulfide-bearing waste which, when exposed to pH conditions 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.

☐ Yes ☒ No ☐ Unknown

It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

☐ Yes ☒ No ☐ Unknown

It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.54.

☐ Yes ☒ No ☐ Unknown

Metals and Organics (Select "Yes" if the following are present at any concentration and provide supporting documentation [e.g., EDF, sample analysis, process knowledge statements].)

Metals	Organics			
Arsenic ☒ Yes ☐ No ☐ Unknown	Benzene ☒ Yes ☐ No ☐ Unknown	Cresol ☐ Yes ☒ No ☐ Unknown	Hexachlorobenzene ☐ Yes ☒ No ☐ Unknown	Pyridine ☐ Yes ☒ No ☐ Unknown
Barium ☒ Yes ☐ No ☐ Unknown	Carbon Tetrachloride ☒ Yes ☐ No ☐ Unknown	2,4-D ☐ Yes ☒ No ☐ Unknown	Hexachlorobutadiene ☐ Yes ☒ No ☐ Unknown	Tetrachloroethylene ☒ Yes ☒ No ☐ Unknown
Cadmium ☒ Yes ☐ No ☐ Unknown	Chlordane ☐ Yes ☒ No ☐ Unknown	1,4-Dichlorobenzene ☐ Yes ☒ No ☐ Unknown	Hexachloroethane ☐ Yes ☒ No ☐ Unknown	Toxaphene ☐ Yes ☒ No ☐ Unknown
Chromium ☒ Yes ☐ No ☐ Unknown	Chlorobenzene ☐ Yes ☒ No ☐ Unknown	1,2-Dichloroethane ☒ Yes ☐ No ☐ Unknown	Lindane ☐ Yes ☒ No ☐ Unknown	Trichloroethylene ☒ Yes ☐ No ☐ Unknown
Lead ☒ Yes ☐ No ☐ Unknown	Chloroform ☐ Yes ☒ No ☐ Unknown	1,1-Dichloroethylene ☒ Yes ☐ No ☐ Unknown	Methoxyclor ☐ Yes ☒ No ☐ Unknown	2,4,5-Trichlorophenol ☐ Yes ☒ No ☐ Unknown
Mercury ☒ Yes ☐ No ☐ Unknown	o-Cresol ☐ Yes ☒ No ☐ Unknown	2,4-Dinitrotoluene ☐ Yes ☒ No ☐ Unknown	Methyl ethyl ketone ☒ Yes ☐ No ☐ Unknown	2,4,6-Trichlorophenol ☐ Yes ☒ No ☐ Unknown
Selenium ☒ Yes ☐ No ☐ Unknown	m-Cresol ☐ Yes ☒ No ☐ Unknown	Endrin ☐ Yes ☒ No ☐ Unknown	Nitrobenzene ☐ Yes ☒ No ☐ Unknown	2,4,5-TP (Silvex) ☐ Yes ☒ No ☐ Unknown

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

WDDF Number: RWMC15005

Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q. RI 11/17/15

Silver	p-Cresol	Heptachlor	Pentachlorophenol	Vinyl Chloride
☒ Yes ☐ No ☐ Unknown	☐ Yes ☒ No ☐ Unknown	☐ Yes ☒ No ☐ Unknown	☐ Yes ☒ No ☐ Unknown	☐ Yes ☒ No ☐ Unknown

12. Waste Usage Information

A. Was the waste used as a solvent or extractant?	☐ Yes	☒ No	☐ Unknown	
A1. If Yes, did the solvent or extractant before use exceed 10% of product composition?	☐ Yes	☐ No	☐ Unknown	☒ NA
A2. If Yes, did the solvent or extractant retain the characteristic of ignitability upon generation as a waste?	☐ Yes	☐ No	☐ Unknown	☒ NA
B. Is the waste an unused chemical or an off-specification commercial chemical product?	☐ Yes	☒ No	☐ Unknown	
B1. If Yes, is the waste a combination of unused commercial chemical products?	☐ Yes	☐ No	☐ Unknown	☒ NA
B1.1. If Yes, does the unused commercial chemical product(s) contain only one sole active ingredient?	☐ Yes	☐ No	☐ Unknown	☒ NA
B2. If Yes (Line B), is the waste soil, water, or other media resulting from a spill or release of an unused commercial chemical product?	☐ Yes	☐ No	☐ Unknown	☒ NA

13. Is the waste covered by a RCRA closure plan? ☐ Yes ☒ No

(If Yes, list the RCRA closure plan number.)

(If Yes, Environmental Project Support certification required, Section II). N/A

14. Is the waste generated by or governed under a CERCLA activity? ☐ Yes ☒ No

(If Yes, list the governing document for waste generation.)

(If Yes, and INTEC Tank Farm Waste, Environmental Project Support certification required, Section II) N/A

CERTIFICATION

I certify that the information in Section I of this form and the applicable attachments are fully disclosed. A good faith effort has been put forward to acquire and verify the information. Willful or deliberate omissions have not been made, and all known and suspected hazards have, to the best of my knowledge, been identified.

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

WDDF Number: RWMC15005

Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q. R1 [illegible]

Faye Srala Generator Print/Type Name	Faye Srala Generator Signature	11/5/2015 Date

SECTION II: WASTE DETERMINATION AND DISPOSITION (Completed by the WGS Technical Specialist)

A. Waste Determination

1. Is the information provided, other than container specific information (e.g., the container source term, dose rates), adequate for the waste determination, management, transportation, treatment, and disposal of waste? ☒ Yes ☐ No (If No, provide additional information or analysis needed.)

2. Waste Stream Data or Analysis Required (TCLP, EDF, Source Term, etc):	Data Received (Yes / No):	Date:	Adequate (Yes / No):
None			

3. Provide a documented evaluation of the process knowledge sources used for waste characterization that identifies the uncertainties, inconsistencies, limitations, and usefulness of the process knowledge sources (provide attachments as needed).
The characterization is not adequate for final WIPP disposition, but is adequate for the purpose of handling, management, and on-site transfer

4. Is this a solid waste (per 40 CFR 261.2)? ☒ Yes ☐ No

5. Is this a hazardous waste (per 40 CFR 261.3)? ☒ Yes ☐ No

5a. Is the waste excluded from regulation under 40 CFR 261.4 or 40 CFR 261.5(g)? ☐ Yes ☒ No ☐ NA
(If Yes, provide the regulatory citation) N/A

5b. Is the waste listed in Subpart D of 40 CFR 261? ☒ Yes ☐ No ☐ NA
(If Yes, provide information in C.2.)

5c. Is the waste characteristic per Subpart C of 40 CFR 261? ☒ Yes ☐ No ☐ NA
(If Yes, provide information in C.2.)

5d. Is the waste exempt for recycling in accordance with 40 CFR 261.2(e)(1)? ☐ Yes ☒ No ☐ NA
(If Yes, provide the regulatory citation.) N/A

B. Evaluation of Land Disposal Restrictions

1. Is waste subject to 40 CFR 268 regulations? ☐ Yes ☒ No

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

WDDF Number: RWMC15005

Waste Stream: AMWTP Debris Repackaging Project - Boxes with Oversized Items

Material Profile Number: 7478Q. AI 11/17/15

If Yes, specify the waste treatability group: ☐ Waste Water ☐ Nonwastewater

1a. Does the waste require evaluation in accordance with 40 CFR 268.48? ☐ Yes ☐ No ☒ NA

(If Yes, provide Information in C.3.)

1b. Is this waste debris per 40 CFR 268.45? ☐ Yes ☐ No ☒ NA

1c. Is this waste a lab pack? ☐ Yes ☐ No ☒ NA

C. Waste Type

1. Based on an evaluation of the process and available data, identify the waste type. (Check all that apply. If mixed low-level, then hazardous and low-level need not be checked.)

☐ Hazardous ☐ Low-level ☐ Mixed low-level ☐ Industrial

☐ High-level ☐ Transuranic ☒ Mixed transuranic ☐ Recyclable

☐ Used oil ☐ Waste regulated as asbestos-containing waste material ☐ Other—Describe: ☐ Waste incidental to reprocessing

☐ Universal waste ☐ Friable or ☐ Nonfriable

☒ TSCA regulated as PCBs

2. Applicable EPA Waste Codes (D, F, K, P, and/or U) D004, D005, D006, D007, D008, D009, D010, D011, D022, D028, D029, F001, F002, F005, F006, F007, F009 - *Waste does not need treatment for WIPP due to the No Migration Variance*

NOTE: *Secondary waste generated from the operation and maintenance of IWTU that cannot be released from unrestricted control as a radiological waste will be assigned all of the RCRA listed waste codes identified in the current revision of EDF-WGS-055.*

3. Applicable Underlying Hazardous Constituents: None

D. Proposed Disposition Plan

1. Will this waste be treated on-site? ☐ Yes ☒ No

If Yes, provide references: N/A

2. Proposed disposition path (e.g., Energy Solutions, RWMC, NNSS): Return to AMWTP for final characterization and disposition

WASTE DETERMINATION & DISPOSITION FORM (WDDF)

(This form is used with MCP-1390, MCP-454, MCP-3811, MCP-9424, & MCP-1396)

CERTIFICATIONS

I certify that the information in Section II of this form (and the applicable attachments) is fully disclosed and accurate. A good faith effort has been put forward to acquire and verify the information. Willful or deliberate omissions have not been made.

S/n Hailey	S/n Hailey	11/9/15
WGS Waste Technical Specialist Print/Type Name	WGS Waste Technical Specialist Signature	Date
Sulinda Martin	SL Martin	11.11.15
WGS Independent Reviewer Print/Type Name	WGS Independent Reviewer Signature	Date

APPROVAL

I approve this WDDF:

Randy Rice	R. Rice	11/17/15
WGS Facility Representative Print/Type Name	WGS Facility Representative Signature	Date

I certify that the waste described in the WDDF was generated under the Closure Plan listed in Section I, Item 13 or in accordance with the governing document for waste generation listed in Section I, Item 14, and I concur with the waste determination completed in Section II.[a]

NA	NA	NA
Environmental Project Support Print/Type Name	Environmental Project Support Signature	Date

[a] The certification above is only necessary if Section I, Item 13 or 14 is marked "Yes" and the waste generated under the CERCLA governing document listed in Item 14 and is INTEC Tank Farm waste.

PCB WASTE CERTIFICATION

This form is the current revision per EDMS
Jim Hale / 11/5/15
Signature/Date

WDDF No.: RWMC15005

The waste stream contains the following PCB categories (please check all that apply):

- ☒ PCB Transformers (contained ≥ 500 ppm PCB concentration)*: Drained? ☒ Yes, ☒ No
- ☒ Other PCB Articles (≥ 500 ppm PCB concentration): Drained? ☒ Yes, ☒ No
- ☒ PCB Small Capacitors (including light ballasts with PCB concentrations < 50 ppm in the potting material): ☒ Intact, non-leaking, ☒ leaking
- ☐ PCB Hydraulic Machines (≥ 50 ppm PCB concentration): Drained? ☐ Yes, ☐ No
  - ☐ PCB concentrations ≥ 1,000 ppm*: Drained? ☐ Yes, ☐ No
- ☐ PCB-Articles, including PCB-contaminated Electrical Equipment (≥ 50 ppm; < 500 ppm): Drained? ☐ Yes, ☐ No
- ☐ PCB Containers: Drained? ☐ Yes, ☐ No
- ☐ PCB Bulk Remediation Waste, as defined in 40 CFR 761.3:
  - ☐ Non-liquid cleaning materials and personal protective equipment waste at any concentration, as described in 40 CFR 761.61(a)(5)(v)(A)
  - ☐ PCB concentrations < 50 ppm or PCB surface contamination < 100 µg/100 cm2
  - ☐ PCB concentrations ≥ 50 ppm or PCB surface contamination ≥ 100 µg/100 cm2
- ☐ PCB Bulk Product Waste, as defined in 40 CFR 761.3
  - ☐ Plastics (such as plastic insulation from wire or cable: radio, television and computer casings; vehicle parts; or furniture laminates); preformed or molded rubber parts and components; applied dried paints, varnishes, waxes or other similar coatings or sealants; caulking; Galbestos; non-liquid building demolition debris; or non-liquid PCB bulk product waste from the shredding of automobiles or household appliances from which PCB small capacitors have been removed (shredder fluff). PCB Bulk Product waste in this category is presumed or known to leach < 10 µg/L PCBs (40 CFR 761.62(b) (1) (i)).
  - ☐ Leaches ≥ 10 µg/L PCBs
- ☐ PCB Waste from Research & Development

* Each drained PCB Transformer with PCB concentrations ≥ 500 ppm and each drained PCB Hydraulic Machine with PCB concentrations ≥ 1,000 ppm must be accompanied by a certification that the flush requirements of 40 CFR 761.60(b) (1) (i) (B) have been met. Flush Certifications must include, at a minimum:

- A unique identification number for each PCB Item that was flushed;
- The date that the flush was performed;
- A statement that the flush was performed in accordance with regulation; and
- A certified signature and date signed.

Provide a description of the PCB waste on the Waste Determination and Disposition Form, 435.39.

GENERATOR CERTIFICATION:
I certify that the waste described on this form and accompanying documents were or shall be obtained using EPA-approved sampling methods, as applicable. I certify that the PCB waste described on this form has not been diluted from a higher concentration in order to avoid any provision of specifying a PCB concentration in accordance with 40 CFR 761. I certify that the information provided on this form is complete, true and correct and is accurately supported and documented by any laboratory testing as required by CWI. I certify that the results of any said testing have been submitted to WGS.

Faye Srala
Generator Print/Type Name

Waste Processing Strategy Project Manager
Generator Title

Faye Srala
Generator Signature

11/5/2015
Date

PCB WASTE CERTIFICATION

This form is the current revision per EDMS
Jim Healy / 11/5/15
Signature/Date

Definitions:

PCB and *PCBs* means any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substance. Refer to §761.1(b) for applicable concentrations of PCBs. PCB and PCBs as contained in PCB items are defined in §761.3. For any purposes under this part, inadvertently generated non-Aroclor PCBs are defined as the total PCBs calculated following division of the quantity of monochlorinated biphenyls by 50 and dichlorinated biphenyls by 5.

PCB Article means any manufactured article, other than a PCB Container, that contains PCBs and whose surface(s) has been in direct contact with PCBs. "PCB Article" includes capacitors, transformers, electric motors, pumps, pipes and any other manufactured item (1) which is formed to a specific shape or design during manufacture, (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use, and (3) which has either no change of chemical composition during its end use or only those changes of composition which have no commercial purpose separate from that of the PCB Article.

PCB Article Container means any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB Articles or PCB Equipment, and whose surface(s) has not been in direct contact with PCBs.

PCB bulk product waste means waste derived from manufactured products containing PCBs in a non-liquid state, at any concentration where the concentration at the time of designation for disposal was ≥50 ppm PCBs. PCB bulk product waste does not include PCBs or PCB Items regulated for disposal under §761.60(a) through (c), §761.61, §761.63, or §761.64. PCB bulk product waste includes, but is not limited to:

(1) Non-liquid bulk wastes or debris from the demolition of buildings and other man-made structures manufactured, coated, or serviced with PCBs. PCB bulk product waste does not include debris from the demolition of buildings or other man-made structures that is contaminated by spills from regulated PCBs which have not been disposed of, decontaminated, or otherwise cleaned up in accordance with subpart D of this part.

(2) PCB-containing wastes from the shredding of automobiles, household appliances, or industrial appliances.

(3) Plastics (such as plastic insulation from wire or cable; radio, television and computer casings; vehicle parts; or furniture laminates); preformed or molded rubber parts and components; applied dried paints, varnishes, waxes or other similar coatings or sealants; caulking; adhesives; paper; Galbestos; sound deadening or other types of insulation; and felt or fabric products such as gaskets.

(4) Fluorescent light ballasts containing PCBs in the potting material.

PCB Capacitor means any capacitor that contains ≥500 ppm PCB. Concentration assumptions applicable to capacitors appear under §761.2.

PCB Container means any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB Articles and whose surface(s) has been in direct contact with PCBs.

PCB-Contaminated means a non-liquid material containing PCBs at concentrations ≥50 ppm but < 500 ppm; a liquid material containing PCBs at concentrations ≥50 ppm but < 500 ppm or where insufficient liquid material is available for analysis, a non-porous surface having a surface concentration >10 μg/100 cm^2 but < 100 μg/100 cm^2, measured by a standard wipe test as defined in §761.123.

PCB-Contaminated Electrical Equipment means any electrical equipment including, but not limited to, transformers (including those used in railway locomotives and self-propelled cars), capacitors, circuit breakers, reclosers, voltage regulators, switches (including sectionalizers and motor starters), electromagnets, and cable, that contains PCBs at concentrations of ≥ 50 ppm and < 500 ppm in the contaminating fluid. In the absence of liquids, electrical equipment is PCB-Contaminated if it has PCBs at > 10 μg/100 cm^2 and < 100 μg/100 cm^2 as measured by a standard wipe test (as defined in §761.123) of a non-porous surface.

PCB Equipment means any manufactured item, other than a PCB Container or a PCB Article Container, which contains a PCB Article or other PCB Equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.

PCB field screening test means a portable analytical device or kit which measures PCBs. PCB field screening tests usually report less than or greater than a specific numerical PCB concentration. These tests normally build in a safety factor which increases the probability of a false positive report and decreases the probability of a false negative report. PCB field screening tests do not usually provide: an identity record generated by an instrument; a quantitative comparison record from calibration standards; any identification of PCBs; and/or any indication or identification of interferences with the measurement of the PCBs. PCB field screening test technologies include, but are not limited to, total chlorine colorimetric tests, total chlorine x-ray fluorescence tests, total chlorine microcoulometric tests, and rapid immunoassay tests.

PCB household waste means PCB waste that is generated by residents on the premises of a temporary or permanent residence for individuals (including individually owned or rented units of a multi-unit construction), and that is composed primarily of materials found in wastes generated by consumers in their homes. PCB household waste includes unwanted or discarded non-commercial vehicles (prior to shredding), household items, and appliances or appliance parts and wastes generated on the premises of a residence for individuals as a result of routine household maintenance by or on behalf of the resident. Bulk or commingled liquid PCB wastes at concentrations of ≥50 ppm, demolition and renovation wastes, and industrial or heavy duty equipment with PCBs are not household wastes.

PCB WASTE CERTIFICATION

PCB Item means any PCB Article, PCB Article Container, PCB Container, PCB Equipment, or anything that deliberately or unintentionally contains or has as a part of it any PCB or PCBs.

PCB/radioactive waste means PCBs regulated for disposal under subpart D of this part that also contain source, special nuclear, or byproduct material subject to regulation under the Atomic Energy Act of 1954, as amended, or naturally-occurring or accelerator-produced radioactive material.

PCB remediation waste means waste containing PCBs as a result of a spill, release, or other unauthorized disposal, at the following concentrations: Materials disposed of prior to April 18, 1978, that are currently at concentrations ≥50 ppm PCBs, regardless of the concentration of the original spill; materials which are currently at any volume or concentration where the original source was ≥500 ppm PCBs beginning on April 18, 1978, or ≥50 ppm PCBs beginning on July 2, 1979; and materials which are currently at any concentration if the PCBs are spilled or released from a source not authorized for use under this part. PCB remediation waste means soil, rags, and other debris generated as a result of any PCB spill cleanup, including, but not limited to:

(1) Environmental media containing PCBs, such as soil and gravel; dredged materials, such as sediments, settled sediment fines, and aqueous decantate from sediment.

(2) Sewage sludge containing < 50 ppm PCBs and not in use according to §761.20(a)(4); PCB sewage sludge; commercial or industrial sludge contaminated as the result of a spill of PCBs including sludges located in or removed from any pollution control device; aqueous decantate from an industrial sludge.

(3) Buildings and other man-made structures (such as concrete floors, wood floors, or walls contaminated from a leaking PCB or PCB-Contaminated Transformer), porous surfaces, and non-porous surfaces.

PCB sewage sludge means sewage sludge as defined in 40 CFR 503.9(w) which contains ≥50 ppm PCBs, as measured on a dry weight basis.

PCB Transformer means any transformer that contains ≥500 ppm PCBs. For PCB concentration assumptions applicable to transformers containing 1.36 kilograms (3 lbs.) or more of fluid other than mineral oil, see §761.2. For provisions permitting reclassification of electrical equipment, including PCB Transformers, containing ≥500 ppm PCBs to PCB-Contaminated Electrical Equipment, see §761.30(a) and (h).

PCB waste(s) means those PCBs and PCB Items that are subject to the disposal requirements of subpart D of this part.

Porous surface means any surface that allows PCBs to penetrate or pass into itself including, but not limited to, paint or coating on metal; corroded metal; fibrous glass or glass wool; unglazed ceramics; ceramics with a porous glaze; porous building stone such as sandstone, travertine, limestone, or coral rock; low-density plastics such as styrofoam and low-density polyethylene; coated (varnished or painted) or uncoated wood; concrete or cement; plaster; plasterboard; wallboard; rubber; fiberboard; chipboard; asphalt; or tar paper. For purposes of cleaning and disposing of PCB remediation waste, porous surfaces have different requirements than non-porous surfaces.

Recycled PCBs means those PCBs which appear in the processing of paper products or asphalt roofing materials from PCB-contaminated raw materials. Processes which recycle PCBs must meet the following requirements:

(1) There are no detectable concentrations of PCBs in asphalt roofing material products leaving the processing site.

(2) The concentration of PCBs in paper products leaving any manufacturing site processing paper products, or in paper products imported into the United States, must have an annual average of less than 25 ppm with a 50 ppm maximum.

(3) The release of PCBs at the point at which emissions are vented to ambient air must be less than 10 ppm.

(4) The amount of Aroclor PCBs added to water discharged from an asphalt roofing processing site must at all times be less than 3 micrograms per liter (µg/L) for total Aroclors (roughly 3 parts per billion (3 ppb)). Water discharges from the processing of paper products must at all times be less than 3 micrograms per liter (µg/L) for total Aroclors (roughly 3 ppb), or comply with the equivalent mass-based limitation.

(5) Disposal of any other process wastes at concentrations of 50 ppm or greater must be in accordance with subpart D of this part

Research and development (R&D) for PCB disposal means demonstrations for commercial PCB disposal approvals, pre-demonstration tests, tests of major modifications to previously approved PCB disposal technologies, treatability studies for PCB disposal technologies which have not been approved, development of new disposal technologies, and research on chemical transformation processes including, but not limited to, biodegradation.

Retrofill means to remove PCB or PCB-contaminated dielectric fluid and to replace it with either PCB, PCB-contaminated, or non-PCB dielectric fluid.

Rupture of a PCB Transformer means a violent or non-violent break in the integrity of a PCB Transformer caused by an overtemperature and/or overpressure condition that results in the release of PCBs.

Sewage sludge means sewage sludge as defined in §503.9(w) of this chapter that contains < 50 ppm (on a dry weight basis) PCBs

Small quantities for research and development means any quantity of PCBs (1) that is originally packaged in one or more hermetically sealed containers of a volume of no more than five (5.0) milliliters, and (2) that is used only for purposes of scientific experimentation or analysis, or chemical research on, or analysis of, PCBs, but not for research or analysis for the development of a PCB product.

APPENDIX 12

RPT-TRUW-94, REV. 0A (draft)

ACCEPTABLE KNOWLEDGE SUMMARY FOR AMWTP COMBINED HOMOGENOUS SOLIDS REPACKAGE PROJECT (BN650)

Acceptable Knowledge Summary for AMWTP Combined Homogeneous Solids Repackage Project (BN650)

Advanced Mixed Waste Treatment Project

Approved:

(Signature on file. See DCR- 20631.

TBD
Date

REVISION LOG

Revision Number	Date Approved	Pages Affected	Description of Revision
0	TBD	All	DCR-20631. Initial issue.

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Table A-1: Generator site, IDC numeric code, IDC Description, Waste Description and constituents for homogenous solids included in the BN650 AMWTP Combined Homogeneous Solids Repackage Project. A1

ACRONYMS

AE	Argonne National Laboratory-East (prefix)
AK	acceptable knowledge
AMWTF	Advanced Mixed Waste Treatment Facility
AMWTP	Advanced Mixed Waste Treatment Project
ARP	Accelerated Retrieval Project
ATWIR	Annual Transuranic Waste Inventory Report
BC	Battelle Columbus (prefix)
BN	AMWTP (prefix)
CCP	Central Characterization Program
CH	contact-handled
CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
D&D	decommissioning and dismantling
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DPS	drum packaging station
DU	depleted uranium
EDMS	Electronic Document Management System
EPA	U.S. Environmental Protection Agency
EU	enriched uranium
EWR	Early Waste Retrieval
FGE	fissile gram equivalent
HEPA	high-efficiency particulate air
HWMA	Hazardous Waste Management Act
HSG	headspace gas
HWN	hazardous waste number
IC	Idaho National Laboratory (prefix)
IDC	item description code
IDR	Initial Drum Retrieval
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center (formerly ICPP)
MD	Mound Plant (prefix)
MEK	methyl ethyl ketone
NBL	New Brunswick Laboratory

nCi/g	nanocuries per gram
NDA	non-destructive assay
PCB	polychlorinated biphenyl
PMC	plutonium-molybdenum cermet
PPO	pressed plutonium oxide
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RF	Rocky Flats Plant (prefix)
RFETS	Rocky Flats Environmental Technology Site
RH	remote-handled
RTR	real-time radiography
RWMC	Radioactive Waste Management Complex
SD	RWMC pre-1980 INL-Exhumed wastes (prefix)
SDA	Subsurface Disposal Area (RWMC)
SRP	Sludge Repackaging Project
SWB	standard waste box
TRU	transuranic
TRUCON	TRU waste content codes
TSA-RE	Transuranic Storage Area–Retrieval Enclosure
TSCA	Toxic Substances Control Act
VE	visual examination
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WF	waste forms
WG Pu	weapons-grade plutonium
WIPP	Waste Isolation Pilot Plant
WMC	waste matrix code
WMF	Waste Management Facility
WMP	waste material parameter
WSPF	waste stream profile form

1.0 WASTE STREAM DESCRIPTION

1.1 Waste Stream Number

BN650

1.2 Basic Waste Stream Information

1.2.1 Waste Stream Name

Advanced Mixed Waste Treatment Project (AMWTP) Combined Homogeneous Solids Repackage Project

1.2.2 Point of Generation

Accelerated Retrieval Project (ARP) –V, Waste Management Facility (WMF)-1617 Sludge Repackage Project (SRP) enclosure. (76)

1.2.3 Waste Stream Volume (Newly Generated)

Projected Volumes:

27,000 55-gallon drums and 1,000 standard waste boxes (SWB), (6,280 m^3). (2)

At a minimum, fifty percent (50%) of the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste is estimated to contain greater than 100 nanocuries per gram (nCi/g) transuranic (TRU) alpha activity. The remaining estimated percentage (e.g., 50%) may contain less than 100 nCi/g TRU alpha activity. (14)

1.2.4 Generation Dates and Rate of Generation

October 2015 to March 31, 2016.

The current average generation rate for BN650 AMWTP Combined Homogeneous Solids Repackage Project waste is estimated at 65 drums per week. (2)

1.2.5 TRUCON Codes

ID 111/ID 211(>95 weight percent [wt%] inorganic sludge)

ID 112/ID 212 (≥ 5 wt% organic sludge)

ID 111/ID 211, ID 112/ID 212, ID 126/ID 226, ID 114/ID 214, ID 122/ID 222. (3)

1.2.6 Waste Isolation Pilot Plant Waste Stream ID

Waste Stream ID: IN-BN650. This waste stream ID will be introduced in the next revision of the Annual Transuranic Waste Inventory Report (ATWIR).

1.2.7 Summary Category Group

S3000 – Homogeneous Solid Waste [(4)]

1.2.8 Waste Matrix Code Group

Solidified Organics [(4, 36)]

1.2.9 Waste Matrix Code

S3900 – Unknown/Other Homogeneous Solids [(4, 36)]

This unknown/other-detailed category includes waste that is:

1. Consistent with the definition for the Homogeneous Solids (S3000) summary category, but: is insufficiently characterized to enable evaluation per the criteria of the Inorganic Homogeneous Solids (S3100) and Organic Homogeneous (S3200) summary categories, or

2. Does not meet the criteria specified for either of the Inorganic Homogeneous Solids (S3100) or Organic Homogeneous Solids (S3200) summary categories.

The waste in this waste stream are composed of inorganic and organic waste and therefore do not meet the criteria specified for either inorganic or organic wastes. [(4)]

1.2.10 Waste Certification Procedures

Containers of waste in the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream will be certified for shipment to WIPP per the requirements listed in MP-TRUW-8.5, TRU Waste Certification. This procedure summarizes the method used by the AMWTP to certify waste as compliant witht MP-TRUW-8.1, Certification Plan for INL Transuranic Waste. [(5, 26, 33, 42)]

1.2.11 Supporting Acceptable Knowledge Documents

The Acceptable Knowledge (AK) document for AMWTP waste, RPT-TRUW-06, Acceptable Knowledge Document for AMWTP Waste, 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. [6, 13] RPT-TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant; RPT-TRUW-13, Acceptable Knowledge Document for INL Stored Waste–Mound Plant Waste; RPT-TRUW-04, Acceptable Knowledge Document for the Battelle Columbus Laboratories Building JN-4 Plutonium Laboratory; RPT-TRUW-89, Acceptable Knowledge Document for Argonne National Laboratory-East Waste; RPT-TRUW-79, Acceptable Knowledge Document for Materials and Fuels Complex Waste; RPT-TRUW-91, Acceptable Knowledge Document for Pre-1980 INL-Exhumed SDA Waste; and RPT-TRUW-92, Acceptable Knowledge Document for Select Idaho National Laboratory (INL) Facilities; are the AMWTP AK documents for the Rocky Flats Plant (RF), Mound Plant (MD), Battelle Columbus (BC), Argonne National Laboratory-East (AE), Radioactive Waste Management Complex (RWMC) pre-1980 INL-Exhumed wastes (SD), and INL facilities, respectively. [7, 8, 9, 41, 52, 53] ITG has incorporated, by Blue Sheet, the Central Characterization Program (CCP) AK report, CCP-AK-INL-026, CCP AK Summary Report for INL Sludge Repackage Project. [76] The AK reports associated with WIPP approved S3000 waste streams were also used as supporting AK documents. These are listed in Section 1.7.3, Other Applicable Waste Streams.

1.2.12 Description from the ATWIR

The ATWIR description for the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream is not available at this time. [27]

The following waste stream description for BN650 will be included in the next ATWIR data call:

The BN650 waste stream is generated from polychlorinated biphenyl (PCB) organic and non-PCB organic and inorganic homogeneous solids from the treatment and repackaging conducted at the ARP, WMF-1617 SRP enclosure.

The treatment and repackaging are conducted at the ARP enclosure WMF-1617 SRP facility enclosure and glovebox. The BN650 wastes are composed of PCB organics and non-PCB organics and inorganics. The BN650 homogenous solids are assigned item description code (IDC) BN-651. The homogenous solids included as feedstock to the BN650 include the following generator IDCs: Argonne National Laboratory-East, AE-102, AE-105, AE-111, AE-121; Battelle Columbus, BC-204; Idaho National Laboratory, IC-603, IC-606; Mound Plant, MD-811, MD-834, MD-835, MD-836; Rocky Flats Plant, RF-001, RF-002, RF-003, RF-004, RF-007, RF-095, RF-290, RF-292, RF-311, RF-361, RF-375, RF-393, RF-420, RF-421, RF-422, RF-425, RF-432, RF-696, RF-700, RF-741, RF-742, RF-743, RF-744, RF-746, RF-747, RF-749, RF-800, RF-801, RF-802, RF-803, RF-806, RF-807, RF-817, RF-818, RF-820, RF-822, RF-823, RF-976, RF-978, RF-995; Subsurface Disposal Area, SD-176. The above IDCs are associated with wastes

that are addressed by the 1995 State of Idaho consent order/compliance agreement. [7, 8, 9, 28, 36, 41, 52, 53, 59]

1.2.13 Defense and WIPP Land Withdrawal Act Determinations

The BN650 AMWTP Combined Homogeneous Solids Repackage Project wastes were generated as a result of treating and repackaging PCB contaminated organic and non-PCB organic and inorganic homogeneous solids. Beginning in 1970 legacy homogeneous solid wastes were transported to the RWMC (now the AMWTP) to be stored as retrievably stored TRU wastes. [60] The homogeneous solids considered for treatment and re-packaging into this waste stream were shipped/transported to the AMWTP by one of the following U.S. Department of Energy (DOE) legacy generators: RF, MD, BC, AE, INL, and SD. These PCB contaminated organic and non-PCB organic and inorganic homogeneous solids are transported to the ARP enclosure WMF-1617 SRP facility for treatment or removal of WIPP prohibited items and repackaged in the SRP glovebox. [28]

1.2.13.1 Defense Determination

The BN650 homogeneous solids included in the AMWTP Combined Homogeneous Solids Repackage Project waste stream are DOE wastes that originated from various defense-related sources. The legacy homogeneous solids were generated as a result of: weapons activities (including defense inertial confinement fusion processes or activities), defense nuclear waste and material by-products management, defense nuclear waste and materials security and safeguards and security investigations, naval reactors development, defense research and development and defense nuclear material production.

The DOE/WIPP-02-3122, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (WIPP-WAC), requires generator sites to use Acceptable Knowledge to determine if the TRU waste streams to be disposed at WIPP meet the definition of TRU “defense” waste. Based on guidance from the DOE, a TRU waste is eligible for disposal at WIPP if it has been generated in whole or part one or more of the activities listed in section 42 U.S.C. 10101(3) of the Nuclear Waste Policy Act (NWPA) of 1982. The term “atomic energy defense activity” means any activity of the Secretary [of the Department of Energy] performed in whole or in part in carrying out any of the following functions:[61, 62]

- 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 materials security and safeguards and security investigations
- Defense research and development.

During early waste management activities at DOE facilities, segregation of defense and non-defense related wastes were not required. 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. In accordance with interim guidance, defense wastes are identified as those wastes generated during work involving only defense activities, or during work in which defense and non-defense wastes were inadvertently mixed in the past and from which the non-defense portion cannot be segregated. [23, 24]

The following outlines the various defense-related activities associated with the DOE RF, MD, BC, AE, SD and INL sites:

- Rocky Flats

  The waste generated at RF and shipped to the INL were generated through defense program activities, or commingled with non-defense program waste that cannot be segregated. [7, 18]

- Mound

  MD wastes were generated during defense-related operations conducted at 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 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 of the waste is the result of commingling of wastes from both defense-related and domestic activities. [8,19]

- Battelle Columbus

  Wastes shipped from BC to the INL were generated during decommissioning and dismantling (D&D) of the JN-3 (Research Reactor Building) and other facilities. Defense-related operations were conducted at BC in support of Army, Navy, and Air Force programs. These operations included weapons-related activities and defense research into plutonium materials properties and development, plutonium metallurgy, actinide joining, and weapons production and assembly. Processing of test shot samples, development of ^{238}Pu heat sources for spacecraft for DOD, and some specialized work for Los Alamos were conducted in the JN-4 Plutonium Laboratory. [9, 20, 21, 23]

- Argonne East

  Waste shipped from AE is associated with the AE's multi-disciplinary research laboratory that performs basic and applied research 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. 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. [41]

- Initial Drum Retrieval (IDR) and Early Waste Retrieval (EWR) pre-1980 INL-exhumed Subsurface Disposal Area (SDA) wastes

  The AMWTP transuranic storage area (TSA) retrieval enclosure (RE) contains wastes that were generated by the INL during the 1970's as a result of early RWMC SDA remedial investigations. From 1954 until 1970, the INL SDA received and disposed of a variety of radioactive waste (including TRU wastes) from multiple sources. The two INL SDA exhumations that contributed waste to the Transuranic Storage Area-Retrieval Enclosure (TSA-RE) were associated with the INL IDR Project, and the INL EWR Project. Segregation practices of defense and nondefense related waste was not employed during the IDR and EWR exhumations. The wastes disposed of into the SDA were both defense and non-defense waste. Defense-related wastes initially disposed of within INL 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 byproducts management, defense nuclear waste and materials security and safeguards and security investigations, Naval reactors development, defense research and development and defense nuclear materials production. Examples of non-defense waste disposed into the INL RWMC SDA include: civilian reactor wastes, medical wastes, United States Geological Service waste, and wastes from various universities. [52]

Most of the IDR and EWR pre-1980 INL-exhumed SDA wastes originated at RF. Containers in poor condition and loose wastes were bagged and for the most part overpacked into 83/85-gallon containers and then placed into M-III bins or cargo containers. Loose wastes that were generated as a result of exhumation activities are inherently mixed with various generator wastes. The waste within the pre-1980 INL-exhumed SDA waste is comprised of both defense and non-defense related waste that are inherently commingled as a result of prior disposal practices and/or retrieval/repackaging activities. The pre-1980 INL-exhumed SDA wastes are considered defense related waste. [52]

- Idaho National Laboratory

  During the early INL facility operations there was no requirement to segregate defense from non-defense-related waste. Routine and non-routine generated waste was not segregated in accordance with current requirements. As a result, waste and other materials generated during these times may have been from widely different programs. As a result of the early INL waste management practices and the inherent commingling of waste that resulted from some of these various activities (e.g., analytical, decontamination, hot cells, D&D operations), segregation of non-defense waste from defense-related waste was not conducted at the time of disposal and remains infeasible. While certain wastes may not have been generated directly from defense activities, the waste is commingled defense waste that was generated "in part" by atomic energy defense activities. Specific examples of defense related activities at various INL locations include the following: [53]

  - Defense research and development
  - Defense nuclear waste and materials by-products management
  - Radiation and chemical monitoring support for defense activities conducted in other INL facilities
  - Analytical support for defense activities conducted in other INL facilities
  - Naval reactors development
  - Defense nuclear materials security and safeguards
  - Defense nuclear materials production.

  As a result of the wide range of INL research and development functions, waste management practices and analytical activities on a wide variety of materials; the INL legacy waste currently in the AMWTP inventory is considered to be eligible for disposal at WIPP as inherently commingled defense waste that was generated "in part" by the atomic energy defense activities from defense nuclear waste and materials by-products management. No pure non-defense-related waste was shipped to the AMWTP TSA. [53]

- Advanced Mixed Waste Treatment Project

  The IDCs included as feedstock for the BN650 waste stream have been retrieved from the TSA-RE and/or are currently stored at the AMWTP. The homogeneous solids IDCs are confirmed to have been generated at one or more of the following generator locations RF, MD, BC, AE, SD, and/or the INL. The BN650 waste stream is newly generated waste derived from transporting containers to the ARP enclosure for treatment of WIPP prohibited items or prohibited item removal and repackaging in the SRP glovebox. Waste currently being received at the AMWTP is subject to evaluation through the Offsite Waste Program's Waste Acceptance Criteria (WAC) prior to receipt of waste. Waste that is classified as from non-defense activities is not accepted. As such these wastes are considered defense-related wastes due to their relationship with the above generator activities. [7, 8, 9, 41, 52, 53, 76, 80, 81]

1.2.13.2 Land Withdrawal Act Determination

Public Law 102-579, WIPP Land Withdrawal Act, prohibits the disposal of spent nuclear fuel and high-level waste as defined by the NWPA at WIPP. According to the NWPA, spent nuclear fuel is "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing."[29, 38]

The DOE Radioactive Waste Management Manual (DOE M 435.1-1) 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 when it is technically infeasible, cost prohibitive, or would increase worker exposure to separate the remaining test specimens from other contaminated material."[24, 38, 62]

High-level waste is defined by the NWPA as "the highly radioactive material resulting from the reprocessing of spent nuclear fuel, 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."[38]

One INL facility (Idaho Nuclear Technology and Engineering Center [INTEC]) reprocessed SNF. The HLW generated from the SNF reprocessing operation underwent calcination (i.e., calcine waste) and is currently stored at the INTEC facility. There have been no calcine wastes sent to the AMWTP. Laboratory and other INTEC operational wastes (e.g., laboratory, D&D) received at the AMWTP since 2001 have undergone Waste Incidental to Reprocessing (WIR) evaluations and are not classified as HLW. AMWTP AK documents for the INTEC facility do not reflect the shipment/transfer of SNF or HLW to the AMWTP. Spent fuel materials were generated at various INL locations. These facilities operated nuclear reactors, which produced SNF, and/or performed various research and experiments on both SNF and test specimens, as defined above. However, although these facilities handled nuclear fuels, there is no evidence that SNF, as defined in the NWPA and DOE M 435.1-1, was sent to the AMWTP

TSA. AMWTP AK documents for the INL do not reflect the shipment/transfer of SNF or HLW to the AMWTP. (53)

Spent nuclear fuel may have been previously disposed of within the INL SDA pits and trenches; however, there is no AK documentation that identifies spent nuclear fuel waste as being generated and transported to the AMWTP TSA-RE as a result of the IDR or EWR Project exhumations. Furthermore, if found, spent nuclear fuel would be expected to be classified as a S5000 waste (i.e., debris waste) and as a result, spent nuclear fuel would not be included within this waste stream. (52)

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]). 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 AE CH waste is not spent nuclear fuel or high-level waste. (41)

There are no historical records or evidence of spent nuclear fuel or high-level waste ever having been handled at the RF, MD, or BC facilities. (7, 8, 9)

The AMWTP off-site waste program does not accept SNF or HLW for storage or treatment at the AMWTP. (80, 81)

The BN650 homogeneous solids do not meet the definitions of HLW or SNF. HLW and SNF are not included in this waste stream. If SNF and HLW wastes are identified the waste will be segregated and managed separately and will not be part of the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream. (7, 8, 9, 41, 52, 53)

1.3 Waste Stream Description

The BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream is generated from the treatment and/or re-packaging of homogenous solids waste. The treatment and repackaging are conducted at the ARP WMF-1617 SRP facility enclosure and glovebox. The BN650 homogenous solids are composed of PCB organics and non-PCB organics and inorganics. The BN650 homogenous solids are assigned IDC BN-651. The AMWTP homogeneous solid IDCs included in the waste stsream as feedstock are: Argonne National Laboratory-East, AE-102, AE-105, AE-111, AE-121; Battelle Columbus, BC-204; Idaho National Laboratory, IC-603, IC-606; Mound Plant, MD-811, MD-834, MD-835, MD-836, Rocky Flats Plant, RF-001, RF-002, RF-003, RF-004, RF-007, RF-095, RF-290, RF-292, RF-311, RF-361, RF-375, RF-393, RF-420, RF-421, RF-422, RF-425, RF-432, RF-696, RF-700, RF-741, RF-742, RF-743, RF-744, RF-746, RF-747, RF-749, RF-800, RF-801, RF-802, RF-803, RF-806, RF-807, RF-817, RF-818, RF-820, RF-822, RF-823, RF-976, RF-978, RF-995;

Subsurface Disposal Area, SD-176. The above IDCs are associated with wastes that are addressed by the 1995 State of Idaho consent order/compliance agreement. (7, 8, 9, 28, 36, 41, 52, 53, 60)

Some of the above IDCs are included in existing WIPP approved waste stream profiles as presented in Table 1.

Table 1. IDCs included in approved waste stream profiles.

Waste Stream	Waste Stream Description	IDC	IDC Name
AMWTP's WIPP-approved homogeneous solid WSPFs:			
BNINW216 (63)	First/Second Stage Sludge	RF-001	First Stage Sludge
		RF-002	Second Stage Sludge
		RF-741	Pits 11 and 12 First Stage Sludge
		RF-742	Pits 11 and 12 Second Stage Sludge
		RF-800	First Stage Sludge-Cemented
BNINW218 (66)	Building 374 Sludge (approved)	RF-007	Building 374 Dry Sludge
		RF-803	Solidified DCP Sludge
		RF-807	Bypass Sludge (after 3/21/87)
BN004 (68)	Special Setups	RF-004	Special Setups
		RF-744	Pits 11 and 12 Special Setups
		RF-802	Solidified Laboratory Waste
BN835 (67)	Solidified Acid/Caustic	MD-834	High Level Acid
		MD-835	High Level Caustic
BN836 (69)	Cemented Sludge	MD-836	High Level Sludge/Cement
BN222 (70)	Solidified Plutonium Recovery Incinerator Waste	RF-292	Cemented Sludge
		RF-696	Cemented Incinerator Sludge (Bldg 771 generated prior to March 21, 1987)
		RF-818	Cemented Incinerator Ash
		RF-820	Cemented Soot
CCP homogeneous solid WSPFs:			
ID-RF-S3114 (71)	Organic Setups	RF-003	Organic Setups, Oil Solids
		RF-743	Pits 11 & 12 Organic Setups
ID-RF-3150A (74)	Organic and Sludge Immobilization System Waste	RF-700	OASIS Waste
		RF-801	Solidified Organics
ID-SRP-S3000 (76)[a]	Sludge Repackage Project Combined Sludge Waste	RF-001/741	First Stage Sludge
		RF-002/742	Second Stage Sludge
		RF-003/743	Organic Setups, Oil Solids
		RF-800	First Stage Sludge-Cemented

[a] When ITG (AMWTP) assumes ownership of ID-SRP-S3000, the output IDC will be CW-216.

The remaining IDCs are Environmental Protection Agency (EPA) Tier 1 approved but not included in an AMWTP approved waste stream. The waste is classified as Unknown/Other Homogeneous Solids (WMC S3900). [36, 82, 83, 84] See Appendix A for the list of approved IDCs and waste type description.

The BN650 homogenous solids have a common physical form that contain similar hazardous constituents and are generated from a single process or activity (the treatment and repackaging conducted at the ARP WMF-1617 SRP facility enclosure).[26] The IDC associated with this waste stream is BN-651 and includes one or more of the IDCs identified in Appendix A.

Table 2. Physical waste form description for BN650 AMWTP Combined Homogeneous Solids Repackage Project

IDC [36]	Waste Matrix Code (WMC) [36]	Waste Description [36]
BN-651	S3900	PCB organic and non-PCB organic and inorganic homogeneous solids from the treatment and repackaging conducted at the ARP WMF-1617 SRP facility enclosure.[a]

a. A list of homogenous solids waste IDCs that are included in BN-651 is presented in Appendix A.

Each container within the BN650 waste stream will be comprised of >50% by volume homogenous solids. Non-homogeneous solids waste (i.e., debris, soil, sand and/or gravel) will be less than 50% by volume in each container. Examples of debris may include cellulosic debris, including cement bags, plastic debris including clamshells, polyethylene bottles, lead items (e.g., lead tape, scrap lead, leaded rubber gloves and aprons, and lead seals), rubber debris, rubber gloves, rubber gaskets, metal debris, bits of unburned incinerator feed material and carbon, filters, aluminum, cloth, leather, latex, and Silver Shield gloves, knives, cutters, drum filters, paper, wood, plastic bottles, plastic sleeving, bags, bag stubs, aprons, rubber bands and O-rings, glovebox gloves, high-efficiency particulate air (HEPA) filters, empty cans, graphite, glass, tile, metal liner baskets, metal tools, and tray liners. No prohibited items are included in the waste. Prohibited items are treated or removed. [32, 36, 76, 85, 86]

Oil-Dri is the absorbent identified for use in the SRP process; however, absorbents approved for use in the Risk-Based Disposal Approval Application for Management of PCBs include Aquaset, Petroset, or Micro Cel E. Non-hazardous immobilization/solidification agents have historically been added to individual containers of sludge during previous characterization activities and are added during SRP repackaging operations. These agents include vermiculite, Aquaset (sodium montmorillonite clay), Aquaset II-G (sepiolite clay), Petroset and Oil-Dri (Bentonite clay), SP-400 (sodium polyacrylate), and Micro-cel E (calcium silicate). Sludge repackaged in the SRP may also include small quantities of waste from equipment decontamination and maintenance such as solidified decontamination solution (Simple Green [water, ethoxylated alcohol, sodium citrate, and other nonhazardous ingredients] absorbed with Oil-Dri). Small quantities of soil may also be present from cleanup of incidental spills of waste materials. [6, 7, 8, 9, 32, 36, 41, 50, 51, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 75, 76, 78, 79, 85, 86]

1.4 Process Description for BN650 AMWTP Combined Homogeneous Solids Repackage Project

1.4.1 Areas of Operation

The SRP waste operations are conducted in the ARP-V enclosure located on an approximately 0.6-acre area over Pit 9 in the SDA of the RWMC. The WMF-1617 (RA-V) enclosure is a temporary structure that houses excavation, excavated waste staging, and personnel and equipment ingress and egress activities. Attached structures house the airlock operations that include excavator and telehandler support capabilities and waste/soil examination, packaging, and sampling systems. Ventilation is provided by a HEPA-filtered ventilation system. [76]

The airlock structure is constructed to abut with the enclosure and provides areas for equipment maintenance, operator entry to the retrieval area and drum packaging stations, remotely observing excavation activities, and performing decontamination activities. A drum packaging station (DPS) is a glove box type facility utilized for the inspection, handling, characterization, and packaging of waste materials. [76, 85, 86]

1.4.2 Process Flow Diagram

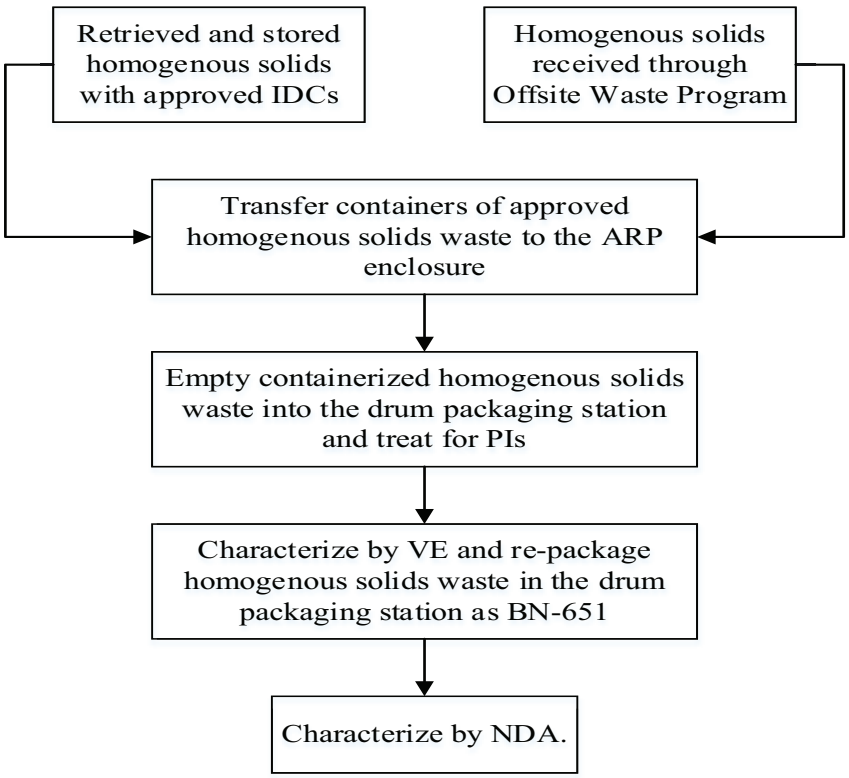

Figure 1. General Flow Diagram for AMWTP BN650 AMWTP Combined Homogeneous Solids Repackage Project.

1.4.3 Waste Generating Process

Since 1970 TRU waste has been accepted from a variety of DOE facilities. The waste was placed in the AMWTP TSA as "retrievably-stored TRU wastes". The majority of the homogenous solids waste in the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream is a result of AMWTP retrieval of legacy waste from RF, MD, AE, SD and INL generators and subsequent waste management operations. Containers of homogenous solids are retrieved from the AMWTP TSA-RE and transported to one of the AMWTP Resource Conservation and Recovery Act (RCRA) permitted Type-II Storage Modules (WMF-628 through WMF-635) for subsequent management, characterization and storage. Wastes that are/were retrieved or previously accepted into the AMWTP legacy waste inventory are also stored in the Type-II Storage Modules (e.g., WMFs). New waste from the INL or other offsite generators is received through the Offsite Waste Programs for characterization, treatment and disposal. [6, 36, 41, 43, 44, 45, 46, 47, 80, 81]

Each retrieved container is visually examined to determine container integrity and to obtain other information from the drum (e.g., initial generator information). Containers with poor integrity or that are breached or have other structural defects are repaired to the extent possible and/or overpacked, or repackaged. If the entire container is compromised, the original packaging materials and pieces of the original drum are included in the new container. [6, 43, 45, 47, 48, 49, 51, 58, 60, 61, 77]

Container specific AK information and characterization information (assay and real-time radiography [RTR]/visual examination [VE]) is reviewed for every container transferred to the SRP to ensure the physical composition and generator information are consistient with the assigned IDC for each container and the IDC is listed in Appendix A. [30, 31, 35]

SRP repackaging activities involve the complete repackaging and inspection of inorganic and organic sludge wastes. Drum contents are emptied onto a sorting table in the WMF-1617 enclosure. Up to two drums may be processed on the sorting table at the same time. The waste is raked with the excavator bucket to identify sealed containers, containers of liquids, WIPP prohibited items and free liquids. Oil-Dri absorbent is added as needed and mixed into the waste to absorb the free liquids identified in the sorting table. Any inner containers that may contain liquid are opened or crushed with the excavator thumb or bucket to allow absorption of the liquid to take place. Oil-Dri is added to the sorting table and mixed into the waste with the excavator bucket to ensure absorption of liquids. Once mixing is completed, the waste is scraped from the sorting table with the excavator into a lined waste tray for processing in the DPS. Only one container of liquid is processed at a time on the sorting table and only one processed container per waste tray.

More than one container of liquid is not deliberately processed on the sorting table. Sealed containers may be vented on the sorting table with approval from the Environmental lead or group. The waste is not removed from the sorting table if the temperature exceeds 125°F following liquid absorbtion or venting. Waste is transferred from the sorting table into waste

trays and moved to the DPS. Unapproved sealed containers and containerized elemental mercury are segregated from the waste. No clean-up or decontamination activities are conducted between repackaging runs of the sludge. The inorganic and organic sludge wastes are processed concurrently, and may become intermingled during repackaging. [32, 75, 76, 85, 86]

The DPSs are Lexan-coverd glovebox-like units used for packaging the waste from the sorting table. The waste trays are moved into the DPS and the waste is characterized by VE and packaged into 55-gallon drums. Containers with liquids are not opened or deliberately mixed in the DPS. Containers with liquids are removed from the waste. Free liquids identified in the waste are absorbed with Oil-Dri. Sealed containers or other prohibited and nonconforming items identified in the waste are segregated from the waste stream, unless the container is a sample vial filled with sludge. [32, 75, 76, 85, 86]

Oil-Dri is the absorbent identified for use in the SRP procedures; however, absorbents approved for use in the Risk-Based Disposal Approval Application for Management of PCBs include Aquaset, Petroset, or Micro Cel E. Secondary waste consisting of small quantities of sludge contaminated debris such as tray liners, plastic sheeting, rubber bands, glovebox gloves, HEPA filters, and metal tools from repackaging operations may also be added to the waste stream. [32, 75, 76]

Equipment in the ARP-V enclosure may be decontaminated with water and Simple Green (water, ethoxylated alcohol, sodium citrate, and other nonhazardous ingredients) prior to maintenance and the resulting liquid absorbed with granular silica- and clay-based absorbent such as that produced by Oil- Dri and added to the sludge. Incidental spills of waste material during SRP reprocessing activities will be collected with small quantities of surrounding soil and included with the sludge. [32, 75, 76]

1.4.4 Generator Feedstock Information

The legacy homogenous solids waste in the BN650 waste stream originated from multiple DOE sites and was associated with various operations within each of these facilities. The following generators and operations that are associated with BN650 waste stream includes:

- Rocky Flats[7]
  - Plutonium metal and plutonium-containing materials manufacture, recovery, and treatment
  - Plutonium production support operations including maintenance, laboratory activities, and R&D
  - Non-routine events including renovations, spills, fires, and decommissioning
  - Construction, demolition, and D&D operations.

- Battelle Columbus[9]
  - Research into the metallurgical and ceramic properties of plutonium and its alloys
  - Plutonium processing
  - Development of nuclear fuels
  - D&D of the BC facilities.
- Mound[8]
  - D&D of the MD Facility
  - Pressed plutonium oxide (PPO) sphere and plutonium-molybdenum cermet (PMC) production
  - Plutonium and other isotopic recovery
  - Plutonium manufacture support such as laboratory activities and R&D
  - Facility maintenance
- Argonne East[41]
  - Support activities associated with the development and testing of various breeder reactor systems
  - Laboratory operations associated with R&D/DOE waste management and supporting the examining/evaluating of nuclear fuel
  - Repackaging activities
  - Decontamination and decommissioning activities
  - General Plant operations including waste management and maintenance.
- Idaho National Laboratory Radioactive Waste Management Complex Subsurface Disposal Area[52]
  - Early (pre-1980) INL SDA retrieval operations
  - INL legacy waste operations (excluding INTEC).
- Idaho National Laboratory[53]
  - Laboratory operations associated with chemical and radiochemical analyses for potential hazardous substances, a comprehensive radiation monitoring program, environmental monitoring, ecological research, radiation safety research and development, and other special projects in support of the DOE's mission at the INL facilities

- R&D activities associated with the operation and testing of various reactor systems and programs
- Hot cell operations for examination and testing of radioactive materials
- Operations associated with R&D management and supporting the evaluation, examination, and testing of nuclear fuels and related materials
- RF and ID repackaging activities
- Decontamination and decommissioning activities
- General operations including storage, waste management and maintenance of laboratories, reactors, and radioactive materials
- Repackaging process for remote-handled debris at INTEC.

- Advanced Mixed Waste Treatment Project[6]
  - Retrieval of homogenous solids associated with the approved IDCs listed in Appendix A from one or more of the legacy waste generators noted above
  - INL homogenous solids received through the off-site waste program.

Some of the containers transferred to the SRP for processing have been previously repackaged or processed at AMWTP in an attempt to remediate prohibited items, primarily liquids. These operations were conducted in the AMWTP Drum Treatment Facility (DTF) or Advanced Mixed Waste Treatment Facility (AMWTF). Drums were processed to remove liquids as necessary by liquid absorption, drill and drain, and/or shaker table operations. [6, 11, 50, 51, 58, 77]

1.4.5 Material Inputs

The BN650 homogenous solids include material inputs from RF, MD, BC, AE, SD, and INL homogeneous solids IDCs. The waste may also contain <50% by volume heterogeneous debris waste; sand or dirt.[36],

Treatment for WIPP-prohibited liquids may include Oil-Dri in the SRP process and/or legacy generator and AMWTP solidification agents vermiculite, Aquaset, Aquaset II-G, Petroset II or Petroset IIG, Micro-Cel E, PIG, Hg absorb or SP-400 absorbents to render the waste acceptable prior to packaging.[6, 32, 76]

IDCs and waste descriptions for wastes contributing to the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream are listed in Appendix A.

1.4.6 Waste Material Parameters

The waste material parameter (WMP) weight percentages for the BN650 AMWTP PCB contaminated homogenous solids waste stream estimate were based on RTR or VE results for homogenous solids associated with RF, MD, BC, AE, SD, and INL. [30, 31]

WMP data for 36,288 containers with completed RTR/VE data from the BN650 waste stream were obtained from the AMWTP Waste Tracking System database for homogenous solids containers examined prior to July 21, 2015. This population represented approximately 90% of the estimated volume projected for the BN650 waste stream. The estimated WMP weight parameters are representative of the BN650 waste stream and are summarized in Table 3. [12]

Table 3. Waste material parameters for BN650 AMWTP Combined Homogeneous Solids Repackage Project.

Waste Material Parameters	Estimated Percent WMP weight/unit waste
Iron-based Metals/Alloys	<1%
Aluminum-based Metals/Alloys	<1%
Other Metals	<1%
Other Inorganic Materials	6%
Cellulosics	<1%
Rubber	<1%
Plastics (waste materials)	<1%
Inorganic Matrix	72%
Organic Matrix	20%
Soils/Gravel	<1%

1.5 AK Sufficiency Determination

No AK sufficiency determinations apply to this waste stream.

1.6 Prohibited Items

The following items are prohibited in waste containers shipped to WIPP as documented in MP-TRUW-8.1 and MP-TRUW-8.2, Quality Assurance Project Plan. [5, 26, 61]

- 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)
- HLW and SNF as identified in the WIPP Land Withdrawal Act (and as defined in the Nuclear Waste Policy Act of 1982).[26, 29]

BN650 AMWTP Combined Homogeneous Solids Repackage Project containers that are identified as containing prohibited items are treated (to absorb prohibited liquids) or undergo removal of the prohibited items or rejected, as appropriate. Prohibited items have been identified by RTR, VE, and AK in the homogenous solids waste IDCs included in the BN650 waste stream. [32, 36, 63, 66, 67, 68, 69, 70, 71, 74, 76]

Prohibited items potentially in this waste stream are sealed containers greater than four liters. Compressed gases in the form of unpunctured aerosol cans, gas cylinders and small tanks may also be present in the waste. These items will be segregated and removed from the waste stream, or verified to be punctured during SRP repackaging operations. [36]

Excess liquid is a common prohibited item identified during RTR and VE. Liquids have been observed on top of the waste, within the drum bag, between the rigid liner and drum, and in small inner containers. Since the organic setups (RF-003 or RF-743 waste) contain greater than 50 ppm PCBs, any residual liquids including containerized liquids, identified during RTR and/or VE are assumed to contain greater than 50 ppm PCBs. Residual liquids containing PCBs are prohibited by the WIPP-WAC. Therefore, any amount of liquid in a drum containing organic setups waste must be remediated during SRP repackaging operations. [26, 32, 36]

Containers with WIPP-prohibited liquids will be treated using non-hazardous solidification agents Oil-Dri absorbent to render the waste acceptable prior to shipment. [75] In the event the treatment renders an acceptable waste form, it is included in the BN650 waste stream.

In addition, RTR has identified sharp objects. Prohibited items may be processed in the ARP enclosure. After treating, sorting, and/or removal of prohibited item(s), the waste is repackaged into containers as BN-651. [32] The containers of homogenous solids in this waste stream will not contain prohibited items. [32, 61]

1.7 Resource Conservation and Recovery Act Determination

Some of the homogenous solids wastes within this waste stream were received prior to the promulgation of the 1980 RCRA Program and as a result some of the waste may have been initially managed as non-RCRA regulated (See Attachment A). However, since the EPA published a "Notice of Intent" within the Federal Register during the late 1980's that provided notification to hazardous waste generators of their (EPA's) intent to regulate the hazardous portion of mixed waste (i.e., waste that is both radioactive and hazardous); the homogenous solids within this waste stream have been managed as mixed waste. [42, 44]

The homogenous solids within this waste stream are currently subject to the State of Idaho Hazardous Waste Management Act (HWMA)/RCRA requirements' Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities and are further regulated under the AMWTP HWMA/RCRA requirements. [38, 39]

1.7.1 EPA Hazardous Waste Numbers

Homogenous solids within this waste stream are characterized as mixed TRU waste. The HWNs assigned to the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream include those HWNs associated with IDCs that contribute to the waste stream. [1, 7, 8, 9, 34, 37, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

Toxicity characteristic HWNs associated with the BN650 waste stream are: D004 (arsenic), D005 (barium), D006 (cadmium), D007 (chromium), D008 (lead), D009 (mercury), D010 (selenium), D011 (silver), D019 (carbon tetrachloride), D022 (chloroform), D026 (cresol), D027 (1,4-dichlorobenzene), D028 (1,2-dichloroethane), D029 (1,1-dichloroethylene), D030 (2,4-dinitrotoluene), D032 (hexachlorobenzene), D033 (hexachlorobutadiene), D034 (hexachloroethane), D036 (nitrobenzene), D037 (pentachlorophenol), and D043 (vinyl chloride).[b]

Listed HWNs associated with the BN650 waste stream are:

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[b] Some characteristic HWNs are also addressed under the listed waste HWNs. When this occurs, then the listed waste HWN is retained in lieu of the characteristic 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, trichlorofluoroethylene, and trichlorofluoromethane; and

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

F004: cresols and nitrobenzene; and

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

F006, F007, and F009: electroplating waste.

P- and U-listed HWNs: P030 (cyanide), P098 (potassium cyanide), P099 (potassium silver cyanide), P106 (sodium cyanide), U003 (acetonitrile), U103 (dimethyl sulfate), U108 (1,4-dioxane), U134 (hydrofluoric acid), and U151 (mercury).

The overall HWNs assigned to the waste steam are a compilation of all HWNs assigned to individual contributors of wastes within the BN650 waste stream. See Table 4a and 4b. [1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

Table 4a. HWNs assigned to the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream.

Generator Site	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
RF [a (7)]	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•		•		•	
MD [b (8)]	•	•	•	•	•	•	•	•											•	•		•			
SD [c (52)]	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	
AE [d (41)]	•	•	•	•	•	•	•	•		•	•	•	•				•			•	•	•			
BC [e (9)]		•	•	•	•	•		•											•	•		•			
INL [f (53)]	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	
BN (BN-651)[g]	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	

a. RF: F001 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, carbon tetrachloride, tetrachloroethylene and 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; D026 cresols and D036 nitrobenzene, assigned to RF-003 and D036 to RF-801 waste, is covered under the F004 assigned to the waste stream. F005 = 2-ethoxyethanol, benzene, carbon disulfide, MEK, pyridine, and toluene; and F006, F007, and F009 (electroplating waste).

b. MD: F001 = 1,1,1-trichloroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene and trichloroethylene; F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, methylene chloride, tetrachloroethylene, and trichloroethylene; and F005 = benzene, carbon disulfide, MEK, and toluene.

c. SD: F001 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, carbon tetrachloride, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane; F002 = 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, methylene chloride, tetrachloroethylene, trichloroethylene, trichlorofluoromethane, chlorobenzene, 1,2-dichlorobenzene, and 1,1,2-trichloroethane; F004 = cresols and nitrobenzene; F005 = benzene, carbon disulfide, isobutanol, 2-ethoxyethanol, MEK (2-butanone), 2-nitropropane, pyridine, and toluene; and F006, F007, and F009 (electroplating waste)

d. AE: D019 carbon tetrachloride, assigned to AE waste, is covered under the F001 assigned to the 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

e. BC: F001= methylene chloride and trichloroethylene; F002 = methylene chloride and trichloroethylene; and F005 = benzene, methyl ethyl ketone, and toluene.

f. INL: 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, trichlorofluoromethane, and trichlorofluoroethylene; F002 =1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane; 1,1,2-trichloroethane, o-(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.

g. BN: 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, trichlorofluoroethylene, and trichlorofluoromethane; F002 = 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, o-(1,2)-dichlorobenzene, chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, trichlorofluoromethane, chlorobenzene, o-dichlorobenzene, and; F004 = cresols and nitrobenzene; F005 = benzene, carbon disulfide, isobutanol, 2-ethoxyethanol, MEK (2-butanone), 2-nitropropane, pyridine, and toluene; and F006, F007, and F009 (electroplating waste).

Table 4b. Acute hazardous wastes (P listed) and toxic hazardous wastes (U listed) HWN assignment by generator site for the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream.

Generator Site/Activity	Cyanide	Potassium cyanide	Potassium silver cyanide	Sodium cyanide	Acetonitrile	Dimethyl sulfate	1,4-Dioxane	Hydrofluoric acid	Mercury
	P030	P098	P099	P106	U003	U103	U108	U134	U151
Idaho National Laboratory (INL) [53]									
Labs at INTEC and RWMC performing analytical activities									
AMWTP (BN)									
Newly-generated waste from repackaging, treatment, and waste management activities (BN-651).	•	•	•	•	•	•	•	•	•

1.7.2 Hazardous Determination

1.7.2.1 Hazardous Waste Management

The waste that comprises the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream is newly generated. The wastes that comprise this waste stream have historically been managed as mixed TRU waste at the AMWTP and are currently classified by AMWTP AK as mixed TRU waste based on RCRA 40 CFR 261 criteria. [1, 44, 45]

1.7.2.2 Ignitability

The waste materials in the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream do not meet the 40 CFR 261.21, Characteristic of Ignitability, definition of ignitability. The homogenous solids in this waste stream are not a liquid, an ignitable compressed gas, or an oxidizer. VE is performed to ensure no amount of liquid is present, liquids will be removed or undergo treatment (absorption) prior to packaging and WIPP disposal. Containers that are identified as having liquids will be treated using Oil-Dri absorbent to ensure that the waste is acceptable for disposal at WIPP.[75, 76] The waste materials in this waste stream are not compressed gas and do not contain compressed gas. VE is performed to verify the absence of ignitable compressed gases. All compressed gas cylinders will be segregated from the waste stream during characterization. The waste does not meet the U.S. Department of Transportation

definition of an oxidizer as defined in 49 CFR 173, Shippers – General Requirements for Shipments and Packagings. Finally, the waste is not capable of causing fire through friction, absorption of moisture, or spontaneous chemical change. This waste stream does not exhibit the characteristic of ignitability (D001). [1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

1.7.2.3 Corrosivity

The materials in the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream do not meet the 40 CFR 261.22, Characteristic of Corrosivity, definition of corrosivity. The homogenous solids in this waste stream are not liquid waste and do not contain liquids in excess of WIPP-WAC limits and they do not contain unreacted corrosive chemicals. If found, liquid in excess of WIPP-WAC limits and unreacted corrosive chemicals will be removed or treated (e.g., absorbed) prior to WIPP disposal. Containers that are identified as having prohibited liquids may be treated using will be treated using Oil-Dri absorbent to ensure that the waste is acceptable for disposal at WIPP. [75, 76] Therefore, this waste stream does not exhibit the characteristic of corrosivity (D002). [1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

1.7.2.4 Reactivity

The waste materials in the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream do not meet the 40 CFR 261.23, Characteristic of Reactivity, definition of reactivity. The homogenous solids in this waste stream are not a liquid waste. To render the waste acceptable at WIPP, wastes identified as having reactive waste properties or containing prohibited liquids will be treated or be removed. Any containers that are identified as having prohibited liquids may be treated using will be treated using Oil-Dri absorbent to ensure that the waste is acceptable for disposal at WIPP. [75, 76] The BN650 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 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 P-listed HWNs for cyanide and assigned F006, F007, and F009 listed HWNs that are associated with cyanide electroplating operations that may also contain sulfides, there is no evidence that full or partially full containers of cyanide were disposed of in this waste stream. [53] If full or partially full containers of cyanide are identified, they will be segregated and managed separately and will not be shipped. [32] Therefore, concentrations of cyanide in the BN650 waste stream are not expected to approach those levels necessary for reactivity. 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, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

1.7.2.5 Toxicity

The homogenous solids in the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream contain RCRA toxicity constituents associated with toxicity characteristic metals and organics. See Table 4a for generator-specific HWNs associated with this waste stream. [1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

Where the same constituent is identified for both characteristic and listed HWNs the listed HWN is retained in lieu of assigning the characteristic. The following characteristic HWNs were not assigned to this waste stream because the constituent associated with the characteristic HWN has also been identified as a listed waste constituent: D019 (carbon tetrachloride) is associated with AE waste and is addressed under the F001 HWN; and D026 (cresols) and D036 (nitrobenzene), assigned to RF-003 and D036 assigned to RF-801 waste, is addressed under the F004 HWN assigned to the waste stream. [1, 7, 41, 71]

The RCRA toxicity characteristic metals and organics assigned to this waste stream are: D004 (arsenic); D005 (barium); D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury); D010 (selenium); D011 (silver); D022 (chloroform); D027 (1,4-dichlorobenzene); D028 (1,2-dichloroethane); D029 (1,1-dichloroethylene); D030 (2,4-dinitrotoluene); D032 (hexachlorobenzene); D033 (hexachlorobutadiene); D034 (hexachloroethane); D037 (pentachlorophenol); and D043 (vinyl chloride).[1, 7, 8, 9, 40, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

The RCRA toxicity characteristic metal HWNs: D004 (arsenic), D005 (barium), D006 (cadmium), D007 (chromium), D008 (lead), D009 (mercury), D010 (selenium), and D011 (silver) are associated with AE, BC, MD, RF, INL, and SD feedstock for the BN650 waste stream. [1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76] The HWNs D004, D005, D006, D007, D008, D009, D010, and D011 are assigned to the BN650 waste stream.

The HWN D022 (chloroform) is associated with RF, INL, and SD feedstock to the BN650 waste stream. [1, 7, 52, 53, 63, 70, 71, 74, 76] The HWN D022 is assigned to the BN650 waste stream.

The HWNs D027 (1,4-dichlorobenzene); D028 (1,2-dichloroethane); D029 (1,1-dichloroethylene); and D030 (2,4–dinitrotoluene) are associated with AE, INL, RF, and SD feedstock to the BN650 waste stream. [1, 7, 41, 52, 53, 68, 71, 74, 76] The HWNs D027, D028, D029 and D030 are assigned to the BN650 waste stream.

The HWNs D032 (hexachlorobenzene) and D034 (hexachloroethane) are associated with INL, RF, and SD feedstock to the BN650 waste stream. [1, 7, 52, 53, 66, 71, 74, 76] The HWNs D032 and D034 are assigned to the BN650 waste stream.

The HWN D033 (hexachlorobutadiene) is associated with INL and SD feedstock to the BN650 waste stream. [1, 52, 53, 76] The HWN D033 is assigned to the BN650 waste stream.

The HWN D037 (pentachlorophenol) is associated with AE, INL, RF, and SD feedstock to the BN650 waste stream. [1, 7, 41, 52, 53, 71, 74, 76] The HWN D037 is assigned to the BN650 waste stream.

The HWN D043 (vinyl chloride) was associated with INL, RF, and SD feedstock to the BN650 waste stream. [1, 7, 52, 53, 76] The HWN D043 is assigned to the BN650 waste stream.

F-Listed HWNs

The homogenous solids in the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream contain constituents associated with RCRA-listed waste HWNs. See Table 4a for generator-specific HWNs associated with this waste stream. [1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

The following F-listed HWNs and hazardous waste constituents are assigned to the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream: [1, 7, 8, 9, 40, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

F001 spent solvent constituents include: 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, trichlorofluoroethylene, and trichlorofluoromethane. These HWN/constituents were assigned based on AK documentation associated with one or more of the following generators: RF, SD, BC, MD, and/or INL. [1, 7, 8, 9, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76] Therefore, the BN650 waste stream is assigned the EPA HWN F001.

F002 spent solvent constituents incude: 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, o-(1,2)-dichlorobenzene, chlorobenzene, methylene chloride, tetrachloroethylene, trichloroethylene, and trichlorofluoromethane. These HWN/constituents were assigned based on AK documentation associated with one or more of the following generators: RF, SD, BC, AE, MD, and/or INL.[1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76] Therefore, the BN650 waste stream is assigned the EPA HWN F002.

Non-halogenated F003 spent solvent constituents include: acetone, n-butyl alcohol (1-butanol), ethanol, ethyl acetate, ethyl benzene, ethyl ether, methanol, methyl isobutyl ketone, and xylene. These HWN/constituents were identified based on AK documentation associated with one or more of the following sources: RF, SD, BC, AE, MD, and/or INL.[1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76] The BN650 waste stream does not exhibit the characteristic of ignitability. Therefore the F003 HWN is not assigned to the BN650 waste stream.

The HWN F004 spent solvent constituents include cresols and nitrobenzene. These HWN/constituents were assigned based on AK documentation associated with AE, INL, and SD AK records. Therefore, the BN650 stream is assigned the EPA HWN F004. [1, 7, 41, 52, 53]

The HWN F005 spent solvent constituents include: benzene, carbon disulfide, isobutanol, 2-ethoxyethanol, MEK, 2-nitropropane, pyridine, and toluene. These HWN/constituents were

assigned based on AK documentation associated with one or more of the following sources: RF, SD, BC, AE, MD, and/or INL. Therefore, the BN650 waste stream is assigned the EPA HWN F005. [1, 7, 8, 9, 41, 52, 53, 63, 66, 68, 69, 70, 71, 74, 76]

The HWNs F006, F007 and F009 were assigned based on AK documentation associated with RF, SD, and INL AK documentation. Therefore, the BN650 waste stream is assigned the F006, F007, and F009 EPA HWNs. [1, 7, 52, 53, 63, 66, 68, 70, 76]

P-, U- and K- Listed HWNs

The wastes associated with INL INTEC and RWMC laboratory operations are assigned the following P- and U-listed HWNs: P030 (cyanide), P098 (potassium cyanide), P099 (potassium silver cyanide), P106 (sodium cyanide), U003 (acetonitrile), U103 (dimethyl sulfate), U108 (1,4-dioxane), U134 (hydrofluoric acid), and U151 (mercury) as a result of conducting analysis on P- and U-listed waste sources or as a result of coming into contact with source samples with the same HWNs.(1, 53) In addition, AMWTP cannot rule out the presence of empty containers previously holding unused product in INL waste, and the potential for trace amounts of unused product that may have been discarded and placed into containers of INL waste. [53] Therefore, the HWNs P030, P098, P099, P106, U003, U103, U108, U134, and U151 are assigned to the BN650 waste stream. The P- and U-listed wastes listed above were not disposed of or transferred to AMWTP in liquid form. [53]

Based on a review of available AK and the repack project process, it was determined that the homogenous solids in the BN650 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, 7, 8, 9, 41, 52, 53, 63, 67, 68, 69, 70, 71, 74, 76]

AK and solid sampling data from Rocky Flats Waste Stream Profile Form RF107.01 and AMWTP RPT-TRUW-15, Acceptable Knowledge Summary for Building 374 Sludge (BNINW218) suggest that beryllium may exceed 1 percent by weight for containers of IDC RF-800. Therefore, in accordance with the WIPP transportation requirements, drums containing repackaged solidified sludge (IDC RF-800) waste will be limited to 100 fissile gram equivalents (FGE) per payload container and 100 FGE per payload package. [65, 66, 76]

The waste materials within the BN650 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 the BN650 waste stream are not assigned K-listed HWNs. [1, 7, 8, 9, 41, 52, 53, 63, 66, 67, 68, 69, 70, 71, 74, 76]

Toxic Substances Control Act (TSCA) Regulated Contaminants

The BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream may contain greater than 50 ppm PCBs and is regulated as a Toxic Substances Control Act (TSCA) waste under 40 CFR 761, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions*.[88] Potential sources of PCBs consist of organic setups (IDC RF-003 or RF-743 series sludge and organic setups in SD-176) repackaged in the SRP. Newly packaged drums in the BN650 waste stream determined by VE to contain any amount of organic setups waste (IDC RF-003 or RF-743 series sludge as RF or as SD-176) are managed as a TSCA waste under 40 CFR 761 and in accordance with the PCB disposal requirements in the WIPP-WAC. [7, 38, 52, 61, 71, 76]

1.7.3 Other Applicable Waste Streams

Various waste forms (WF) have been evaluated and profiled by the Rocky Flats Environmental Technology Site (RFETS) that include comparable IDCs included within the BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream.

The following similar waste streams were profiled by the RFETS:

1. RFETS Waste Form (WF) No. 61 (WF61), Sewer Sludge. RFETS Sewer Sludge would be applicable to all AMWP legacy sewer sludge. No HWNs were assigned by RFETS.[16, 54, 55]

2. RFETS WF18 (used absorbents) are similar to the AMWTP legacy Oil Dri wastes. The RFETS used absorbents were assigned the following HWNs: D001, D006, D007, D008, D009, D010, D011, D018, F001, F002, F004, F005, F006, F007, and F009.[16, 54, 55] HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream.

3. RMRS-WIPP-98-100, Section 7.3, TRM Incinerator Ash (D004-D011, F001, F002, F005) Profile No. RF118.01, Rev. 14, assigned the following HWNs: D004, D005, D006, D007, D008, D009, D010, D011, F001, F002, and F005. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. [74]

4. RMRS-WIPP-98-100, Section 6.15, TRU Resin, Profile No. RF031.01, Rev. 2, assigned no HWNs to resin wastes. [72]

5. RFETS WF46 (particulate sludge) assigned the following HWNs: D003, D006, D007, D008, F001, F002, F005, and F007 to Cemented Miscellaneous Sludge. [16, 54, 55] The above HWNs would also be applicable to AMWTP legacy Cemented Miscellaneous Sludge. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream.

6. RMRS-WIPP-98-100, Section 7.31, TRM Wastewater Treatment Sludge, Profile No. RF139.01; assigned the following HWNs: D004, D005, D009, D010, F001, F002, F005, F006, F007, and F009. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (64)

7. RMRS-WIPP-98-100, Section 7.24, TRM Solidified Inorganic Waste (D006, D007, D008, D009, D011), Profile No. RF107.01, Rev. 3; assigned the following HWNs: D006, D007, D008, D009, and D011. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (65)

8. RMRS-WIPP-98-100, Section 7.26, TRM Inorganic Solids (D006, D007, D008, D009), Profile No. RF123.03, Rev 2; assigned the following HWNs: D006, D007, D008, and D009. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

9. RMRS-WIPP-98-100, Section 7.27, TRM Soldified Organic Waste (D022, D028, D029, D030, D032, D034, F001, F002, F005), Profile No. RF107.04, Rev 1; assigned the following HWNs: D022, D028, D029, D030, D032, D034, F001, F002, and F005. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

10. RMRS-WIPP-98-100, Section 7.28, TRM Soldified Inorganic Waste (F001, F002, F005, F006, F007, F009), Profile No. RF107.03, Rev 4; assigned the following HWNs: F001, F002, F005, F006, F007, and F009. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

11. RMRS-WIPP-98-100, Section 7.8, TRM Solidified Inorganic Waste (D006, D007, D008, D009, D011), Profile No. RF107.01; assigned the following HWNs: D006, D007, D008, D009, and D011. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

12. RMRS-WIPP-98-100, Section 6.14, TRU Sand, Slag, and Crucible Heel, Profile No. RF033.01, Rev. 17; assigned no HWNs. (73)

13. RMRS-WIPP-98-100, Section 7.33, TRM Inorganic Sludge (D006, D007, D008, D009, F001, F002, F005), Profile No. RF122.01, Rev 0; assigned the following HWNs: D006, D007, D008, D009, F001, F002, and F005. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

14. RMRS-WIPP-98-100, Section 7.36, TRM Inorganic Sludge (D006, D007, D008, D009, D011, F001, F002, F005, F006, F007, F009), Profile No. RF122.05, Rev 1; assigned the following HWNs: D006, D007, D008, D009, D011, F001, F002, F005, F006, F007, and F009. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

15. RMRS-WIPP-98-100, Section 7.37, TRM Incinerator Sludge (D004, D005, D006, D007, D008, D009, D010, D011, F001, F002, F005) Profile No. RF119.01, Rev. 0, assigned the following HWNs: D004, D005, D006, D007, D008, D009, D010, D011, F001, F002, and F005. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

16. RMRS-WIPP-98-100, Section 7.47, TRM Soldified Organic Waste (D022, D026, D027, D029, D030, D032, D034, D036, D037, F001, F002), Profile No. RF135.01, Rev 0; assigned the following HWNs: D022, D026, D027, D029, D030, D032, D034, D036, D037, F001, and F002. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

17. RMRS-WIPP-98-100, Section 7.49, TRM Absorbed Liquids (D007, D010, F005), Profile No. RF113.01, Rev 0; assigned the following HWNs: D007, D010, and F005. HWNs assigned by RFETS are a subset of the HWNs assigned to the BN650 waste stream. (73)

The AMWTP has profiled the following RFP and MD S3000 waste streams to WIPP (see Table 1. IDCs included in approved waste stream profiles):

1. BNINW216 First/Second Stage Sludge: The HWNs assigned to First/Second Stage Sludge includes: D004, D005, D006, D007, D008, D009, D010, D011, D022, F001, F002, F003, F005, F006, F007, and F009. The HWNs assigned to this waste stream are included in the HWNs assigned to the BN650 waste stream.(63)

2. BNINW218 Building 374 sludge: The HWNs assigned to Building 374 sludge includes: D006, D007, D008, D009, D010, D011, D032, F001, F002, F003, F005, F006, F007, and F009. The HWNs assigned to this waste stream are included in the HWNs assigned to the BN650 waste stream.(66)

3. BN004 Special setups waste: The HWNs assigned to Special setups waste includes: D006, D007, D008, D011, D029, F001, F002, F005, F006, F007, and F009. (68) HWNs assigned to this waste stream are included in the HWNs assigned to the BN650 waste stream.

4. MD-835, Solidified Acid/Caustic Wastes: The HWNs assigned to Solidified Acid/Caustic Wastes includes: D007, D008, D009, F001 and F002. The HWNs assigned to this waste stream are included in the HWNs assigned to the BN650 waste stream.(67)

5. MD-836, Cemented Sludge. The HWNs assigned Cemented Sludge Wastes includes: D004, D005, D006, D007, D008, D009, D010, D011, F001, F002 and F005. The HWNs assigned to this waste stream are included in the HWNs assigned to the BN650 waste stream. (69)

6. BN222, Solidified Plutonium Recovery Incinerator Waste: The HWNs assigned Solidified Plutonium Recovery Incinerator Waste includes: D004, D005, D006, D007, D008, D009, D010, D011, D022, F001, F002, F005, F006, F007 and F009. The HWNs assigned to this waste stream are included in the HWNs assigned to the BN650 waste stream.[70]

In addition to the above, the CCP has also profiled the following waste streams (see Table 1. IDCs included in approved waste stream profiles):

1. ID-RF-S3114, Organic Setups, CCP-AK-INL-005. The HWNs assigned to organic setups includes: D022, D026, D027, D028, D029, D030, D032, D034, D036, D037, F001, F002 and F005. HWNs assigned by CCP are included in the HWNs assigned to the BN650 waste stream. [71]
2. ID-RF-3150-A, Organic and Sludge Immobilization System Waste, CCP-AK-INL-005. The HWNs assigned to this waste stream includes: D022, D028, D029, D030, D032, D034, D036, D043, F001, F002 and F005. HWNs assigned by CCP are included in the HWNs assigned to the BN650 waste stream. [74]
3. ID-AECHHM, CCP-AK-INL-025, Central Characterization Project Acceptable Knowledge Summary Report For Idaho National Laboratory, Argonne Contact-Handled Transuranic Waste from Facility Maintenance and Laboratory Operations. The HWNs assigned to ID-AECHHM waste include: D004, D005, D006, D007, D008, D009, D010, D011, D019, D027, D028, D030, D037, F002, F004, and F005. HWNs assigned by CCP are included in the HWNs assigned to the BN650 waste stream.[56]
4. ID-SDA-SLUDGE, CCP-AK-INL-001, Central Characterization Project Acceptable Knowledge Summary Report for Waste Retrieved from Designated Areas within the Subsurface Disposal Area at the Idaho National Laboratory. The HWNs assigned to the ID-SDA-SLUDGE waste includes: D004, D005, D006, D007, D008, D009, D010, D011, D022, D027, D028, D029, D030, D032, D033, D034, D037, D038, D043, F001, F002, F004, F005, F006, F007, F009, P098 and P106. With the exclusion of the P-listed HWNs assigned due to the unused cyanide in the designated SDA areas, the HWNs assigned by CCP are included in the HWNs assigned to the BN650 waste stream. P-listed HWNs associated with the INL Advanced Retrieval Project are not applicable to the Pre-1980, INL-Exhumed SDA Homogeneous Solids (i.e., SD-176). There is no supporting AK that unused cyanide pellets are included in the AMWTP TSA inventory.[57]
5. ID-SRP-S3000, CCP-AK-INL-026, Central Characterization Project Acceptable Knowledge Summary Report for Idaho National Laboratory Sludge Repackage Project Combined Sludge Waste. The HWNs assigned to Waste Retrieved from Designated Areas within the Subsurface Disposal Area includes: D004, D005, D006, D007, D008, D009, D010, D011, D022, D026, D027, D028, D029, D030,

D032, D034, D036, D037, F001, F002, F005, F006, F007, and F009. HWNs assigned by CCP are included in the HWNs assigned to the BN650 waste stream.[76]

6. CCP-AK-INL-002, Central Characterization Project Acceptable Knowledge Summary Report for the Idaho National Laboratory, Rocky Flats Transuranic Graphite Debris Waste Stream ID-RF-S5126, Revision 4, April 19, 2007. The HWNs assigned are D008, D029, F001 and F002. HWNs assigned by CCP are included in the HWNs assigned to the BN650 waste stream. [17]

1.8 Radionuclides

The radionuclides of concern for BN650 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, may be detected during non-destructive assay (NDA). Cesium-137 and ^{90}Sr were identified as potentially present in MD, BC, and AE. [7, 8, 9, 14, 41, 53, 60]

At a minimum, the ratios of the two most prevalent radionuclides in the isotopic mix are compared to confirm existing AK data in compliance with CH-WAC requirements. The two most prevalent radionuclides expected in the majority of waste stream are ^{239}Pu and ^{240}Pu. However, the prevalent radioisotopes in some containers of waste may be a combination of ^{239}Pu and a different second TRU or uranium isotope due to commingling of wastes.

Table 5 identifies the predominant radionuclides and the principle source of those radionuclides for each of the originating facilities.[7, 8, 9, 14, 53, 73] For waste containers that have multiple generators and therefore a mixture of weapons grade plutonium (WG Pu), enriched uranium (EU), depleted uranium (DU), heat source isotopes, and fuel grade plutonium, a combination of any two of the common isotopes identified may be detected as the most prevalent. Radioassay data are reviewed and assessed by AMWTP NDA personnel as described in the RPT-TRUW-03, Drum Assay Technical Review Report. [15]

The radioisotopic content for each BN650 AMWTP Combined Homogeneous Solids Repackage Project container is calculated based on RPT-TRUW-07. The BN650 containers will be characterized by non-destructive assay. [35]

TRU and MLLW waste will be utilized as feedstock to the BN650 waste stream. Each payload container shipped to WIPP will be certified in accordance with MP-TRUW-8.1 as containing more than 100 nCi/g of alpha-emitting isotopes with half-lives greater than 20 years. AMWTP will employ payload management practices in accordance with the WAC for waste stream BN650. 55-gallon drums with an IDC listed in Appendix A with at least one TRU radionuclide greater than the lower limit of detection (LLD) as determined by radioassay may be loaded into an SWB. The load management will ensure that each SWB will contain 55-gallon drums with at least one TRU radionuclide greater than the LLD and the SWB will comply with the required TAAC (greater than 100 nCi/g). [58, 87]

Table 5. Predominant radionuclides expected in BN650 AMWTP Combined Homogeneous Solids Repackage Project waste stream by contributing generator site.

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

2.0 SHIPPING CONSIDERATIONS

2.1 Waste Packaging

The following provides packaging information for BN650 AMWTP Combined Homogeneous Solids Repackage Project. Waste packaging for BN650 waste is conducted in accordance with existing AMWTP procedures. The completed package is assigned the IDC of BN-651, SRP Combined Homogeneous Solids.

2.1.1 BN-651 Waste Packaging

Waste repackaged in the SRP is placed directly in prepared 55-gallon drums. Prepared drums are lined with a rigid liner and a filtered drum bag. After loading, the drum bags are twisted and taped closed and the drums closed with filtered drum lids. [76, 85 86]

2.1.1.1 Filter Vents

Rigid liner lids are not included in the packaging configuration for SRP combined homogeneous solids. Drum liner bags and 55-gallon drum lids are filtered. [76, 85 86]

2.1.1.2 Layers of Confinement

Repackaged drums from the SRP will have a rigid liner without a lid and one layer of confinement consisting of a filtered liner bag. [76, 85 86]

2.1.2 Standard Waste Box Direct Loading

All SWBs loaded with 55-gallon drums are packaged and managed according to INST-OI-65. Only containers that have been previously vented can be overpakced ito an SWB. Filter type and number are installed according to operating procedures. Four 55-gallon drums are placed into the SWB, including dunnage. [58]

2.2 Flammability Consideration

The payload containers in the BN650 AMWTP Combined Homogeneous Solids Repackage Project 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

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

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7. RPT-TRUW-56, Acceptable Knowledge Document for INL Stored Transuranic Waste – Rocky Flats Plant, current revision.

8. RPT-TRUW-13, Acceptable Knowledge Document for INL Stored Transuranic Waste – Mound Plant Waste, current revision.

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14. RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge, current revision.

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31. INST-OI-34, Non-Facility Visual Examination Operations, current revision.

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63. BNINW216 First/Second Stage Sludge Waste Stream Profile Package, Rev. 1, September 17, 2004, Change Notice #1, February 2, 2005, Change Notice #2, January 24, 2007, Change Notice #3, April 2, 2008 and Change Notice #4, August 6, 2010, Advanced Mixed Waste Treatment Project. [P402A]

64. RMRS-WIPP-98-100, RFETS Acceptable Knowledge TRU/TRM Waste Stream Summaries, Section 7.31, TRM Wastewater Treatment Sludge, Profile No. RF139.01, Revision 1, September, 16, 2004. [P432A]

65. RMRS-WIPP-98-100, RFETS Acceptable Knowledge TRU/TRM Waste Stream Summaries, Section 7.24, TRM Solidified Inorganic Waste (D006, D007, D008, D009, D011), Profile No. RF107.01. [P431A]

66. BNINW218 Building 374 Sludge Waste Stream Profile Package, Rev. 1 September 17, 2004, Change Notice #1, February 2, 2005, Change Notice #2, June 14, 2007 and Change Notice # 3, April 2, 2008, Advanced Mixed Waste Treatment Project. [P420A]

67. BN835 Solidified Acid/Caustic Waste Stream Profile Package, Change Notice #1, and Change Notice #2, April 7, 2005, Advanced Mixed Waste Treatment Project. [P437A]

68. BN004 Special Setups Waste Stream Profile Package, December 28, 2005; Change Notice #1, February 15, 2007; Change Notice #2, April 2, 2008; and Change Notice #3, August 5, 2010, Advanced Mixed Waste Treatment Project. [P609A]

69. BN836 Cemented Sludge Waste Stream Profile Package, April 28, 2006, Change Notice #1, January 24, 2007 Change Notice #2, April 2, 2008, Advanced Mixed Waste Treatment Project. [P646A]

70. Waste Stream Profile Package for Solidified Plutonium Recovery Incinerator Waste (BN222), January 29/2020, Advanced Mixed Waste Treatment Project. [P841A]

71. Central Characterization Project Waste Stream Profile Form; Waste Stream Profile Number ID-RF-S3114; Barbara Broomfield; November 1, 2009, Rev 1, Central Characterization Project. [P666A]

72. RMRS-WIPP-98-100, RFETS Acceptable Knowledge TRU/TRM Waste Stream Summaries. RMRS-WIPP-98-100, Section 6.15, TRU Resin Wastes (No HWNs), Profile No. RF031.01, Rev 2. June 14, 2004. Rocky Flats Environmental Technology Site. [P460A]

73. RMRS-WIPP-98-100, RFETS Acceptable Knowledge TRU/TRM Waste Stream Summaries, Revision 116, April 21, 2005. [P435S]

74. Central Characterization Project Waste Stream Profile Form; Waste Stream profile Number ID-RF-S3150-A, Barbara Broomfield; November 15th, 2006, Rev 0, Central Characterization Project. [P665A]

75. Material Safety Data Sheet for Oil Dri Floor Absorbent, Oil-Dri Corporation of America, July 21, 1988 [P426A]

76. CCP-AK-INL-026, CCP AK Summary Report for INL Sludge Repackage Project, current revision. [P2034]

77. INST-OI-91, Drum Re-Overpacking Facility Operations [P1117A]

78. INST-FOI-39, Processing Sludge Drums in the South Box Line [P2031] (Suspended)

79. EDF-0826, Criticality Analysis Involving the Use of Liquid Sorbents and Immobilizing Agents, November 24, 2014. (replaced RPT-NFCS-09)

80. MP-TRUW-8.40, INL Waste Acceptance and Transfers, current revision.

81. MP-TRUW-8.41, Offsite Waste Acceptance, current revision.

82. EPA Docket No. A-98-49: II-A4-169, Waste Characterization Tier 1 Change Report, Addition of Contact-Handled Transuranic Waste to The Advanced Mixed Waste Treatment Project Approved Program: S3000 and S5000 Waste from Argonne National Laboratory-East and S5000 Waste from Idaho National Laboratory Materials and Fuels Complex, U.S. EPA, January 20, 2013. [C1284A]

83. EPA Docket No. A-98-49; II-A4-174, Waste characterization Tier 1 Change Report: Addition of Contact-Handled Transuranic Waste to the Advanced Mixed Waste Treatment Project Approved Program: Pre-1980 INL-Exhumed Subsurface Disposal Area Summary Category Group S3000 and S5000 Waste, United States Environmental Protection Agency, May 01, 2013. [C1306A]

84. EPA Docket No. A-98-49; II-A4-180, Waste characterization Tier 1 Change Report: Addition of Contact-Handled Transuranic Waste to the Advanced Mixed Waste Treatment Project Approved Program: S3000 and S5000 Waste from Idaho National Laboratory, United States Environmental Protection Agency, February 11, 2014. [P2064S]

85. TPR-7866, SRP DPS Waste Packaging, current revision. [P2158S]

86. TPR-7867, SRP RA V Waste Processing, current revision. [P2156S]

87. MP-TRUW-8.11, Data Reconciliation, current revision.

88. 40 CFR 761, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions,* current revision.

Appendix A
BN650 AMWTP Combined Homogeneous Solids Repackage Project Feedstock Waste Generators and IDCs

The following Table lists the wastes that are included in the BN650 AMWTP Combined Homogeneous Solids Repackage Project Waste Stream. [7, 8, 9, 41, 52, 53, 54, 55, 63, 66, 67, 68, 69, 70, 71, 74, 76]

Table A-1: Generator site, IDC numeric code, IDC description, waste description and constituents for homogenous solids included in the BN650 AMWTP Combined Homogeneous Solids Repackage Project.

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
AE	102	Absorbed Liquids	Various organic and inorganic absorbed liquids and homogeneous solids from multiple ANL-E buildings. Wastes include but are not limited to: precipitates, oils, ether-based scintillation fluids, decontamination liquids, ion exchange resins, evaporator residues and may include absorbed photographic solutions and other solid or semisolid materials. Liquid wastes were neutralized with the addition of NaOH, and absorbed onto vermiculite or Oil-Dri. The waste may contain Portland cement and may also contain <50% by volume heterogeneous debris waste.	1,1-dichlorethylene
				1,2-dichloroethane
				1,4-dichlorobenzene
				1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				2-4-dinitrotoluene
				acetone
				arsenic
				barium
				benzene
				cadmium
				carbon tetrachloride
				carbon disulfide
				chlorobenzene
				chromium
				ethyl acetate
				ethyl benzene
				ethyl ether
				isobutanol
				lead
				mercury
				methanol
				methyl ethyl ketone (2-butanone)
				methyl isobutyl ketone
				methylene chloride

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				n-butyl alcohol
				nitrates
				nitrobenzene
				pentachlorophenol
				petroleum ether/Naptha
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
AE	105	Empty Bottles and Absorbent	Waste consists of empty polyethylene and glass bottles used to transport liquid waste. Absorbents (vermiculite) were added to the bottles. The waste may also contain <50% by volume heterogeneous debris waste.	See IDC AE-102 for constituents
AE	111	Solidified Wet Sludge	Various organic and inorganic absorbed liquids and homogeneous solids from multiple ANL-E buildings. Wastes include but are not limited to: precipitates, oils, ether-based scintillation fluids, decontamination liquids, ion exchange resins, evaporator residues and may include absorbed photographic solutions and other solid or semisolid materials. Liquid wastes were neutralized with the addition of NaOH, and absorbed onto vermiculite or Oil-Dri. The waste may contain Portland cement and may also contain <50% by volume heterogeneous debris waste	See IDC AE-102 for constituents
AE	121	TRU Organic Solid Waste	Various organic and inorganic absorbed liquids and homogeneous solids from multiple ANL-E buildings. Wastes include but are not limited to: precipitates, oils, ether-based scintillation fluids, decontamination liquids, ion exchange resins, evaporator residues and may include absorbed photographic solutions and other solid or semisolid materials. Liquid wastes were neutralized with the addition of NaOH, and absorbed onto vermiculite or Oil-Dri. The waste may contain Portland cement and may also contain <50% by volume heterogeneous debris waste.	See IDC AE-102 for constituents
BC	204	Solidified Solutions	Solidified solutions from washing gloveboxes. Approximately 30 gallons of water with Turco soap was mixed with 250 pounds of plaster of paris and allowed to cure in the drum.	lead
				acetone
				alcohol (unspecified)
				barium

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				cadmium
				chromium
				mercury
				silver
				benzene
				methanol
				n-butyl alcohol (butanol)
				ethanol
				hexane
				various acids (H_2S0_4, HNO_2, HCL)
				hydrofluoric acid (used)
				ethyl benzene
				lithium metal
				methyl ethyl ketone (2-butanone)
				sodium (metal and sodium potassium)
				trichloroethylene
				methylene chloride
				toluene
				xylene
IC	603	Laboratory Homogenous Solids Waste	The waste is comprised of analytical liquids (e.g., extraction liquids) that have been absorbed or solidified with Imbiber Beads, Spill-X-A, or –C, or clay-based absorbents (e.g., vermiculite, Oil-Dri). After 1990, Acid Bond A660 may have been used as an absorbent and, after 1996 Nochar N965 may have been used. These liquids were generated during analysis of TRU waste samples. The waste may contain sample residues (leached solids remaining after extraction) and returned unused sample material. It may also contain <50% by volume debris items (e.g., vials). This waste was generated at the analytical laboratory located at INTEC.	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,1,2-trichloroethane
				1,1,2,2-tetrachloro-1,2-difluoroethane
				1,1-dichlorethylene
				1,2-dichlorobenzene
				1,2-dichloroethane
				1,4 dichlorobenzene
				1,4-diethyleneoxide
				2,4-dinitrotoluene
				2-ethoxyethanol
				2-nitropropane
				acetonitrile
				arsenic (various compounds)
				barium (various compounds)
				benzene
				cadmium (various compounds)
				carbon disulfide

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				carbon tetrachloride
				chlorobenzene
				chloroform (trichloromethane)
				chromium (various compounds)
				cresols
				cresylic acid
				cyanides (soluble cyanide salts) not otherwise specified
				dimethyl sulfate
				hexachlorobenzene
				hexachlorobutadiene
				hexachloroethane
				hydrofluoric acid
				isobutanol
				lead (various compounds)
				mercury (various compounds)
				methyl ethyl ketone (2-butanone)
				methylene chloride
				nitrobenzene
				pentachlorophenol
				potassium cyanide
				potassium silver cyanide
				pyridine
				selenium (various compounds)
				Silver (various compounds)
				sodium cyanide
				spent cyanide plating bath solutions from electroplating operations
				spent stripping and cleaning bath solutions from electroplating operations
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				trichlorofluoroethylene
				trichlorofluoromethane
				vinyl chloride
				wastewater treatment sludges from electroplating operations
IC	606	CWI CH Homogeneous Solids from Re-Packaging AMWTP RH Debris—WIPP	The waste consists of absorbed liquids generated during the repackaging of AMWTP RH debris at INTEC. The AMWTP RH debris had one of the following IDCs: AE-100, AE-104, AW-150, BN-508, IC-157, ID-150,	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,1,2-trichloroethane
				1,1,2,2-tetrachloro-1,2-difluoroethane

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
		Approved IDCS	ID-154, IR-154, IR-157, IW-157, RF-336, RF-337, RF-376, or RF-391. Absorbents may include any absorbent approved by AMWTP in EDF-0826, plus Nochar N965. The waste may include additional material such as a lift bag and sling. The waste may also include <50% by volume heterogeneous debris.	1,1-dichlorethylene
				1,2-dichlorobenzene
				1,2-dichloroethane
				1,4 dichlorobenzene
				2,4-dinitrotoluene
				2-ethoxyethanol
				2-nitropropane
				arsenic (various compounds)
				barium (various compounds)
				benzene
				cadmium (various compounds)
				carbon disulfide
				carbon tetrachloride
				chlorobenzene
				chloroform (trichloromethane)
				chromium (various compounds)
				cresols
				cresylic acid
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				hexachlorobenzene
				hexachloroethane
				isobutanol
				lead (various compounds)
				mercury (various compounds)
				methyl ethyl ketone (2-butanone)
				methylene chloride
				nitrobenzene
				pentachlorophenol
				pyridine
				selenium (various compounds)
				silver (various compounds)
				toluene
				trichloroethylene (TCE)
				trichlorofluoroethylene
				trichlorofluoromethane
				vinyl chloride
				wastewater treatment sludges from electroplating operations

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
MD	811	Evaporator and Dissolver Sludge	Dry evaporator and dissolver sludge in the form of powder or sand-like particles. Waste may also contain <50% by volume debris (metal, glass, filters, graphite, rust, floor sweepings, plastic, combustible, etc.). Waste may also contain small containers of mercury (see Special Notes for MD-832, Contaminated Elemental Mercury).	See MD-834.
MD	834	High Level Acid	Acidic liquid wastes from Pu recovery processing. Acidic liquids were absorbed in clay material (Florco absorbent) between July 1975 and December 1976. Prior to July 1975, diatomaceous earth (Auto-Dri and/or Dri-Rite) was used but drums were subsequently repackaged and Florco added at Mound prior to shipping to INL. After 1976, caustic waste was combined with the acidic waste for processing as IDC MD-835. A limited number of drums of acidic and caustic liquid wastes were absorbed with Florco and packaged in small bottles prior to 1982.	nitrates potential corrosives if liquids exceed the WIPP-WAC limit 1,1,1-trichloroethane (TCA) asbestos acetone beryllium (not beryllium powder) chromium lead mercury methanol carbon tetrachloride trichloroethylene (TCE) xylene
MD	835	High Level Caustic	Caustic liquid wastes from fume scrubber system. Caustic waste was absorbed in aluminum-magnesium-iron silicate clay (Florco). Since 1976, acidic waste was combined with the caustic waste.	potential corrosives if liquids exceed the WIPP-WAC limit 1,1,1-trichloroethane (TCA) chromium asbestos acetone beryllium (not beryllium powder) lead mercury methanol nitrates carbon tetrachloride trichloroethylene (TCE) xylene
MD	836	High Level Sludge/Cement	Cemented sludge (sometimes called solidified sludge/liquid) generated from processing all low-level, alpha contaminated liquids wastes (shower water and soap, decontamination water, cooling water, some acids and caustics, etc.) from building floor drains, laundry, and labs. Waste generated by mixing approximately 40 gallons of dewatered sludge with	1,1,1-trichloroethane (TCA) 1,1,2-trichloro-1,2,2-trifluoroethane acetone arsenic barium benzene

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
			2 to 2-1/2 bags of Portland cement resulting in a solidified waste.	beryllium (not beryllium powder)
				cadmium
				carbon disulfide
				carbon tetrachloride
				chromium
				lead
				mercury
				methanol
				methylene chloride
				methyl ethyl ketone
				potential corrosives if liquids exceed the WIPP-WAC limit
				nitrates
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	001, 741	First Stage Sludge	Inorganic sludge generated in Building 774 from the precipitation of process aqueous liquids. After 1979, waste consisted of combined first and second stage sludge. Up to 50 pounds Portland cement added to drum (primarily at bottom of drum, rigid liner, and/or drum bags) to absorb liquids. After 1982, cement added at top of sludge prior to sealing O-ring drum bag. Waste may also contain <50% by volume cellulosic, plastic, rubber and metal debris items (e.g., surgeon's gloves, glovebox gloves, leaded rubber aprons, filters, plastic tubing, and bolts).	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,1,2,2-trichloroethane
				1-butanol
				acetone
				arsenic
				barium
				benzene
				beryllium (not beryllium powder)
				cadmium
				carbon tetrachloride
				chlorobenzene
				chloroform (trichloromethane)
				chromium
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				ethyl benzene
				ethyl ether
				lead

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				mercury
				methanol
				methylene chloride
				nitrate
				potential corrosives if liquids exceed the WIPP-WAC limit
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	002, 742	Second Stage Sludge	Inorganic sludge generated in Building 774 from precipitation of liquid effluent from First Stage Treatment, and aqueous liquid waste from all process areas at RF. Up to 50 pounds Portland cement was added in layers as sludge was placed in the drum, as well as inside poly drum bag to absorb liquids. Drums packaged prior to 1973 may also contain <50% by volume other waste including debris items (e.g., electric motors, batteries) and bottles of liquid chemical waste or mercury.	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,1,2,2-trichloroethane
				1-butanol
				acetone
				arsenic
				barium
				benzene
				beryllium (not beryllium powder)
				cadmium
				carbon tetrachloride
				chlorobenzene
				chloroform (trichloromethane)
				chromium
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				ethyl benzene
				ethyl ether
				lead
				lithium (discharged batteries)
				mercury
				methanol
				methylene chloride
				nitrate
				potential corrosives if liquids exceed the WIPP-WAC limit
				selenium

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	003, 743	Organic Setups. Oil Solids	Organic sludge-like waste generated in Building 774 Grease Plant by mixing solvent and oils from machining operations with Micro-Cel E (i.e., synthetic calcium silicate) and small quantities of Oil-Dri. Up to 20 pounds Oil-Dri was added at the top and/or bottom of the drum, rigid liner, and/or drum bags.	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,1-dichloroethylene
				1,2-dichlorobenzene
				1,2-dichloroethane
				1,4-dichlorobenzene
				2-ethoxyethanol
				2,4-dinitrotoluene
				acetone
				benzene
				beryllium (not beryllium powder)
				butanol
				carbon disulfide
				carbon tetrachloride
				chloroform (trichloromethane)
				cresol
				ethyl benzene
				hexachlorobenzene
				hexachloroethane
				methanol
				methyl ethyl ketone (2-butanone)
				methylene chloride
				nitrobenzene
				nitrates
				pentachlorophenol
				polychlorinated-biphenyls (PCBs)
				pyridine
				tetrachloroethylene (perclene)
				trichlorofluoromethane
				toluene
				trichloroethylene (TCE)
				xylene
RF	004, 744	Special Setups	Solidified inorganic waste generated in Building 774 by	1,1,1-trichloroethane (TCA)

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
			mixing aqueous chemical liquid waste generated by various operations at RF with a cement mixture and adding up to 15 pounds of cement to the top of the sludge. Up to 20 pounds of cement was added to top and/or bottom of drum, rigid liner, and/or O-ring drum bag.	1,1,2-trichloro-1,2,2-trifluoroethane
				1,1-dichloroethylene
				1-butanol
				acetone
				benzene
				cadmium
				carbon tetrachloride
				chromium
				cyanide
				ethyl benzene
				ethyl ether
				lead
				methanol
				methylene chloride
				methyl ethyl ketone (2-butanone)
				nitrates
				silver
				toluene
				tetrachloroethylene (perclene)
				trichloroethylene (TCE)
				xylene
				electroplating sludges
				cyanide plating bath solutions
				cyanide cleaning bath solutions
RF	007	Building 374 Dry Sludge	Inorganic sludge generated in Building 374 in support of Pu recovery activities. This sludge was dried, or a moist sludge was mixed with cement or a cement and diatomaceous earth mixture. Oil-Dri, Vermiculite or other absorbents may be present in some drums. Waste may also contain <50% by volume plastic, rubber and metal debris items (e.g., leaded rubber gloves).	1,1,1-trichloroethane (TCA)
				1,1,2,2-tetrachloroethane
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,2-dichloroethylene
				1-butanol
				acetone
				benzene
				beryllium (not beryllium powder)
				1-butanol
				cadmium
				carbon tetrachloride
				chromium
				electroplating sludges

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				cyanide plating bath solutions
				cyanide cleaning bath solutions
				ethyl benzene
				hexachlorobenzene
				hexane
				lead
				mercury
				methanol
				methyl ethyl ketone (2-butanone)
				methyl isobutyl ketone
				methylene chloride
				potential corrosives if liquids exceed the WIPP-WAC limit
				selenium
				silver
				styrene
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	095, 749, 995	Sewer Sludge	Organic sludge from cleaning the stabilization ponds at the Building 995 sewage treatment plant. If sludge was wet, cement was added in layers as the sludge was placed into drum.	None
RF	290	Filter Sludge	Sludge is from the incinerator off-gas system or from filter plenums during a filter change, may also be from pumps	See RF-292
RF	292	Cemented Sludge	Incinerator sludge generated from the scrubber system. The sludge is a combination of fly ash and diatomaceous filter media. Portland cement was added as an absorbent for liquids in the sludge. Waste may also contain <50% by volume plastic debris items (e.g., filters).	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1-butanol
				acetone
				arsenic
				barium
				benzene
				beryllium (not beryllium powder)
				cadmium
				carbon disulfide
				carbon tetrachloride
				chloroform (trichloromethane)
				chromium

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				lead
				mercury
				methanol
				methylene chloride
				methyl ethyl ketone (2-butanone)
				potential corrosives if liquids exceed the WIPP-WAC limit
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	311	Graphite Heels	Heel remaining after graphite scarfings were dissolved in nitric acid to recover the Pu. The graphite heel was collected on an R-6 filter pad and dried.	nitrates
RF	361	Insulation Heels	Insoluble insulation residue or “heel” remaining after the dissolution process to dissolve Pu contaminants in acid for reprocessing. Generated from an R&D process.	1,1-dichloroethylene
				1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,2-dichloroethane
				1-butanol
				acetone
				arsenic
				asbestos
				barium
				benzene
				cadmium
				carbon disulfide
				carbon tetrachloride
				chloroform (trichloromethane)
				chromium
				cyanide
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				ethyl benzene

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				lead mercury methanol methyl ethyl ketone (2-butanone) methylene chloride nitrates potential corrosives if liquids exceed the WIPP WAC limit in waste packaged bef selenium silver tetrachloroethylene (perclene) toluene trichloroethylene (TCE) xylene
RF	375	Oil Dri	Oil-Dri, vermiculite, and includes Oil-Dri segregated from combustible feed to Plutonium Recovery Incinerator. Waste may also contain <50% by volume debris (e.g., rags, sorbent booms).	See RF-292
RF	393	Sand, Slag, and Crucible Heels	The spent MgO2 crucible, slag, and sand from the button break out and foundry areas were processed through the ball mill to make into a coffee ground consistency and then processed through dissolution to recover the Pu. The material that did not dissolve in the dissolution process is the sand, slag, and crucible (SS&C) heels. Waste may or may not contain absorbent. Waste may also contain <50% by volume plastic debris items.	calcium chromium methylene chloride nitrates
RF	420	Incinerator Ash (virgin)	Ash from incinerated combustibles at the Building 771 plutonium recovery incinerator. Ash was pulverized in a ball mill. Waste may also contain <50% by volume miscellaneous tramp metal and bits of unburned feed materials.	See RF-292.
RF	421	Ash Heel	Ash heels are the remaining ash from the dissolution process. Incinerator ash was dissolved in nitric acid to recover Pu. The ash that did not dissolve was collected on an R-6 filter pad and dried. This dried ash is the ash heel .	See RF-292.
RF	422	Soot	Soot is the waste collected from the cleaning of the plutonium recovery incinerator off-gas system.	See RF-292.
RF	425	Fluid Bed Ash	Fluid bed ash was generated from the combustion of combustible materials in the FBI pilot plant or the FBI demonstration unit.	chromium methanol

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				1,1,2-trichloro-1,2,2-trifluoroethane
				acetone
				benzene
				barium (not TCLP)
				cadmium (not TCLP)
				carbon tetrachloride
				lead (not TCLP)
				methyl ethyl ketone (2-butanone)
				methylene chloride
				tetrachloroethylene (perclene)
				trichloroethylene (TCE)
				toluene
				xylene
RF	432	Resin, leached and Cemented	Leached, spent anion and cation exchange resins cemented with Portland cement and water. One-half inch of dry Portland cement was added to the bottle before the slurry was added and on top of the hardened resin/cement mixture.	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				benzene
				chloroform (trichloromethane)
				1,2-dichloroethane
				chromium
				carbon tetrachloride
				ethyl benzene
				isopropanol
				lead
				methylene chloride
				nitrates
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	696	Cemented Incinerator Sludge	Cemented Incinerator Sludge was generated between 1985 and 1987. The incinerator sludge was immobilized with Portland cement and water into a 1-gallon polyethylene container mold and allowed to cure. The mold was removed and the solidified “puck” was placed in a 55-gallon drum. Waste may also contain <50% by volume plastic debris items (e.g., broken clamshells).	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1-butanol
				acetone
				arsenic
				barium
				benzene
				beryllium (not beryllium powder)
				cadmium

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				carbon disulfide
				carbon tetrachloride
				chloroform (trichloromethane)
				chromium
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				lead
				mercury
				methanol
				methyl ethyl ketone (2-butanone)
				methylene chloride
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	700	Oasis Waste	Solidified organic liquid generated in Building 774 Organic and Sludge Immobilization System (OASIS) prototype by mixing solvent and oils from machining operations with Envirostone and gypsum cement.	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,2-dichloroethane
				1,1-dichloroethylene
				2,4-dinitrotoluene
				2-ethoxyethanol
				acetone
				benzene
				carbon disulfide
				carbon tetrachloride
				chloroform (trichloromethane)
				chlorobenzene
				hexachlorobenzene
				hexachloroethane
				methanol
				methylene chloride
				methyl ethyl ketone (2-butanone)
				nitrobenzene
				tetrachloroethylene (perclene)
				trichloroethylene (TCE)

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				toluene
				vinyl chloride
				xylene
RF	746	Pits 11 & 12 903 Pad Oil Drums	Drums with container prefix 746 may include empty drums that previously contained oil and solvents stored on the 903 Pad at RFP. The drums were emptied and absorbent and Micro-Cel E (i.e., a synthetic calcium silicate) added at RFP prior to shipping the drums to INL. Some of these drums were placed in Pits 11 and 12 prior to October 1972 and subsequently retrieved from Pits 11 and 12. IDC RF-746 was created to designate those drums that were not adequately emptied and contain solvent/oil/absorbent/Micro-Cel E. Drums with container prefix 746 may also contain debris or soil.	See SD-176
RF	747	Pits 11 & 12 Miscellaneous Sludge	Drums of sludge generated at RFP prior to October 1972 with container prefixes other than 741 through 746 (e.g., prefixes 71, 771, 776, 777, or 871) that were retrieved from Pits 11 and 12. The sludge was generated in buildings other than Building 774 (e.g., Buildings 444, 447, 771, 776, 777, 881 and 883).	See RF-823
RF	800	First Stage Sludge - Cemented	Same as IDC RF-001 except for the immobilization process. For IDC RF-800, the sludge was co-fed into a drum with diatomite and Portland cement mixture that formed a solid monolith after curing. Waste may also contain <50% by volume cellulosic, plastic, and metal debris items (e.g., lead tape, filters).	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1-butanol
				acetone
				arsenic
				barium
				benzene
				beryllium (not beryllium powder)
				cadmium
				carbon tetrachloride
				chlorobenzene
				chloroform (trichloromethane)
				chromium
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				ethyl benzene
				ethyl ether

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				lead
				mercury
				methanol
				methylene chloride
				nitrate
				potential corrosives if liquids exceed the WIPP-WAC limit
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	801	Solidified Organics	Solidified organic liquid generated in Building 774 OASIS process by mixing solvent and oils from machining operations with Envirostone and gypsum cement. Waste may also contain <50% by volume metal debris items.	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,2-dichloroethane
				1,1-dichloroethylene
				2,4-dinitrotoluene
				acetone
				carbon tetrachloride
				benzene
				beryllium (not beryllium powder)
				carbon disulfide
				chloroform (trichloromethane)
				chlorobenzene
				hexachlorobenzene
				hexachloroethane
				methanol
				methylene chloride
				methyl ethyl ketone (2-butanone)
				nitrobenzene
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				vinyl chloride
				xylene
RF	802	Solidified Laboratory Waste	Waste is solidified inorganic waste generated in Building 774 after 1986 by mixing aqueous chemical liquid waste generated by various operations at RF with a cement	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1,1-dichloroethylene

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
			mixture.	benzene
				cadmium
				carbon tetrachloride
				chromium
				cyanide
				cyclohexane (if waste contains free liquids)
				ethyl benzene
				lead
				methanol
				methylene chloride
				methyl ethyl ketone (2-butanone)
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
RF	803	Solidified DCP Sludge	Wet sludge from Building 374 was dried and mixed with cement and water to form a monolith. Vermiculite may also be present in the waste.	1,1,1-trichloroethane (TCA)
				1,1,2,2-tetrachloroethane
				1,1,2-trichloro-1,2,2-trifluoroethane
				1-butanol
				acetone
				benzene
				beryllium (not beryllium powder)
				1-butanol
				cadmium
				carbon tetrachloride
				chromium
				chloroform (trichloromethane)
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				ethyl benzene
				hexachlorobenzene
				lead
				mercury

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				methanol
				methyl ethyl ketone (2-butanone)
				methyl isobutyl ketone
				methylene chloride
				potential corrosives if liquids exceed the WIPP-WAC limit
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	806	Solidified Process Solids	Various sludges, particulates (including ash, resins, etc.), and dissolution heels immobilized into solid monoliths, typically into pucks using a 1-gallon mold. Waste may also contain <50% by volume plastic debris items (e.g., broken clamshells).	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1-butanol
				acetone
				arsenic
				barium
				cadmium
				carbon tetrachloride
				chromium
				lead
				mercury
				methanol
				methylene chloride
				methyl ethyl ketone (2-butanone)
				selenium
				silver
				tetrachloroethylene (perclene)
				trichloroethylene (TCE)
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				xylene
RF	807	Bypass Sludge	Sludge generated in building 374 in support of Pu recovery activities. This sludge bypassed the dryer unit and was direct loaded into the waste drum with cement, generated after 3-21-87. Oil-Dri or vermiculite may be present in the waste.[22] Waste may also contain <50% by volume rubber and metal	1,1,1-trichloroethane (TCA)
				1,1,2,2-tetrachloroethane
				1,1,2-trichloro-1,2,2-trifluoroethane
				trans-1,3-dichloropropene
				1-butanol

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
			debris items (e.g., leaded rubber glove, batteries).	acetone
				benzene
				beryllium (not beryllium powder)
				cadmium
				carbon tetrachloride
				chromium
				cyanide
				cyanide cleaning bath solutions
				cyanide plating bath solutions
				electroplating sludges
				ethyl benzene
				hexachlorobenzene
				lead
				mercury
				methanol
				methyl ethyl ketone (2-butanone)
				methyl isobutyl ketone
				methylene chloride
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	817	Cemented SS and C Heels	Sand, slag, and crucible heels are the fines that had been processed through the dissolution process to remove Pu. What did not dissolve is called the heels. The heels were mixed with Portland cement and water in 1-gallon molds (clamshell halves) and allowed to cure. The waste was removed from the molds in the form of a solid monolith (puck). Waste may also contain <50% by volume plastic debris items (e.g., broken clamshells).	See RF-393
				nitrates
				1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1-butanol
				acetone
				benzene
				arsenic
				barium
				beryllium (not beryllium powder)
				cadmium
				carbon disulfide
				carbon tetrachloride
RF	818	Cemented Incinerator	Ash from the burn chamber (IDC RF-420) of the Pu	chromium

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
		Ash	recovery incinerator. The ash was cemented by hand. Waste may also contain <50% by volume plastic debris items (e.g., broken clamshells).	lead
				mercury
				methyl ethyl ketone (2-butanone)
				methanol
				methylene chloride
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene
RF	820	Cemented Soot	Soot removed during the cleanup of the off-gas system for the Pu recovery incinerator. Was cemented by hand in clamshells and allowed to cure into pucks. Waste may also contain <50% by volume plastic debris items (e.g., broken clamshells).	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1-butanol
				acetone
				arsenic
				barium
				benzene
				beryllium (not beryllium powder)
				cadmium
				carbon disulfide
				carbon tetrachloride
				chromium
				lead
				mercury
				methanol
				methyl ethyl ketone (2-butanone)
				methylene chloride
				selenium
				silver
				tetrachloroethylene (perclene)
				toluene
				trichloroethylene (TCE)
				xylene

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
RF	822	Cemented Resins	Washed, spent anion and cation exchange resins cemented with Portland cement and water to form slurry, then cast into a 1-gallon mold. The cured puck was removed from the mold as a solidified monolith. 1 Waste may also contain <50% by volume plastic debris items (e.g., broken clamshells).	See RF-432
RF	823	Cemented Miscellaneous Sludge	Various inorganic particulates and sludges were cemented and allowed to cure into pucks. 66 The cured pucks were removed from the molds in the form of solid monoliths. Waste may also contain <50% by volume plastic debris items (e.g., broken clamshells).	1,1,1-trichloroethane (TCA) 1,1,2-trichloro-1,2,2-trifluoroethane acetone arsenic barium cadmium carbon tetrachloride chromium lead mercury methanol methyl ethyl ketone (2-butanone) methylene chloride selenium silver tetrachloroethylene (perclene) trichloroethylene (TCE) cyanide cleaning bath solutions cyanide plating bath solutions electroplating sludges xylene
RF	976	Building 776 Process Sludge	Sludge mixed with cement from two waste collection tanks in building 776. The tanks collected effluent from the floor drains.	1,1,1-trichloroethane (TCA) 1,1,2-trichloro-1,2,2-trifluoroethane 1,2-dichloroethylene 1-butanol cadmium carbon tetrachloride chloroform (trichloromethane) chromium lead mercury methanol

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				methylene chloride
				tetrachloroethylene (perclene)
				trans-1,2-dichloroethylene
				trichloroethylene (TCE)
				xylene
RF	978	Laundry Sludge	Sludge mixed with cement from two tanks that collected effluent from the laundry in building 776.	1,1,1-trichloroethane (TCA)
				1,1,2-trichloro-1,2,2-trifluoroethane
				1-butanol
				beryllium (not beryllium powder)
				cadmium
				carbon tetrachloride
				chromium
				lead
				mercury
				methanol
				methylene chloride
				tetrachloroethylene (perclene)
				trichloroethylene (TCE)
				xylene
SD	176	Pre-1980 INL-Exhumed SDA Homogeneous Solids	This includes all waste exhumed, generated, and/or repackaged during the Early Waste Retrieval (EWR) Project and placed into M-III bins and during the Initial Drum Retrieval (IDR) Project packaged into 85-gallon drums, FRP boxes, M-III bins and cargos whose primary waste form is unknown at the time of TSA retrieval. The waste includes all waste previously identified as IW-179. The waste includes any combination of inner containers associated with IDCs SD-176 through SD-178.	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
				carbon tetrachloride

Generator Site, Area	IDC Numeric Code	AMWTP IDC Description	Waste Description [36]	Hazardous Constituents [1]
				carbon disulfide
				methylene chloride
				tetrachloroethylene (perclene)
				1,1,1-trichloroethane (TCA)
				trichloroethylene
				trichlorofluoromethane
				1,1,2-trichloro-1,2,2-trifluoroethane
				chlorobenzene
				1,2-dichlorobenzene
				1,1,2-trichloroethane
				acetone
				1-butanol
				ethanol
				ethyl acetate
				ethyl benzene
				ethyl ether
				methanol
				methyl isobutyl ketone
				xylene
				cresol
				nitrobenzene
				benzene
				isobutanol
				2-ethoxyethanol
				methyl ethyl ketone (2-butanone)
				2-nitropropane
				pyridine
				toluene
				electroplating sludges
				cyanide plating bath solutions
				stripping and cleaning bath solutions cyanide electroplating
				polychlorinated-biphenyls (PCBs)

APPENDIX 13

RPT-TRUW-012

AMWTP Waste Stream Designations

Rev. 24

Date: 09/02/14

AMWTP Waste Stream Designations

Advanced Mixed Waste Treatment Project

(Signature on file. See DCR-13424.)

09/02/14
Date

REVISION LOG

Revision Number	Date Approved	Pages Affected	Description of Revision
0	08/27/03	All	DCR-2378-1. Create RPT-12 from EDF-199
1	11/20/03	Various	DCR-2528. Update TRUCONs, add newly created IDC 512 and applicable data, add EPA HWN F003.
2	03/07/05	All	DCR-4022. Revise paragraph following flowchart; edit for clarification.
3	07/12/05	All	DCR-4229. Incorporate IDC information to be consistent with RPT-TRUW-05, Waste Matrix Code Reference Manual.
4	09/13/05	Table 1, Figure 1	DCR-4477. Update Table 1 and Figure 1 to be consistent with RPT-TRUW-05.
5	11/30/05	All	DCR-4666. Incorporate information concerning PCB items shippable to WIPP, characterization data for approved WSPFs, and identification of new waste streams.
6	03/06/06	All	DCR-4822. Incorporate new approved profile, CCP waste streams, retrieval, and to address newly generated waste.
7	07/11/06	All	DCR-4874. Reflect a streamlined approach to using certain project scoping documents (RPTs 05, 06, 07 and 12).
8	08/15/06	Various	DCR-5224. Document recent PCB contamination incidents.
9	07/17/07	All	DCR-6155. Incorporate revision log; annual update to reflect current operations prior to audit.
10	8/27/08	All	DCR-6333. Re-write. Remove MLLW IDCs from Appendix B.
11	07/01/09	Table 6b, Page 41	DCR-7530. Rewrite.
12	08/04/09	Various	DCR-8505. Revise document to include new IDCs to support operations (Add IDCs BN-528, BN-529, BN-536, BN-537). Changed IDC description on BN-520 and BN-521 to be consistent with recent changes noted in RPT-TRUW-05. Update PCB information to include new IDCs managed as PCB waste. Deleted MLLW BN IDCs (i.e., BN-607 through BN-617). Provided clarification.

Revision Number	Date Approved	Pages Affected	Description of Revision
13	03/09/10	Various	DCR-8588. Deleted IN-151 and AW-151 from Appendix A they do not exist in WTS. Remove MX-142 WIPP WSPF HWNs to correct prior cut and paste error. Corrected Section 3.0 (#5 AMWTP Newly Generated IDCs) on page 19 to include BN-501, BN-511, IC-526, IC-603, and BN-616 as PCB regulated. Added IDCs: IC-527, BN-513, BN-514, BN-515, BN-522, BN-538, RF-749, RF-753, RF-754. Clarified PCB language on Appendix A Notes. Changed IDC description in Table A-1 for RF-095, RF-995, RF-337, BN-501, BN-507, BN-509, BN-511, IC-526 and IC-603. Clarified newly generated waste Section 8. Added Notes 20, 21, 22, and 23 in Table A-1 to clarify HWNs and applicable hazardous constituents assignment. Added references for CCP AK summaries. Insert new information relating to recent WIPP approval of BN222 WSP (i.e., RF IDCs: 292, 696/807b, 818 and 820). Made editorial changes.
14	08/02/10	Various	DCR-9295. Table 1: Changed IDC Description for IDC RF-374. Section 7.0: Provided additional clarification within Section 7.0 relating to HWDs. Figure 3: Replaced boxes for IDC RF-832 and MD-330 with RF-336 and RF-330, and corrected WMC S5330 to S5300. Section 9.0: Added references 96–114. Table A-1: Add new IDCs: GV-222, BN-518, BN-538, BN-550, IC-150, IC-151, IW-526, IW-527, IW-603, LL-212, LL-213, LL-221, RL-712, RL-714, and RL-716. Changed Waste Description for IDCs: BN-520, BN 521, AW-160, AW-164, AW-165, AW-167, NT 211, NT-212, NT-213, RF-374. Added new constituents for IDCs: BN-507, BN-514, BN-520, AW-165, AW-167, IC-526, IC-527, IC-603, SD-704, RF-760. Deleted IDCs: AW-142. Added footnotes 24, 25, and 26. Added missing IDC RF-303. Table A-2: Added new generator site codes: GV, LL, and RL.

Revision Number	Date Approved	Pages Affected	Description of Revision
15	11/03/10	Text and Appendix A	DCR-9523. Modified BN-508 HWNs to accommodate new BN510.1 WSPF list of HWNs and applicable references. Deleted Note 26 from BN-520. Deleted Note 25 from BN-508. Deleted Note 25 from BN-521. Deleted Note 26 as a reference to Appendix A. Added information on beryllium in Appendix A for supercompacted-related IDCs. Changed Section 7.1 to include RPT-TRUW-83 and BN510.1 WSPF and to clarify that BN510 feedstock inventory will not be included into BN510.1 WSPF. Added BN510.1 information to Table 4. Section 8.0: last paragraph add BN510.1 and references. Deleted footnote f. References: added reference #s 115 and 116.
16	03/03/11	2, 6, 10, 15, 16, A107 – A110	DCR 9720: Modified language to incorporate new WIPP definition of a waste stream, Add three new IDCs to WSPFs BNINW216 and one IDC to BN004 as a result of WIPP approval of change notices (i.e., RF-741, RF-742 and RF-744). Added IDCs: BN-534, IC-157 and IW-525. Updated Appendix A. Modified notes to Appendix A as needed. General editorial changes.
17	07/19/11	Various	DCR-10076. General grammar/editorial changes. Added IDCs: BN-550, RL-712, RL-714 and RL-716 to Table 1. Added new PCB IDCs BN-523 and IW-526 to PCB section. Deleted Section 7.2, AMWTP Retrieved Wastes/Repackaged Retrieved Wastes, including Figure 3, Example of the delineation scheme for supercompacted waste stream. Added References 123 through 143. Appendix A: Deleted blank rows. Moved ID/AW, BW and BX to alphabetic listing. Added IC-525 (P/U listed HWNs) and IC-602 (P/U listed HWNs). Added proposed (forthcoming) IDCs BN-523, BN-524 and BN-600. Added IDCs: AE-254, BN-519, BN-539, BN-607 through BN-617, IC-021, IC-152, IC-156, and IC -601. Added off-site cored waste IDCs LA-002, LA-003, LA-005, LA-006, LB-229, OR-250, RL-715, RL-720, SL-223, SL-224, SL-227, SR-251, SR-252, SR-253 and SR-835. Deleted IDCs: AW-156, AW-157, IW-525 and IW-602. Added hazardous constituents and HWNs as applicable.

Revision Number	Date Approved	Pages Affected	Description of Revision
18	8/31/11	Various	Added BN600 WSPF information. Added new PCB IDCs (IW-526, BN-526, BN-597, BN-603 and BN-598) Added new references 145 through 150 Added new IDCs to Appendix A (AE-230, AW-225, BN-525, BN-526, BN-527, BN-597, BN-598, BN-599, BN-602, BN-603 and SR-842. Added references to IW-526, IW-527 and IW-603 Added Note 25
19	11/13/12	Various	DCR-10552. Deleted mention of RPT-LLW-12 on pages 1 and 2. Replaced reference 107 with TRUW-8.13. Added in refs 150 through 166. Changed various BN IDCs and constituent information. Changes made to IDC 807a and 807b. Added IDCs and information for Argonne East; added IDCs for INL exhumed SDA wastes. Deleted prior footnote 14 and renumbered footnotes. Added footnotes 20 and 21. Other routine updates. Changed IDCs IW-176 through 179 to SD-176 through 179.
20	05/22/13	Various	DCR 11951. Various editorial changes and updates. Updated Tables and Figures. Changed Section 3.0 for PCB IDCs. Modified Figure 1. Added references 167-179. Complete revision/update of Appendix A information. (e.g., removed repetitive references associated with individual constituents for IDCs to prevent document corruption). Updated Notes: 2, 3, 8, 10, 13, and 20. Add Notes 22 and 23. Document considered a rewrite.
21	09/26/13	Various	DCR-12475. Made changes to support EPA Tier 1 change and to support the processing of LANL debris waste into the Supercompactor. Added IDCs LA-007 through LA-010 as appropriate. Added hazardous constituents and HWNs as appropriate. Deleted CW-600. Added references as needed. Changed Appendix A as needed.
22	11/21/13	Various	DCR-12885. Incorporated changes to support the addition of Pre-1980 SDA debris wastes to the Supercompactor as approved feedstock material.

Revision Number	Date Approved	Pages Affected	Description of Revision
23	04/15/14	Various	DCR-13004. Entire document revised (no revision bars) to make document consistent with current operations. General changes include, but are not limited to, reorganizing Sections 1.0 through 7.0, adding acronyms, updating Table 1 to include MFC/Argonne West and LANL waste IDCs, Adding IDC CW-216 to PCB section and to Appendix A, updating and adding references as needed and re-organization of some information. Divided the table in Appendix A into stand-alone tables for each generator. Updated IDC BN-550 and BN-600 to address LANL input to S/C; updated/corrected IDC information within Appendix A; updated INL IDCs to reflect information in AMWTP INL baseline document (RPT-TRUW-92); deleted IC-525; revised MD debris IDCs to general reference to MD-801 (where applicable) to support document stability; merged RF-300 graphite information and updated/ added notes in Appendix A. Periodic review.
24	09/02/14	Various	Performed routine updates as needed. Updated Table 2. Updated Table 5. Updated Section 9 references, added ref 207 and 208. Reorganized, updated, and clarified Appendix A. Made corrections to HWNs/constituents and updated LANL IDCs. Added IDCs: BN-770, IA-021, IA-150, IA-152, IA-153, IA-154, IA-155, IC-153, IC-154, IC-604, IC-605, IC-606, IC-607, IF-021, IF-152, IF-153, IF-154, IF-155, IN-150, IN-154, IP-021, IP-150, IP-152, IP-153, IP-154, IP-155, IP-157, IR-152, IR-153, IT-150, IT-153, IT-154, IT-155, IW-150, IW-152, IW-153, IW-154, IW-176, IW-177, IW-178, RF-752, and SD-703. Added petroleum ether (naptha) to IDC AE-100 list of constituents. Correct transcription error for RF-480 (removed F002 HWN for carbon tet). Added “See Note 2” to F003 HWN applicable locations in appendix tables for consistency. Clarified Appendix A notes and added Note 30.

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ACRONYMS

AE	Argonne National Laboratory-East (generator site code)
AK	acceptable knowledge
AKR	Acceptable Knowledge Resolution
AMWTP	Advanced Mixed Waste Treatment Project
ANL-E	Argonne National Laboratory-East
ANL-W	Argonne National Laboratory-West
ARP	Accelerated Retrieval Project
ATR	Advanced Test Reactor
AW	Argonne National Laboratory-West (generator site code)
B&W	Babcock &Wilcox
BC	Battelle Columbus (generator site code)
BL	Bettis Atomic Power Laboratory (generator site code)
BN	AMWTP (generator site code)
BNFL	British Nuclear Fuels Limited
BW	Babcock & Wilcox (generator site code)
BX	Bendix-Grand Junction Operation Office (generator site code)
CAS	Chemical Abstract Service
CBFO	Carlsbad Field Office
CCP	Central Characterization Project
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CH	Contact-Handled
CPP	Chemical Processing Plant
CW	CH2M-WG Idaho, LLC (generator site code)
CWI	CH2M-WG Idaho, LLC
DOE	United States Department of Energy
EDF	engineering design file
EDMS	Electronic Document Management System
EPA	Environmental Protection Agency
FLAMGAS	flammable gas
GEN	generator
GGT	gas generation testing
HLW	high-level waste
HWD	hazardous waste determination
HWMA	Hazardous Waste Management Act
HWN	Hazardous Waste Number
HSG	headspace gas

IC	INL Idaho Nuclear Technology and Engineering Center (formerly called Chemical Processing Plant; generator site code)
ICPP	INL Idaho Chemical Processing Plant
ID	Idaho National Laboratory (generator site code)
IDC	item description code
IF	INL Central Facilities Area (generator site code)
IN	INL Naval Reactor Facility (generator site code)
INL	Idaho National Laboratory
IR	INL Reactor Technology Complex (formerly called Test Reactor Area; generator site code)
IW	INL Radioactive Waste Management Complex (generator site code)
IWTS	integrated waste tracking system
JH	J. C. Haynes (generator site code)
LA	Los Alamos National Laboratory (generator site code)
LANL	Los Alamos National Laboratory
LL	Lawrence Livermore National Laboratory (generator site code)
LLNL	Lawrence Livermore National Laboratory
LLW	low-level waste
MD	Mound Laboratories (generator site code)
MFC	Materials Fuel Complex
MLLW	mixed low-level waste
MO	Monsanto-Dayton Laboratory (generator site code)
MX	^{241}Am waste from a smoke detector manufacturing company in Mexico (generator site code)
NDA	nondestructive assay
NRF	Naval Reactor Facility
NT	Nevada Test Site (generator site code)
NNSS	Nevada National Security Site
OASIS	Organic and Sludge Immobilization System
PCB	polychlorinated biphenyl
PK	process knowledge
PPE	personal protective equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RF	Rocky Flats Plant (generator site code)
RH	remote handled
RL	Richland, Washington Hanford Site (generator site code)
RTR	real-time radiography
RWMC	Radioactive Waste Management Complex
SCG	Summary Category Group
SD	INL Subsurface Disposal Area (generator site code)
SDA	Subsurface Disposal Area

SNF	spent nuclear fuel
SR	Savannah River (generator site code)
SRS	Savannah River Site
TAN	Test Area North
TBD	to be determined
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TRA	Test Reactor Area
TRU	transuranic
TSA	Transuranic Storage Area
TSCA	Toxic Substances Control Act
VE	visual examination
WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan
WIPP	Waste Isolation Pilot Plant
WMC	waste matrix code
WMCG	Waste Matrix Code Group
WS	waste stream
WSP	waste stream profile
WSPF	Waste Stream Profile Form
WTS	Waste Tracking System

1.0 INTRODUCTION

The Advanced Mixed Waste Treatment Project (AMWTP) retrieves, characterizes, and packages transuranic (TRU) wastes for disposal at the Waste Isolation Pilot Plant (WIPP). The United States Department of Energy (DOE) originally identified an estimated 65,000 cubic meters (i.e., legacy waste) that require characterization for disposal at WIPP. The majority of the legacy waste inventory was originally generated at the following DOE facilities: Idaho National Laboratory (INL),[a] Battelle Columbus (BC), Bettis Atomic Power Laboratory (BL), Argonne National Laboratory – East, Mound Laboratories (MD), and Rocky Flats Plant (RF).

In addition to the legacy waste inventory, minor contributions of legacy and non-legacy wastes have been or may be received from other offsite locations such as (but not limited to) Los Alamos National Laboratory (LANL), Savannah River Site (SRS), Bendix-Grand Junction Operation Office (BX), Hanford (RL), Monsanto-Dayton Laboratory (MO), Nevada National Security Site (NNSS), Lawrence Livermore National Laboratory (LLNL), J. C. Haynes (JH),[b] a Mexican smoke detector manufacturer (contributed ^{241}Am wastes), and Babcock and Wilcox (B&W).

The AMWTP also generates TRU-contaminated newly generated waste (i.e., BN) as a result of retrieval, characterization, storage, processing/treatment, and/or repackaging. AMWTP newly generated wastes are assigned the BN acronym in order to identify the generator of the wastes as AMWTP.

This report is to be used for TRU wastes and includes, but is not limited to, waste classification schemes, the identification of WIPP assigned hazardous waste numbers (HWNs), and the identification of waste material (by item description codes [IDCs] associated with WIPP-approved waste stream profile forms [WSPFs]) covered under the current AMWTP scope of work).

Appendix A summarizes available acceptable knowledge (AK) associated with hazardous waste constituents for TRU IDCs that are profiled to WIPP by AMWTP personnel and, when available, AMWTP newly generated waste characterization information. The information in Appendix A is subject to change when additional AK, process knowledge (PK), or additional characterization is received. Appendix A will be revised as necessary to reflect finalized HWNs and/or changes to waste stream designations for TRU waste. WIPP HWNs within this document are evaluated and assigned through an initial AK evaluation. This information is augmented by real-time radiography and/or visual examination (RTR/VE). [107, 202, 203, 204]

At a minimum, all accessible and retrievably stored TRU wastes are managed as mixed waste unless final characterization results reflect a non-hazardous status.

---

a. Includes: INL Argonne-West/Materials Fuel Complex (AW/MFC); INL Radioactive Waste Management Complex (RWMC); Auxiliary Reactor Area; INL Idaho Chemical Processing Plant (ICPP); INL Naval Reactor Facility (NRF); INL Test Reactor Area (TRA); Test Area North (TAN); INL Central Facilities Area (CFA); INL subsurface disposal area; and waste from various INL CH2M-WG Idaho, LLC (CWI) operations.

b. An Ohio businessman that irradiated diamonds with ^{241}Am.

Low-level waste (LLW) and mixed low-level waste (MLLW) that cannot be disposed at WIPP are characterized and profiled by AMWTP LLW/MLLW organizations and not by the AMWTP TRU program. Wastes not destined for disposal at WIPP are not subject to WIPP characterization requirements and may require offsite treatment prior to disposal. LLW/MLLW characterization and profile development are conducted through applicable LLW/MLLW Programs requirements and in accordance with the receiving facility's offsite waste stream profile (WSP) approval processes. Final LLW/MLLW characterization results may differ from the determinations noted in Appendix A due to differences in the offsite receiving facility's waste acceptance criteria (WAC) and/or whether the waste undergoes AMWTP waste processing/treatment prior to offsite shipment.[c]

TRU waste destined for disposal at WIPP is characterized on a waste-stream basis as described by the WIPP Waste Analysis Plan (WAP) and the AMWTP implementing documents MP-TRUW-8.1, Certification Plan for INL Transuranic Waste, and MP-TRUW-8.2, Quality Assurance Project Plan. (See Section 3.0)

Figure 1 (below) presents the general document hierarchy and information flow for AK documents into the AK record.

c. See the LLW/MLLW off-site program coordinator for LLW/MLLW characterization determinations.

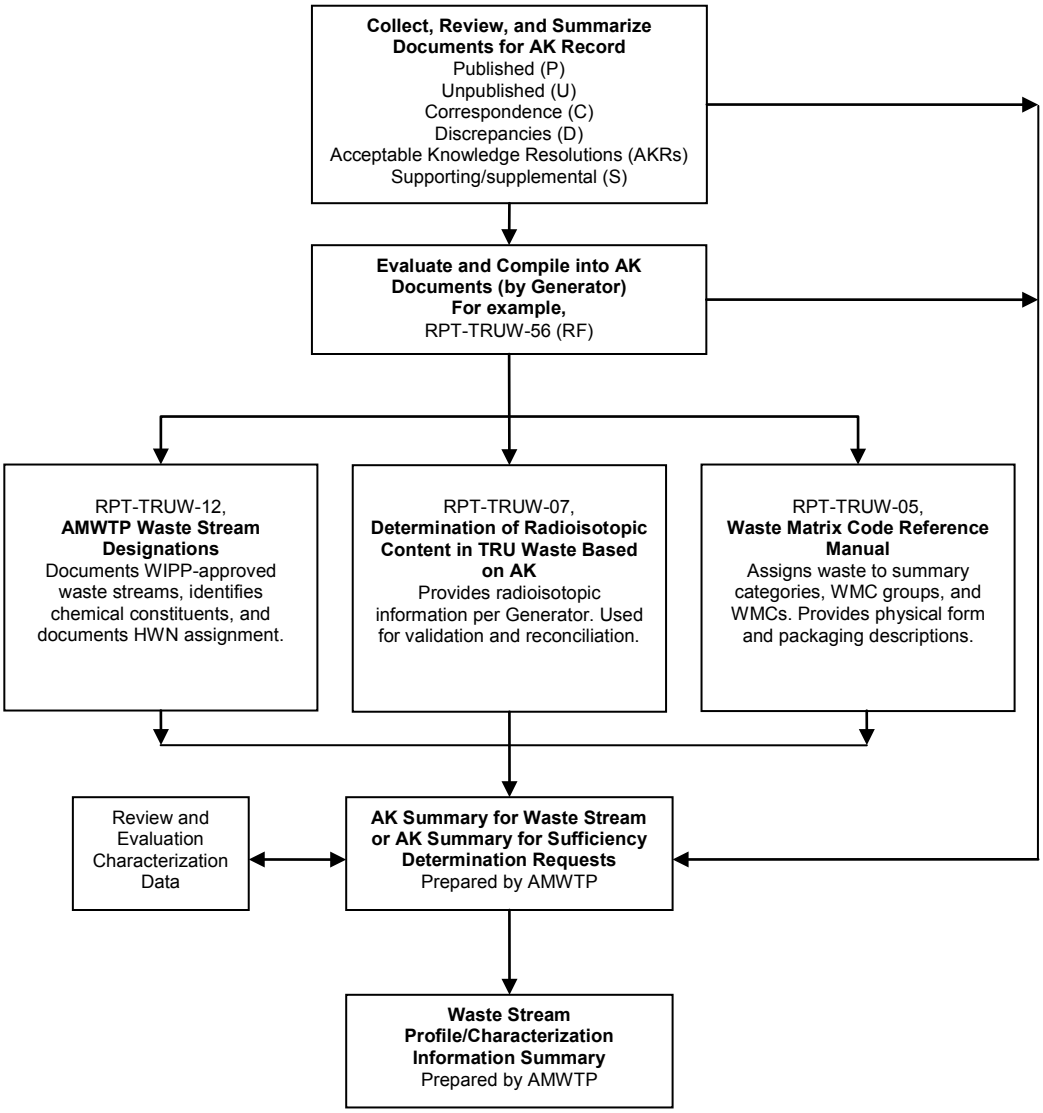

Figure 1. General document hierarchy and information flow for AK.

The following sections of this report address current AMWTP WSPFs. The sections are organized by Summary Category Group (SCGs) with an additional Section 7.0 to present the approach to the AMWTP newly generated waste.

- Section 4.0, AMWTP Retrieved Homogeneous Solid Waste (SCG S3000)
- Section 5.0, AMWTP Retrieved Soil/Gravel Waste (SCG S4000)
- Section 6.0, AMWTP Retrieved Debris Waste (SCG S5000)
- Section 7.0, AMWTP Newly Generated Waste.[d]

Also included in this document is Appendix A, Chemical Constituents and HWNs identified in TRU Waste. The tables in Appendix A provide available AK and WIPP characterization information about chemical constituents and HWN assignments for TRU wastes currently stored/treated at the AMWTP. The Appendix A determinations are based on documents and other information received by AK and/or WIPP WAP sampling results. The information in Appendix A is used to support safe storage and treatment of TRU waste and for AMWTP WIPP waste profiling.

The following sources of information and characterization activities were/are used to identify applicable hazardous constituents, chemical properties, polychlorinated biphenyl (PCB) classification, and/or HWNs assigned to waste IDCs prior to and during WIPP profile development:

1. Review of existing AMWTP AK documents
2. RTR/VE augmentation information
3. Engineering Design File (EDF)-803, Chemical Constituents in Transuranic Storage Area (TSA) Waste
4. AMWTP Offsite coordinators (e.g., Form-1900, AMWTP Offsite Waste Stream Profile, and/or other correspondences)
5. AK documents received directly from legacy waste generators
6. Miscellanous INL databases
7. Central Characterization Project (CCP) personnel/AK documentation
8. AMWTP Waste Services[e]

d. Section 7.0 presents the general AMWTP approach for newly generated waste management.

e. For example, HWDs and supporting information for newly generated waste are maintained by AMWTP Waste Services and incorporated into the AK record during WIPP profiling.

9. CWI

10. Other INL or AMWTP operational personnel

11. AK/PK associated with treatment activities (e.g., supercompaction, liquid absorption).

In some cases, prior HWNs may have been conservatively assigned based on headspace gas (HSG) detections and/or may have been assigned due to regulatory requirements prior to mid 1990s (e.g., assigning the F003 HWN for non-ignitable waste containing F003 constituents). Generator-assigned characteristic HWNs or waste that was previously assigned the F003 HWN may differ from the final AMWTP HWNs assigned in WIPP profiles. The removal of prior generator-assigned characteristic-based HWNs may be due to AMWTP treatment of the characteristic property (e.g., absorption, compacting) and/or repackaging (e.g., removal of prohibited items) prior to shipment. As a result, the HWNs initially assigned may not be retained.[f] Justification for not retaining an HWN that was previously identified by the original generator or within a prior WIPP profile is documented according to MP-TRUW-8.13, Collection, Review, and Management of Acceptable Knowledge Documentation.[(107)]

Final WIPP hazardous waste constituents and HWNs are formally included within this document after the AMWTP receives WIPP-approval for the submitted WSPF.

2.0 ASSIGNMENT OF SUMMARY CATEGORY GROUPS, WASTE MATRIX CODE GROUPS, AND WASTE MATRIX CODES

Wastes are delineated prior to WIPP profiling based on AK and placed into one of three broad physical form categories. The three broad physical form categories are referred to as SCGs. The three SCGs are:

1. Homogeneous Solids (S3000)

2. Soils/Gravel (S4000)

3. Debris Wastes (S5000).

If a waste does not contain at least 50% by volume of a SCG the waste is characterized based on the summary category constituting the greatest volume of waste.

2.1 S3000 – Homogeneous Solids

SCG S3000 is composed of waste that is primarily homogeneous solids. Homogeneous solids are defined as solid materials, excluding soil, that do not meet the New Mexico Environment Department criteria for classification as debris. The waste within this SCG

f. For example, in accordance with the current Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) regulatory framework [i.e., 40 CRF.261. 4(3)(g)(1)], wastes with a D001, D002, D003, or F003 HWN originally assigned by an initial generator may not apply to the final waste form being shipped to WIPP due to treatment/removal of characteristic properties.

includes, but is not limited to, inorganic process residues, inorganic sludge, salt waste, and pyrochemical salt waste. Other waste streams are included in this SCG based on the specific waste stream types and final waste form. This SCG is expected to contain toxic metals and spent solvents. This SCG includes wastes that are at least 50% by volume homogeneous solids.

2.2 S4000 – Soils/Gravel

SCG S4000 is defined as waste that is composed primarily of soil and/or gravel. This SCG includes waste streams that are at least 50% by volume soil/gravel. This SCG is expected to contain spent solvents and toxic metals.

2.3 S5000 – Debris Wastes

For TRU wastes, SCG S5000 is defined as heterogeneous waste that is at least 50% by volume debris. Debris means solid material exceeding a 2.36 inch (60 millimeter) particle size that is intended for disposal and that is: [99]

1. A manufactured object
2. Plant or animal matter
3. Natural geologic material.

Particles smaller than 2.36 inches in size may be considered debris if the debris is a manufactured object, and if it is not a particle of S3000 or S4000 material.

The waste in this SCG includes, but is not limited to glass, rubber, cellulosic, ceramic, wood, paper/rags, graphite, metal, and plastic debris waste. This SCG may contain spent solvents and toxic metals.

2.4 Approach for Assigning IDCs, WMCGs, and WMCs

The overall general approach for assigning IDCs, waste matrix code groups (WMCGs), and waste matrix codes (WMCs) is discussed below.

Each TRU waste managed at the AMWTP is identified by a unique IDC. Initially, the AMWTP classifies each IDC rather than individual containers and assigns an appropriate SCG, WMCG, and WMC based on guidance established in the DOE Waste Treatability Group Guidance document and the WIPP WAP. [52, 53, 108], [g]

Most of the AMWTP legacy wastes were previously assigned an IDC by the INL. Where an IDC was not assigned to waste by the original generator (e.g., pre-1971 wastes from RF), the AMWTP assigns an IDC. [108]

The IDC (or temporary IDC) contains a two-letter generator code (see Table 1), which identifies the generator (or unknown/undetermined status), and a three-digit numerical code.

g. RTR and VE are also used to identify the presence of prohibited items/conditions within the waste and to augment AK.

Combined, the generator code and the three-digit number form a unique IDC that identifies a specific type of waste generated at a specific facility. [108]

Table 1. Generator site and area acronyms.

Gen Site	Area	Description
AE	—	Argonne National Laboratory-East
BC	—	Battelle Columbus Laboratory
BL	—	Bettis Atomic Power Laboratory
BW	—	Babcock and Wilcox
BX	—	Bendix-Grand Junction Operation Office (M&O Contractor)
GV	—	General Electric Vallecitos Nuclear Center
ID	AW	Argonne National Laboratory-West [currently identified as Materials and Fuels Complex (MFC)]
ID	BN	INL Advanced Mixed Waste Treatment Facility (formerly called British Nuclear Fuels Limited [BNFL])
ID	CW	CH2M-WG Idaho, LLC
ID	IA	INL Auxiliary Reactor Area
ID	IC	INL Idaho Nuclear Technology and Engineering Center (formerly called Chemical Processing Plant [CPP])
ID	IF	INL Central Facilities Area
ID	IN	INL Naval Reactor Facility
ID	IP	INL Power Burst Facility
ID	IR	INL Reactor Technology Complex (formerly called Test Reactor Area)
ID	IT	INL Test Area North
ID	IW	INL Radioactive Waste Management Complex
ID	SD	INL RWMC Subsurface Disposal Area
JH	—	J. C. Haynes, Ohio businessman who irradiated diamonds with ^{241}Am
LA	—	Los Alamos National Laboratory
LB	—	Lawrence Berkeley National Laboratory
LL	—	Lawrence Livermore National Laboratory
MD	—	Mound Laboratory
MO	—	Monsanto-Dayton Laboratory
MX	—	^{241}Am waste from a smoke detector manufacturing company in Mexico
ND	—	Nuclear Radiation Development, LLC
NT	—	Nevada Test Site
OR	—	Oak Ridge National Laboratory
RF	—	Rocky Flats Plant
RL	—	Hanford
SL	—	Sandia National Laboratories
SR	—	Savannah River Site

For example, the IDC RF-004 is described as a Rocky Flats solidified inorganic sludge, and is further classified under the homogeneous solids (S3000) SCG.

The S3000 SCG is split into two subgroups: (1) the inorganic subgroup and (2) the organic subgroup.

The inorganic subgroup (S3100) contains two WMCGs (salt wastes and solidified inorganics), but the organic subgroup (S3200) contains only a single WMCG (solidified organics).

For example, the IDC RF-004 mentioned above is classified under the Rocky Flats homogeneous solids (S3000) SCG and further classified as a solidified inorganic waste.

The wastes are further assigned an applicable WMC in accordance with guidance associated with the DOE Treatability Guide and the WIPP WAP. [52, 53, 108] The WMC is used to identify the expected waste matrix (physical form) that makes up the majority of the waste material in each container. Waste matrix codes were developed by DOE in response to the Federal Facilities Compliance Act [54] as a method to aid in categorizing DOE TRU mixed waste streams. A WMC consists of a series of five-character alphanumeric codes and descriptors that represent different physical/chemical matrices (e.g., S3121, homogeneous solids, wastewater treatment sludge). The first position is a letter that denotes the physical form of the waste (L for liquid, S for solid, etc.). The next position denotes whether the waste is homogeneous solids, soil, or debris (S3000 is homogeneous solids waste, S4000 is soil/gravel, and S5000 is debris waste), and the last three positions denote more specific categories (e.g., specific type of homogeneous solids [sludge, salt, etc.], soil/gravel, or debris [plastic, light metal, etc.]).

Based on the above, the waste associated with IDC RF-004 is assigned a WMC of S3150 by the AMWTP in accordance with guidance associated with the DOE Treatability Guide and WIPP WAP. [52, 53, 108]

Wastes with a WMC of S9000 and/or an IDC of UN-000 or PC-000 are classified as having an undetermined waste form and are further classified as “Resource Conservation and Recovery Act (RCRA)/ Hazardous Waste Management Act (HWMA) unknowns” per the AMWTP HWMA/RCRA permit. [15] Until a final WMC and IDC are assigned, these types of wastes are subject to special handling and notification requirements as required by the AMWTP HWMA/RCRA permit.

Examples of SCGs, WMCGs, and WMCs are depicted in Figure 2.

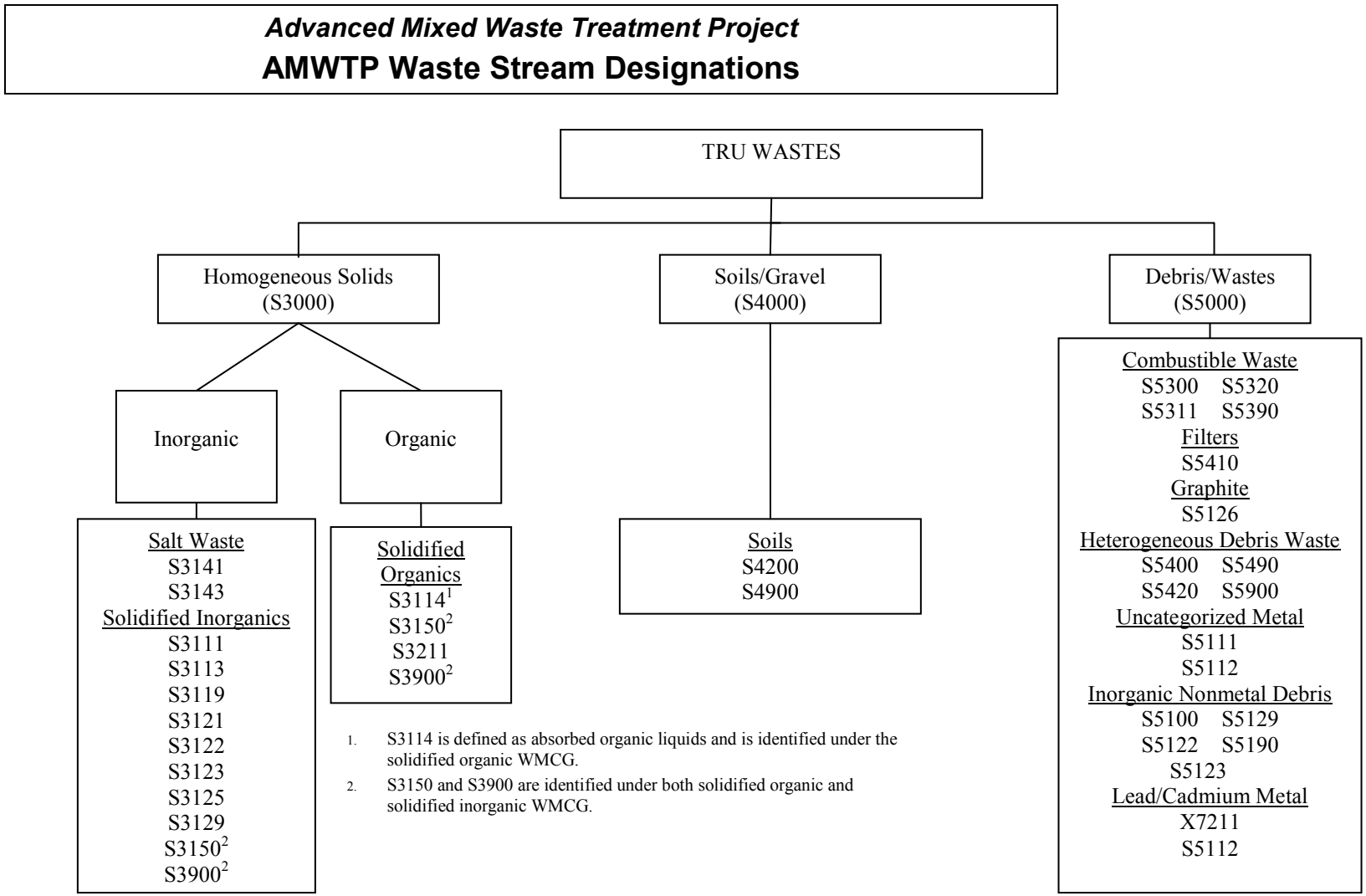

Figure 2. General examples of SCGs, WMCGs, and WMC assignment/grouping diagram. See DOE treatability group guidance for full list of potential WMCs.

The TRU Program's list of SCGs, WMCGs, WMCs, and IDCs for TRU wastes that have been included in AMWTP WIPP-approved direct ship WSPFs or are fed to the supercompacted WSPF are presented in Table 2.

Table 2. AMWTP WMCG and WMC classification for waste included in WIPP-approved WSPFs.

S3000 Homogeneous Solids (SCG)					
	S3100 Inorganic Homogeneous Solids (SCG subgroup)				
	WMCs	**WMC Description**	**GEN IDC Prefix[b]**	**IDC**	**IDC Description**
WMCG Solidified Inorganics	S3113	Inorganic Particulate Absorbents	MD	834	High Level Acid
			MD	835	High Level Caustic
	S3121	Wastewater Treatment Sludges	MD	836	High Level Sludge/Cement
			RF	001	First Stage Sludge
			RF	002	Second Stage Sludge
			RF	007	Building 374 Dry Sludge
			RF	741	Pits 11 and 12 First Stage Sludge
			RF	742	Pits 11 and 12 Second Stage Sludge
	S3150	Solidified Homogeneous Solids	RF	004	Special Setups
			RF	292	Cemented Sludge
			RF	696	Bldg 771 Cemented Incinerator Sludge
			RF	744	Pits 11 and 12 Special Setups
			RF	800	First Stage Sludge-Cemented
			RF	802	Solidified Laboratory Waste
			RF	803	Solidified DCP Sludge
			RF	818	Cemented Incinerator Ash
			RF	820	Cemented Soot
	S3200 Organic Homogeneous Solids (SCG subgroup)				
	WMCs	**WMC Description**	**GEN IDC Prefix[b]**	**IDC**	**IDC Description**
WMCG Solidified Organics	S3114	Absorbed Organic Liquids	RF	003[f]	Organic Setups, Oil Solids
			RF	743	Pits 11 & 12 Organic Setups
	S3150	Solidified Homogeneous Solids	RF	700[a]	OASIS Waste
			RF	801[a]	Solidified Organics

Table 2 (cont.)

S4000 Soil/Gravel (SCG)
No WIPP approved WSPFs

S5000 Debris Waste (SCG)					
	WMCs	**WMC Description**	**GEN IDC Prefix[b]**	**IDC**	**IDC Description**
WMCG Heterogeneous Debris Waste	S5490	Unknown/Other Heterogeneous Debris	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 Contact-Handled (CH)-TRU Heterogeneous Debris
			BC	201	Non-combustible Solids
			BC	202	Combustible Solids–Paper/Cloth
			RF	241	Americium Process Residue
			RF	372	Grit
			RF	374	Blacktop, Concrete, And Construction Rubble
			RF	430	Unleached Ion Column Resin
			BN	508	AMWTP Newly Generated Debris
			BN	510	Supercompacted Debris
			BN	550	Supercompacted Debris
			BN	600	WMF-676 PCB Contaminated Debris
			RF	750	Pits 11 and 12 Debris
			RF	760	Pad 1 Cells 1 and 2 Debris

Table 2 (cont.)

S5000 Debris Waste (cont.)					
	WMCs	**WMC Description**	**GEN IDC Prefix[b]**	**IDC**	**IDC Description**
			MD	801	Rags, Paper, Wood, etc.
			MD	802	Dry Box Gloves and O-rings
			MD	803	Metal, Equipment, Pipe, Valves, etc.
			MD	804	Plastic, Tygon, Mani-Boots, etc.
			MD	805	Asbestos Filters
			MD	810	Glass Flasks, Sample Vials, etc.
			MD	813	Glass Filters and Fiberglass
			MD	814	Graphite Waste
			MD	824	Equipment Boxes, Non-combustible
			MD	825	Equipment Drums, Non-combustible
			MD	826	Equipment Boxes, Combustible
			MD	827	Equipment Drums, Combustible
			MD	838	<10 nCi/g Non-combustible
			MD	847	LSA <100 nCi/g Combustible
			MD	848	LSA <100 nCi/g Non-combustible
			RF	950	LSA Metals, Glass, etc.
			RF	960	Concrete, Asphalt, etc.
			SD	177	Pre-1980 INL-Exhumed SDA Heterogeneous Debris
	S5400	Unknown/Other Heterogeneous Debris	LA	007	Mixed Heterogeneous Debris from TA-3
			LA	009	Heterogeneous Debris Waste from the TA-21 West Facility
			LA	010	Heterogeneous Debris Waste from TA-50
			IC	601	Alpha Low Level Lab. WIPP Analytical Waste
			RL	712	Hanford Plutonium Finishing Plant Debris
			RL	714	Hanford Radiochemical Processing Lab 325 Bldg Debris
			RL	716	Hanford 231-Z Building Debris
WMCG Filters	S5410	Composite Filters	RF	328	Ful-Flo Incinerator Filters
			RF	335	Absolute 8 × 8 Filters
			RF	338	Insulation and CWS Filter Media
			RF	360	Insulation

Table 2 (cont.)

S5000 Debris Waste (cont.)					
	WMCs	**WMC Description**	**GEN IDC Prefix[b]**	**IDC**	**IDC Description**
WMCG Filters (cont.)	S5410 (cont.)	Composite Filters (cont.)	RF	376	Cemented Insulation and Filter Media
			RF	490	HEPA Filters and CWS Filters
			RF	491	Plenum Prefilters
WMCG Combustible Waste	S5300	Organic Debris	RF	010	Paper and Rags
			RF	020	Wood and Benelex
			RF	030	Plastic
			RF	33A	WETP Bin Program – Combustibles A
			RF	33B	WETP Bin Program – Combustibles B
			RF	302	Benelex and Plexiglas
			RF	330[c]	Paper and Rags – Dry
			RF	336[c]	Paper and Rags – Moist
			ID	337	Plastic, Teflon, Wash, PVC, Ret. RF TRU
			RF	337[c]	Plastics, Teflon, Washables, PVC
			RF	464	Benelex and Plexiglas
			RF	831	Dry Combustibles
			RF	832	Wet Combustibles
			RF	833	Plastics, TRU Mixed
	S5311	Leaded Gloves/Aprons	RF	040	Rubber
			RF	050	Metal scrap
			RF	339	Leaded Rubber Gloves and Aprons
			RF	463	Leaded Rubber Gloves and Aprons
	S5320	Wood Debris	RF	970	Wood
	S5390	Unknown/Other Organic Debris	RF	431	Leached Resin
			RF	432	Resin, Leached and Cemented
			RF	460	Washables, Rubber, Plastic
			RF	900	LSA Paper, Plastic, etc.
WMCG Graphite	S5126	Graphite Debris	RF	070	Graphite
			RF	300[d]	Graphite Molds
			RF	301[d]	Graphite Cores
			RF	303[d]	Scarfed Graphite Chunks
			RF	310[d]	Graphite Scarfings
			RF	312[d]	Coarse Graphite
WMCG Inorganic Nonmetal Debris	S5100[e]	Inorganic Debris	RF	441[e]	Raschig Rings, Unleached
			RF	442[e]	Raschig Rings, Leached
	S5122	Glass debris	RF	060	Glass

Table 2 (cont.)

S5000 Debris Waste (cont.)					
	WMCs	**WMC Description**	**GEN IDC Prefix[b]**	**IDC**	**IDC Description**
WMCG Inorganic Nonmetal Debris (cont.)	S5122 (cont.)	Glass debris (cont.)	RF	44A	WETP Bin Program – Glass
			RF	440	Glass
	S5123	Ceramic/brick debris	RF	371	Fire Brick
			RF	377	Coarse Fire Brick
	S5190	Unknown/Other Inorganic Debris	RF	368	Magnesium Oxide Crucibles
			RF	370	Leco Crucibles
			RF	391	Crucibles and Sand
			RF	392	Sand, Slag, and Crucibles
WMCG Lead/Cadmium Metal	S5112	Metal Debris With Lead	RF	488	Glovebox Parts w/Lead
WMCG Uncategorized Metal	S5111	Metal Debris without Lead or Cadmium	RF	416	Zinc Magnesium Alloy Metals
	S5112	Unknown/Other Metal Debris	RF	320	Heavy Non-special Source Metal
			RF	321	Lead
			RF	480	Non-special Source Metal
			RF	481	Leached Non-special Source Metal
			RF	48A	WETP Bin Program – Metal

a. Part of CCP profile ID-RF-S3150-A, Organic and Sludge Immobilization System Waste.(47)
b. Generator sites/areas are identified using the generator site and area acronyms listed in Table 1.
c. Part of CCP profile ID-RF-S5300-A, RFETS Combustibles and Plastics Stored at INL.(50)
d. Part of CCP profile ID-RF-S5126, TRU Mixed Graphite Debris.(49)
e. Part of CCP profile ID-RF-S5100-A, Rocky Flats Raschig Rings Stored at the INL.(48)
f. Part of CCP profile ID-RF-S3114, Organic Setups.(46)

3.0 AMWTP WASTE STREAMS

AK is used to describe and define WIPP waste streams. AMWTP TRU waste streams are proposed based on compilation of AK data in accordance with the WIPP WAP and the AMWTP implementing documents: MP-TRUW-8.1, Certification Plan for INL Transuranic Waste, and MP-TRUW-8.2, Quality Assurance Project Plan.(52, 98, 99)

All waste streams to be disposed of at WIPP must be from (or must have been generated from) processes associated with the national nuclear weapons program and must meet the definition of defense-related waste. In addition the waste to be disposed of at WIPP cannot be defined as high-level waste (HLW) or spent nuclear fuel (SNF). All AMWTP proposed and submitted WIPP waste streams are verified to be defense-related wastes and not HLW and/or SNF prior to development of (or inclusion into) a WIPP WSPF. (200, 201)

The delineation of all AMWTP waste streams include the following WIPP WAP criteria: [(52), i]

1. The waste stream must contain waste materials that have common physical form;
2. The waste stream must contain similar hazardous constituents; and
3. The waste stream must be generated from a single process or activity.

During waste stream development one or more IDCs may be grouped together to establish an AMWTP WIPP waste stream. Each IDC included into a WIPP waste stream undergoes characterization by AK [which is augmented on a container-by-container basis by RTR or VE]. The SCG, WMCG, WMC and IDCs included within a WIPP waste stream are confirmed through the AMWTP WIPP characterization process and through the TRU waste certification steps prior to shipment.

AMWTP TRU waste streams are identified with a BN prefix followed by the designated AMWTP WSP number. [j] For example, the AMWTP waste stream containing special setups (IDCs RF-004 and RF-802) is numbered BN004 where the BN is the AMWTP generator prefix and the assigned AMWTP WSP number is "004." [k]

AMWTP WIPP-approved waste streams are identified in tables in Sections 4.0, 6.0, and 7.0. WIPP waste streams developed by the AMWTP are documented within the AMWTP's WIPP WSP package (or, if applicable, the CCP WIPP WSP package). The AMWTP waste stream profile package includes Forms-1195, Waste Stream Profile Form; Form-1597, Reconciliation with Data Quality Objectives; Form-1598, Characterization Information Summary Report; and the applicable AK summary document. AMWTP WSP packages are submitted to Carlsbad Field Office (CBFO) for approval prior to shipment. [(52, 98, 99)] TRU waste eligible for disposal at WIPP is managed by the TRU Programs department and is shipped to WIPP upon WIPP approval of the applicable WSPF.

3.1 Characterization

The following subsections present general information relating to AMWTP TRU waste characterization.

Retrieved/legacy wastes that do not have legible information may be temporarily identified with an undetermined or unknown IDC. They (i.e., undefined and unknown IDCs) are temporary

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i. The requirement for grouping waste materials generated from a single process or activity, that have common physical form and that contain similar hazardous constituents is provided in the WIPP WAP, which is Attachment C to the WIPP Hazardous Waste Facility Permit.[(52)]

j. Wastes profiled during the INL 3100m^3 Project and by CCP are assigned their own unique generator-specific waste stream numbers that starts with the designation "BNINW" followed by a three digit numerical code (e.g., for the WSPF relating to RF first/second stage sludge the AMWTP waste stream number is BNINW216).

k. WIPP-assigned waste stream identification numbers also have their own specific prefixes for each generator site location (for BN004 waste the WIPP waste stream identification number is IN-BN004). [(45)]

IDCs used for container management until the final IDC assignment can be made. Undefined IDCs have known physical forms, but determination of the generator and/or historical information is required. Undefined wastes are designated as: UN-00A, undefined homogeneous solids; UN-00B, undefined debris; UN-00C, undefined soil; or UN-00D, undefined liquid). Waste whose physical form and legacy waste generator location/ID is unknown is classified as an unknown waste (UN-000/PC-000). Undefined and unknown IDCs are evaluated on a case-by-case basis during the characterization process.

In accordance with the WIPP WAP, AK (augmented by RTR/VE) is used to perform RCRA and Toxic Substances Control Act (TSCA) characterization for WIPP waste streams. [52, 107, 202, 203, 204, 205, 206]

Initial and final AMWTP AK RCRA/TSCA characterization results for TRU waste are found in Appendix A tables. Appendix A initial characterization determinations are based on AK records received from various sources (as noted below). WIPP WAP characterization results noted in Column 7 reflect AMWTP AK characterization results including past/present augmentation of AK by RTR, VE, HSG, and solid sampling.

See Section 7.0 for additional characterization information related to AMWTP newly generated TRU waste.

3.1.1 Resource Conservation and Recovery Act

Applicable HWNs and/or hazardous waste constituents are identified for each TRU IDC prior to WIPP profiling. The HWNs and chemical constituents associated with the TRU IDCs in this report are obtained from various AK records and interactions, as well as WIPP WAP characterization results.

The various sources of AK input include, but are not limited to, one or more of the following:

1. AMWTP, INL, and CCP AK generator documentation (e.g., reports, summaries, synopses, etc.)
2. Characterization results (e.g., AK, RTR, VE, HSG, solid sampling)[1]
3. AMWTP offsite coordinators (e.g., Form-1900 and/or other offsite correspondences)
4. INL/AMWTP/CCP process knowledge information
5. Miscellaneous INL databases
6. AMWTP environmental personnel (which includes Waste Services)
7. INL/AMWTP/CCP communications.

l. Unless specifically directed by WIPP, HSG and solid sampling is no longer required to augment AK characterization. Currently, gas generating testing (GGT)/flammable gas (FLAMGAS) analysis only takes place for transportation purposes.

3.1.2 Toxic Substance Control Act

Applicable PCB determinations are conducted using the same approach as noted in Section 3.1.1 above.

The general approach and current PCB classification for AMWTP TRU waste is as follows. PCBs may be identified during collection and compilations of AK and/or during RTR/VE. [108] There is evidence that some IDCs have PCB contaminated waste (e.g., containing PCB ballast, PCB contaminated debris, or in the case of RF-003 are associated with treating PCB oil). Any retrieved waste container may contain a PCB electrical item such as light ballasts or contain oil filled electrical equipment. Once a container is found to contain PCB contaminated waste, the IDC associated with the container is evaluated to determine whether the entire IDC requires classification as PCB or whether a case-by-case container management is more appropriate. [m]

AMWTP newly generated waste may be designated as PCB waste. PCB determinations for newly generated waste are provided by Waste Services.

Unless tested to verify the actual concentration of PCBs, the AMWTP ships TRU PCB waste streams as being greater than 500 parts per million (ppm). This requirement (i.e., classification of >500 ppm PCB if untested) is specified in the WIPP PCB disposal authorization and the 40 Code of Federal Regulations (CFR) 761.50(a)(5), Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions, Subpart D, Storage and Disposal, Applicability.

The following TRU IDCs managed at the AMWTP are classified in their entirety as being PCB: RF-003, BC-203, BN-501, BN-511, BN-520, BN-523, IC-526, IW-526, BN-526, BN-528, BN-536, BN-597, BN-598, BN-600, IC-603, IW-603, BN-603, BN-604, BN-605, BN-616, RF-743, RF-746, SD-176, CW-216, and SD-178. Additional information on each potential and known PCB IDC is noted below.

1. IDC RF-003 (Organic Setups, Oil Solids): Waste is known to contain PCBs. This IDC is classified as PCB regulated.

2. Battelle Columbus Laboratories (BC): Based on AK, IDC BC-203 (paper, cloth, metal, glass) contains waste oils drained from various equipment pieces that are a potential source of PCBs of unknown concentrations. These waste oils were absorbed in Oil-Dri in one-gallon paint cans. An estimated 20 cans were placed in IDC BC-203 waste containers. Due to the limited number of drums in this IDC, the IDC is classified as PCB regulated. No other BC IDCs have been identified by AK as having the potential for PCB contamination.

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m. AMWTP may choose to manage individual containers within an IDC as PCB, while at the same time classify the entire IDC as non-PCB. For example, if a container identified as IDC RF-480 (Non-Special Source Metal) is found to contain a large oil filled PCB capacitor, the container may be classified as PCB; however, the IDC itself (i.e., RF-480) remains non-PCB.

3. IDC RF-480 (Non-special Source Metal): AK records indicate that one or more containers contain PCB-contaminated equipment. PCB-containing items such as capacitors/ballast have been found in boxed waste of IDC RF-480. The overall number of PCB-items found to date is extremely small in relation to the overall volume of waste within IDC RF-480 and as a result IDC RF-480 is only considered a PCB waste stream on a case-by-case container basis.[59]

4. IDCs UN-000, UN-00A, UN-00B, UN-00C, and UN-00D: IDCs identified with a UN designator will be evaluated for PCB potential through the normal processes of RTR/VE, AK evaluation, and applicable final IDC assignment. Through these actions and applicable IDC assignment the AMWTP will determine the presence or absence of PCBs for waste management purposes. The UN-000, UN-00A, UN-00B, UN-00C, and UN-00D IDCs are determined to be PCB on a case-by-case basis at the time of RTR/VE.

5. Some newly generated IDCs may be classified as PCB, as described below.

   - The following newly generated IDCs are classified as PCB regulated: BN-501 (AMWTP PCB Soil), BN-511 (PCB Organic Homogeneous Solids), BN-520 (TRU PCB Secondary Debris Generated from Offsite Waste), BN-523 (Pad 1 Cells 1 and 2 PCB Debris), BN-526 (Lab PCB Debris Waste [not P/U-listed]), BN-528 (TRU PCB Liquids Generated During Retrieval), BN-536 (TRU Empty Containers with PCBs), BN-597 (P/U-listed Lab PCB Debris Waste), BN-598 (P/U-listed Lab PCB Homogeneous Solids Waste), BN-600 (WMF-676 PCB Contaminated Debris), BN-603 (Lab PCB Homogeneous Solids Waste [not P/U-listed]), BN-604 (Debris TSCA/PCB), BN-605 (Absorbed Liquids TSCA/PCB), and BN-616 (Organic Setups PCB Liquid).

   - BN-180 (Pad 1 Cells 1 and 2 Waste Retrieval Containers) includes intact containers and repackaged containers of waste historically stored within Cells 1 and 2 of Pad 1 with insufficient AK information to assign a legacy IDC. This IDC (BN-180) is a temporary IDC used for container management. Containers of this IDC (and inner containers) are evaluated for PCBs on a case-by-case basis.

   - All other newly generated wastes are evaluated for PCBs on a case-by-case basis.

6. IDCs RF-743 (Pits 11 & 12 Organic Setups) and RF-746 (Pits 11 & 12 Pad 903 Oil Drums): This waste was generated at Rocky Flats prior to 1972 and was retrieved from Pits 11 and 12. The waste was originally generated from the response to leaking drums stored on the RF Pad 903. These IDCs are currently managed as PCB regulated.

7. IDCs SD-704 (SDA Homogeneous Solids), SD-705 (SDA Heterogeneous Debris), and SD-706 (SDA Soil): SD-704 and SD-706 generated by the Accelerated Retrieval Project (ARP) may contain PCBs and will require a CCP evaluation on a case-by-case basis.

8. SD-179 (Pre-1980 SDA Waste Retrieval Bins), RF-998 (Pits 11 and 12 Cargos and Bins [without Roaster Oxide]), and RF-999 (Pits 11 and 12 Cargos and Bins with Roaster Oxide): These waste IDCs are from a variety of generator sources. Some of the containers within these IDCs may contain PCBs. Containers of these IDCs (and internal containers) will require an AMWTP case-by-case evaluation.

9. Offsite wastes (e.g., SL-224, RL-720, etc.) are evaluated through their applicable offsite/non-AMWTP profile and supporting PK/AK documents for RCRA/TSCA applicability prior to receipt at the AMWTP. Offsite IDCs are evaluated on a case-by-case basis.

10. Non-AMWTP (i.e., INL wastes): INTEC and RWMC laboratory waste (e.g., IC-526/IW-526, Laboratory PCB Debris Waste) are generated during laboratory support operations which include testing regulated PCB wastes. Unless tested to determine actual PCB concentrations the waste is managed as PCB regulated. These IDCs are currently classified as PCB regulated.

    One MFC container (# 10027891) that is associated with IDC AW-164 (ANL-W HRA/WCA Debris) has been identified as containing PCBs >50 ppm. All other INL IDCs (e.g., AW-167, IR-150, etc.) undergo PCB evaluation through their applicable offsite/non-AMWTP profile and supporting PK/AK documents for RCRA/TSCA applicability prior to receipt at the AMWTP on a case-by-case basis.

11. SD-176 (Pre-1980 INL- Exhumed SDA Homogeneous Solids) and SD-178 (Pre-1980 INL-Exhumed SDA Soil) are classified as PCB regulated.

12. CW-216 (Sludge Repackage Project PCB Contaminated Inorganic Sludge) is classified in its entirety as PCB regulated.

13. IW-179 (Pre-1980 SDA Waste Retrieval Bins) is an overpack container for legacy SD wastes. The IDC is a temporary IDC used for container management. This IDC (and inner containers) is evaluated for PCBs on a case-by-case basis.

3.1.3 Offsite/Non-AMWTP Waste

Offsite waste (e.g., Hanford, etc.) and non-AMWTP waste (e.g., Idaho Nuclear Technology and Engineering Center/Idaho National Laboratory, etc.) may be received for storage, for processing as supercompaction feedstock or for shipping directly to WIPP (as direct-ship profiles).

HWNs and constituents associated with offsite waste generators and non-AMWTP INL TRU wastes are received based on the generator characterization obtained through the AMWTP offsite profiling process. AK characterization information for offsite/non-AMWTP waste is obtained through the offsite waste coordinator and applicable AMWTP profiling process. Offsite and non-AMWTP RCRA/TSCA waste determinations as well as any supporting documents [offsite waste profiles, Integrated waste tracking system (IWTS), radiological results, process knowledge documentation] that are received by AK personnel through the AMWTP offsite coordinator (or designee) are included into the AMWTP AK record upon receipt.

The offsite and non-AMWTP characterization information may be subject to change prior to initial WIPP profiling.[n] With the exception of offsite waste and non-AMWTP INL legacy waste received at the AMWTP for immediate inclusion into active AMWTP WSPF or inclusion into a newly proposed AMWTP WIPP WSPF, up-to-date characterization results for offsite and non-AMWTP wastes are maintained by the AMWTP offsite waste coordinator. As a result, Appendix A tables refer the reader to the offsite waste coordinator for the most up-to-date characterization information unless the offsite/non-AMWTP waste (as received) is assigned one of the AMWTP's IDCs associated with existing AMWTP legacy waste, or is immediately being placed into an active (or newly proposed) AMWTP WSPF.

AK will obtain the most up-to-date characterization information from the AMWTP offsite coordinator at the time of WIPP profiling or inclusion into an AMWTP-designated waste stream using the same approach as noted in Section 3.1.1.

3.1.4 Radioassay

The AMWTP uses non-destructive analysis (NDA) to obtain radioassay results for WIPP waste. AMWTP's general approach for radioassay during WIPP waste stream development begins with an AK review of radioassay results. Each AMWTP waste container within a WIPP waste stream undergoes radioassay prior to reconciliation. Radioassay is conducted on the waste prior to subsequent treatment and/or shipment. AK associated with radioassay is obtained using the same approach as noted in Section 3.1.1. After radioassay is complete, the results are entered into the AMWTP's waste tracking system (WTS) and evaluated by AMWTP radiological experts to determine if the waste is a TRU WIPP candidate or a LLW/MLLW candidate waste. [o] Waste streams that are eligible for load management may contain containerized waste with radioisotope concentrations that are less than 100 nCi/g of TRU isotopes and may be shipped to WIPP providing that the payload container is equal to, or greater than, 100 nCi/g TRU isotopes. Waste streams that are not authorized for load management only include containerized wastes that are equal to, or greater than 100 nCi/g TRU isotopes. A summary of AMWTP AK and radioassay results are presented in RPT-TRUW-07, Determination of Radioisotopic Content in TRU Waste Based on Acceptable Knowledge. [109]

3.1.5 RTR and VE

AMWTP's general approach for RTR/VE augmentation of AK during WIPP waste stream development begins with AMWTP waste containers within a WIPP waste stream undergoing RTR or VE (as applicable) in accordance with the WIPP WAP.[52] The results of the RTR/VE are documented in the AMWTP WTS database by RTR/VE experts; used to augment AK characterization; used to identify prohibited items within each container; and (if applicable) are documented within AMWTP's RPT-TRUW-05. [108]

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n. For example, based on management direction, if CWI/INL waste is received for the purpose of AMWTP storage and/or processing, the waste can be received based on initial generator characterization information. The initial generator characterization will remain applicable until after the waste is received and/or the waste is shipped off-site to WIPP. [195, 196, 197, 198, 199]

o. Unless authorized for load management, containers of waste that are determined to be non-TRU waste are managed by the LLW/MLLW Program. The LLW/MLLW Program performs final characterization and profile development based on the applicable offsite facility requirements.

4.0 AMWTP RETRIEVED HOMOGENEOUS SOLID WASTE

4.1 AMWTP Homogeneous Solids Wastes

Homogeneous solid wastes that have been profiled by AMWTP and approved by WIPP are presented in Table 3 under the subheading "*The following are AMWTP's WIPP-approved homogeneous solid WSPFs.*" The table also includes current examples of WIPP-approved WSPFs submitted by CCP on AMWTP's behalf. The associated AMWTP-authorized CCP profiles that have been approved by WIPP are presented in Table 3 under the subheading *"Examples of AMWTP-authorized CCP homogeneous solid WSPFs."*

The approach to characterization of WIPP-eligible TRU homogeneous solids waste is the same as other WIPP-eligible TRU waste streams (See Section 3.0 above).

With the exception of CCP WSPFs developed at the direction of AMWTP, homogeneous solids waste streams identified in Table 3 were developed and characterized individually by the AMWTP using AMWTP procedures for direct-shipment to WIPP (CCP WSPFs are based on CCP AK procedures).

The CCP has profiled waste at the direction of AMWTP. AMWTP-authorized CCP WSPs (e.g., ID-RF-S3114 and ID-RF-S3150-A) were developed for direct-shipments to WIPP and include the CCP AK summary (i.e., CCP-AK-INL-005, Central Characterization Project Acceptable Knowledge Summary Report for Rocky Flats Immobilized Organic Liquids Stored at the Idaho National Laboratory, Waste Streams: ID-RF-S3114 and ID-RF-S3150-A). [111] The AMWTP-authorized CCP WSPs include RF organic sludge waste from the Grease Plant (IDC RF-003) and from the Organic and Sludge Immobilization System (OASIS) (IDCs RF-700 and 801). [46, 47]

CCP WSPFs and AK summaries include the assignment of applicable SCG, WMC, WMCG, and HWNs and are based on CCP AK procedures. Copies of the CCP documents are located in the AMWTPs Electronic Document Management System (EDMS).

Table 3. Homogeneous solids waste streams (S3000).

BN Waste Stream#	Waste Stream Description	IDC	IDC Description	Gen IDC Prefix	WMC
The following are AMWTP's WIPP-approved homogeneous solid WSPFs:					
BNINW216[57]	First/Second Stage Sludge	001	First Stage Sludge	RF	S3121
		002	Second Stage Sludge	RF	S3121
		741	Pits 11 and 12 First Stage Sludge	RF	S3121
		742	Pits 11 and 12 Second Stage Sludge	RF	S3121
		800	First Stage Sludge-Cemented	RF	S3150
BNINW218[58]	Building 374 Sludge (approved)	007	Building 374 Dry Sludge	RF	S3121
		803	Solidified DCP Sludge	RF	S3150
		807	Bypass Sludge (after 3/21/87)	RF	S3121
BN004[45]	Special Setups	004	Special Setups	RF	S3150
		744	Pits 11 and 12 Special Setups	RF	S3150
		802	Solidified Laboratory Waste	RF	—
BN835 [36]	Solidified Acid/Caustic	834	High Level Acid	MD	S3113
		835	High Level Caustic	MD	—
BN836[56]	Cemented Sludge	836	High Level Sludge/Cement	MD	S3121
BN222[95]	Solidified Plutonium Recovery Incinerator Waste	292	Cemented Sludge	RF	S3150
		696	Cemented Incinerator Sludge (Bldg 771 generated prior to March 21, 1987)	RF	—
		818	Cemented Incinerator Ash	RF	—
		820	Cemented Soot	RF	—
Examples of AMWTP-authorized CCP homogeneous solid WSPFs:					
ID-RF-S3114 (by CCP)[46]	Organic Setups	003	Organic Setups, Oil Solids	RF	S3114
		743	Pits 11 & 12 Organic Setups	RF	S3114
ID-RF-3150A (by CCP)[47]	Organic and Sludge Immobilization System Waste	700	OASIS Waste	RF	S3150
		801	Solidified Organics	RF	—

5.0 AMWTP RETRIEVED SOIL/GRAVEL WASTE

Containers primarily consisting of soil/gravel waste that are not TRU waste are ineligible for disposal at WIPP and will be segregated from the TRU soil/gravel waste and managed in accordance with applicable program requirements (e.g., LLW/MLLW Program requirements). Containerized soil that is removed from the earth-covered berm area is assigned a legacy waste IDC (as applicable). Uncontainerized soil/gravel generated as a result of soil berm and/or overburden soil removal is assigned a BN IDC.

Currently, there are no WIPP-approved WSPFs for AMWTP soil/gravel waste. When applicable, the approach to characterization of WIPP-eligible TRU soil/gravel waste would be the same as other WIPP-eligible TRU waste streams as noted above. Soil/gravel generated by removal of the soil berm and/or overburden soils is newly generated waste. The approach to characterization is in accordance with Section 3.0 and 7.0.

6.0 AMWTP RETRIEVED DEBRIS WASTE

6.1 AMWTP Direct-Shipped Debris Waste

Retrieved debris wastes (i.e., not AMWTP newly generated waste) profiled by AMWTP and approved by WIPP are presented in Table 4 under the subheading "*The following are AMWTP's WIPP-approved direct shipped heterogeneous debris WSPFs.*" The table also includes current examples of WIPP-approved WSPFs submitted by CCP on AMWTP's behalf. The associated AMWTP-authorized CCP WIPP-approved profiles that are presented in Table 4 under the subheading *"Examples of AMWTP-authorized CCP WIPP-approved direct-shipped heterogeneous debris WSPFs."*

With the exception of CCP WSPFs developed at the direction of AMWTP, debris waste streams identified in Table 4 were developed and characterized individually by the AMWTP using AMWTP procedures for direct-shipment to WIPP. [p]

Waste stream profiles ID-RF-S5126, ID-RF-S5100-A, and ID-RF-S5300-A and associated AK summaries, written by the CCP at AMWTP's direction, incorporate CCP AK information on AMWTP's IDCs: RF-300, 301, 303, 310, and 312 (Graphite), RF-441 and 442 (Raschig Rings), and RF-330, 336, and 337 (Combustibles and Plastics).

Applicable CCP AK summaries and WSPFs include: [48, 49, 50, 64, 112, 113]

- CCP-AK-INL-002, Central Characterization Project Acceptable Knowledge Summary Report for the Idaho National Laboratory Rocky Flats Transuranic Graphite Debris Waste Stream, Waste Stream: ID RF S5126
- ID-RF-S5126; CCP AK INL 006, Central Characterization Project Acceptable Knowledge Summary Report for Rocky Flats Raschig Rings Stored at the Idaho National Laboratory, Waste Stream: ID-RF-S5100-A
- CCP-AK-INL-004, Central Characterization Project Acceptable Knowledge Summary Report for Rocky Flats Combustibles and Plastic Stored at the Idaho National Laboratory, Waste Stream ID-RF-S5300-A.

p. CCP WSPFs are based on CCP AK procedures.

Table 4. Retrieved direct-ship debris waste streams (S5000).

Waste Stream #	Waste Stream Description	IDC	IDC Description	Gen IDC Prefix	WMC
The following are AMWTP's WIPP-approved direct-shipped heterogeneous debris WSPFs:					
BN161[44]	Firebrick Debris	371	Fire Brick	RF	S5123
		377	Coarse Fire Brick	RF	
BN211[38]	Filter Debris Waste	328	Ful-Flo Incinerator Filters	RF	S5410
		335	Absolute 8 × 8 Filters	RF	
		338	Insulation and CWS Filter Media	RF	
		360	Insulation	RF	
		376	Cemented Insulation and Filter Media	RF	
		490	HEPA Filters and CWS Filters	RF	
BN243[40]	Glass	440	Glass	RF	S5122
BN252[41]	Leaded Rubber	339	Leaded Rubber Gloves and Aprons	RF	S5311
		463	Leaded Rubber Gloves and Aprons	RF	
BN296[39]	Non-Special Source Metal	320	Heavy Non-special Source Metal	RF	S5112
		321	Lead	RF	
		480	Non-special Source Metal	RF	
		481	Leached Non-special Source Metal	RF	
BN304[42]	Mound Debris	801	Rags, Paper, Wood, etc.	MD	S5490
		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	
		825	Equipment Drums, Non-combustible	MD	
		827	Equipment Drums, Combustible	MD	
		848	LSA <100 nCi/g Non-combustible	MD	

Table 4 (cont.)

Waste Stream #	Waste Stream Description	IDC	IDC Description	Gen IDC Prefix	WMC
Examples of AMWTP-authorized CCP WIPP-approved direct-shipped heterogeneous debris WSPFs:					
ID-RF-S5126 (by CCP)[49]	TRU Mixed Graphite Debris	300	Graphite Molds	RF	S5126
		301	Graphite Cores	RF	
		303	Scarfed Graphite Chunks	RF	
		310	Graphite Scarfings	RF	
		312	Coarse Graphite	RF	
ID-RF-S5100-A (by CCP)[48]	Rocky Flats Raschig Rings Stored at the INL	441	Raschig Rings, Unleached	RF	S5100
		442	Raschig Rings, Leached	RF	
ID-RF-S5300-A (by CCP)[50]	RFETS Combustibles and Plastics Stored at INL	330	Paper and Rags-Dry	RF	S5300
		336	Paper and Rags-Moist	RF	
		337	Plastics, Teflon, Washables, PVC	RF	

7.0 AMWTP NEWLY GENERATED WASTE

The term "newly generated waste" (including newly generated primary and secondary waste) as outlined in this document is for WIPP designation only. See the HWMA/RCRA permit for the definition of newly generated waste for purposes of compliance with the AMWTP HWMA/RCRA.[15]

AMWTP newly generated waste may be classified as newly generated "primary" wastes (e.g., repackaged legacy wastes) or newly generated "secondary" waste (e.g., PPE).[55]

AMWTP newly generated waste are identified by the IDC generator acronym "BN". AMWTP newly generated wastes may include, but may not be limited to:

- Wastes that were (and are) initially generated as a result of conducting support/secondary operations to AMWTP retrieved (and stored) legacy wastes
- Waste that has lost its original generator "pedigree" due to repackaging and/or commingling of wastes such as retrieved legacy waste within an intact original container where historical information is inadequate and whose contents can only be verified by RTR/VE at the SCG level (e.g., homogeneous solids, debris or soil)
- Loose/uncontainerized legacy waste
- Overburden soil
- Waste generated from AMWTP treatment operations (e.g., supercompaction).

AMWTP Waste Services oversees/assigns IDCs to various AMWTP newly generated wastes through waste services/generator interaction. If a new IDC is required, the IDC is developed through waste services/generator and AK interface. AMWTP Waste Services develops AMWTP HWDs (i.e., Form-1086, AMWTP Hazardous Waste Determination Checklist) and assigns HWNs for newly generated waste. Hazardous waste determinations and initial characterization for newly generated AMWTP wastes are documented within the AMWTP operating record in accordance with AMWTP MP-WM&M-13.9, Waste Characterization and Waste Services Management.[(63)]

AK for containers of newly generated TRU wastes is obtained from various sources as noted in Section 3.0. Containers of newly generated TRU waste undergo AK characterization using acquired AK prior to the waste being placed into an appropriate AMWTP WIPP waste stream and prior to WIPP profiling.[q]

7.1 AMWTP Debris Waste

Currently, the AMWTP is actively shipping newly generated debris waste to WIPP with two general types of WIPP-approved WSPFs. The first general type of WSPF is related to treating/compacting non-PCB debris waste. The second general type of WSPF is related to direct shipment of PCB-contaminated debris waste. Table 5 identifies the current and prior AMWTP WIPP-approved newly generated S5000 WSPFs.

The supercompacted debris waste is generated as a result of compacting non-PCB debris waste. The WIPP-approved supercompacted debris waste WSPF consists of multiple feedstock debris wastes IDCs. The list of authorized Supercompactor feedstock debris IDCs is presented in RPT-TRUW-83, Acceptable Knowledge Summary for Supercompacted Debris Waste. [(114)] [r]

The direct shipped PCB contaminated debris waste is generated as a result of conducting support operations within the AMWTP WMF-676. PCB-contaminated debris is primarily generated from:

- Removing PCB waste from approved Supercompactor debris feedstock
- Spill clean-up/decontamination within the WMF-676
- Treating prohibited liquids.

Table 5 identifies the AMWTP WIPP-Approved Newly Generated S5000 WSPF.

q. LLW/MLLW final hazardous/radioactive waste determinations are determined prior to offsite shipment under the LLW/MLLW Program and are maintained by LLW/MLLW personnel.

r. Proposed feedstock (e.g., new debris IDCs) must be approved as feedstock by CBFO/EPA and must also be included in the Supercompactor WIPP-approved WSPF prior to supercompaction.

Table 5. AMWTP WIPP-Approved Newly Generated Debris (S5000) WSPF.

WSP	IDC	Waste Stream and IDC Description	Gen IDC Prefix	WMC
BN510	510[a]	Supercompacted Debris	BN	S5490
BN510.1	550[b]	Supercompacted Debris	BN	S5490
BN510.2	550[c]	Supercompacted Debris	BN	S5490
BN510.3	550[d]	Supercompacted Debris	BN	S5490
BN510.4	550[f]	Supercompacted Debris	BN	S5490
BN600 [e]	600	AMWTP WMF-676 PCB Contaminated Debris(BN600)	BN	S5490

a. See RPT-TRUW-30 for list of approved feedstock IDCs.
b. See RPT-TRUW-83, Rev. 5 for list of approved feedstock IDCs.
c. See RPT-TRUW-83, Rev. 6 for list of approved feedstock IDCs.
d. See RPT-TRUW-83, Revs. 7 and 8 for list of approved feedstock IDCs.
e. A new BN600.1 direct ship PCB contaminated debris WSPF is in development due to the addition of the D033 HWN to the Supercompactor feedstock.. The new WSPF will be added to this table upon approval by CBFO.
f. See RPT-TRUW-83, Rev. 9 for list of approved feedstock IDCs

8.0 SUMMARY

All TRU wastes are evaluated and assigned SCGs, WMCGs, WMCs, and IDCs, in accordance with the DOE treatability guide and WIPP WAP.

HWN assignments and PCB status for TRU waste IDCs are based on AK information obtained from various sources (as noted in Section 3.0). The initial and final HWN/PCB assignments are the result of an AK review of available AK records for the applicable IDC. The HWNs and PCB status assigned to a WIPP waste stream are based on available AK records associated with all IDCs included within the proposed WIPP waste stream and WIPP WAP characterization requirements.

WIPP waste streams meet the WIPP WAP criteria of: being generated from a single generation process or activity; must contain waste materials that have common physical form; and must contain similar hazardous constituents.

9.0 REFERENCES

NOTE: *Various AMWTP active documents, such as AMWTP procedures, reports, and operating instructions, may be cited without revision numbers or dates. Where applicable, the prior and most recent revisions of these AMWTP documents are available through the AMWTP Electronic Document Management System (EDMS).*

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132. AMWTP Form-1687 NON-AMWTP Generator Waste Profile for Hanford PFP Absorbed Plutonium Nitrate Solutions RLPUNIT (RL-715), AMWTP, June 10, 2008. [P774A]

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134. AMWTP Form-1900 DOE CH-TRU WASTE PROFILE For Mound Plant Solidified Acid/Caustic Waste Stored at the Savannah River Site (SR-835), AMWTP, March 04, 2009. [P778A]

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136. AMWTP Form-1900, DOE CH-TRU Waste Profile for Savannah River Site, Building 221F, Absorbed Waste (IDC SR-252), AMWTP, September 05, 2010. [P1134S]

137. AMWTP Form-1900, AMWTP Offsite Waste Stream Profile for SR-MD-HOM-C, Mound Site Inorganic Particulates Stored at Savannah River Site (SR-253), AMWTP, July 26, 2011. [P1153A]

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141. AMWTP Form-1900, AMWTP Offsite Waste Stream Profile for AECHHM-PK, Argonne CH Homogeneous Solids (AE-254), AMWTP, May 11, 2011. [P1154A]

142. AMWTP Form-1900, AMWTP Offsite Waste Stream Profile for LBNL-S5400, Lawrence Berkeley Mixed Heterogeneous Debris (LB-229), AMWTP, May 19, 2011. [P1313A]

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146. AMWTP Form-1687, Non-AMWTP Generator Waste Profile for IW-LAB-S5490, Laboratory Non-PCB Debris (IW-527), AMWTP, February 8, 2010. [P1163A]

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175. AMWTP Form-1900, DOE CH-TRU Waste Profile for SR-W027-221H-HOM, SRS Solidified Inorganics from 221H (SR-256), AMWTP, November 7, 2011. [P1469A]

176. AMWTP Form-1900, DOE CH-TRU Waste Profile for, SRS SR-W027-321M-HOM Solidified Organics from 321M (SR-260), AMWTP, May 14, 2012. [P1470A]

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190. AMWTP Form-1900, for Materials and Fuels Complex trans-shipped Advanced Test Reactor Complex Waste, AMWTP, September 19, 2013. [P1997A]

191. RPT-TRUW-13, Acceptable Knowledge Document for INL Stored Transuranic Waste - Mound Plant Waste, AMWTP, current revision. [P418A]

192. RPT-TRUW-92, Acceptable Knowledge Document for Select Idaho National Laboratory (INL) Facilities, AMWTP, current revision. [P1970A]

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Debris Waste Stream ID-MFC-S5400 (CCP-AK-INL-008), CCP, December 3, 2012. [P680A]

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203. INST-OI-12, Real-Time Radiography Examinations (Certification Scans), AMWTP, current revision. [P407A]

204. INST-OI-34, Non-Facility Visual Examination Operations, AMWTP, current revision. [P387A]

205. INST-FOI-01, In-Plant Drum Assay Operations, AMWTP, current revision. [P1125S]

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Appendix A
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Chemical Constituents and HWNs Identified in TRU Waste

Appendix A – Chemical Constituents and HWNs Identified in TRU Waste

Appendix A information is used to support the AMWTP HWMA/RCRA permit development relating to TRU waste storage and management and is used to track HWN assignments relating to WIPP-approved WSPFs. Appendix A characterization determinations do not reflect LLW/MLLW program decisions and do not include (or are otherwise based on) a review of AK/PK documentation associated with the LLW/MLLW program. See the LLW/MLLW program coordinator for characterization determinations for LLW/MLLW shipped off-site.

Appendix A summarizes hazardous waste constituents for TRU IDCs with the exception of waste received by the AMWTP Offsite Waste Program (see Notes 9 and 15). AMWTP TRU wastes including TRU wastes received at the AMWTP for WIPP profiling by AMWTP or CCP, are listed in the following tables by generator and IDC. A brief waste description is noted in Column 2. The chemical constituents, hazardous items, or potential properties for individual IDCs are identified in Column 3. Related Chemical Abstract Service (CAS) numbers are tabulated in Column 4. Potential hazardous constituents, potential chemical properties, and potential hazardous items that may be found within an applicable IDC (and associated source document reference numbers) are noted in Column 5. Information within Column 5 reflects unconfirmed information relating to potential EPA hazardous constituent (e.g., listed or characteristic) or potential EPA hazardous characteristic property.[s]

Potential hazardous constituents (Column 5) associated with AMWTP legacy wastes may not necessarily reflect generator-assigned HWNs (Column 6) or final WIPP-assigned HWNs (Column 7). These potential hazardous constituents/properties/items listed in Column 5 were identified based on information provided by the AMWTP Waste Services organization; non-AMWTP waste generators; potential constituents/properties identified from conducting historical reviews of referenced AK documents; and/or based on the result of sampling activities. The identification of potential hazardous constituents/properties is for purposes of supporting safe storage.

Changes to the current list of potential hazardous constituents and/or potential properties and hazardous items will be based on new AK information associated with various sources of information identified in Section 3.1. Generator-assigned and WIPP-approved EPA HWNs are presented in Columns 6 and 7, respectively. The “Initial Gen Assigned HWN” column (Column 6) contains the HWNs originally assigned by the waste generator, if available. The “WIPP WSPF Approved HWN” column (Column 7) contains HWNs assigned through the WIPP characterization process and documented in the applicable WIPP-approved WSPF. The HWNs assigned for WIPP disposal pertain only to those containers certified for WIPP disposal. HWNs

s. IDCs listed in Appendix A are subject to change. HWNs and constituents associated with off-site wastes are available through the offsite waste program personnel. The final list of WIPP HWNs and constituents for TRU wastes will be identified prior to the time of WIPP profiling.

associated with non-WIPP disposal shipments are maintained by the appropriate AMWTP programs.

HI (historical interpretation), WG (waste generator), AK (acceptable knowledge), and WS (waste stream) noted in the headers of the following tables reflect applicable sources of information based on waste generator supplied information, AK, and WSPF characterization results, respectively.

Throughout the following tables, comments such as "See Note 1" refer to the notes in Table A-34. Those notes refer to all of the tables in this appendix.

The AK source document references associated with hazardous constituent/HWN are typically noted within the first row of the applicable columns as superscripted reference numbers in parentheses, such as X [(1)].

Table A-1. Argonne National Laboratory – East (AE) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

AE IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
100	GENERAL PLANT WASTE	1,1-dichlorethylene	75-35-4	X [1, 4, 5, 150, 151, 152, 172]	D029 [4, 5, 108, 150, 151, 152, 172, 182, 183] See Notes 4, 8, 25	See Note 22
		1,2-dichloroethane	107-06-2	X	D028	
		1,4-dichlorobenzene	106-46-7	X	D027	
		1,1,1-trichloroethane (TCA)	71-55-6	X	F002	
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	
		2-4-dinitrotoluene	121-14-2	X	D030	
		acetone	67-64-1	X	F003 See Note 2	
		arsenic	7440-38-2	X	D004	
		barium	7440-39-3	X	D005	
		benzene	71-43-2	X	F005	
		cadmium	7440-43-9	X	D006	
		carbon tetrachloride	56-23-5	X	D019	
		carbon disulfide	75-15-0	X	F005	
		chlorobenzene	108-90-7	X	F002	
		chromium	7440-47-3	X	D007	
		ethyl acetate	141-78-6	X	F003 See Note 2	
		ethyl benzene	100-41-4	X	F003 See Note 2	
		ethyl ether	60-29-7	X	F003 See Note 2	
		isobutanol	78-83-1	X	F005	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		methanol	67-56-1	X	F003 See Note 2	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
		methyl isobutyl ketone	108-10-1	X	F003 See Note 2	
		methylene chloride	75-09-2	X	F002	
		n-butyl alcohol	71-36-3	X	F003 See Note 2	
		nitrates	—	X	—	
		nitrobenzene	98-95-3	X	F004	
		pentachlorophenol	87-86-5	X	D037	
		petroleum ether/Naptha	64742-82-1	X[208]	D001 (see Notes 2 and 30)	
		selenium	7782-49-2	X	D010	

Table A-1. (cont.) AE

AE IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
100	GENERAL PLANT WASTE (cont.)	silver	7440-22-4	X	D011	See Note 22
		tetrachloroethylene (perclene)	127-18-4	X	F002	
		toluene	108-88-3	X	F005	
		trichloroethylene (TCE)	79-01-6	X	F002	
		xylene	1330-20-7	X	F003 See Note 2	
101	CUT UP GLOVEBOXES	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X (1, 4, 5, 108, 150, 151, 152, 182, 183) See Notes 4, 8, and 25	See Note 22
102	ABSORBED LIQUIDS	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X(1, 4, 5, 150, 151, 152)	—
104	ALPHA HOT CELL WASTE	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X(1, 4, 5, 108, 150, 151, 152, 182, 183) See Notes 4, 8, and 25	See Note 22
105	EMPTY BOTTLES AND ABSORBENT	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X (1, 4, 5, 150, 151, 152)	—
106	SPECIAL SOURCE MATERIAL	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X (1, 4, 5, 150, 151, 152)	See Note 22
107	RH WASTE (See Note 21)	1,2-dichloroethane	107-06-2	X (153)	D029 (153)	—
		1,4-dichlorobenzene	106-46-7	X	D027	—
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001/F002	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	—
		acetone	67-64-1	X	F003 See Note 2	—
		arsenic	7440-38-2	X	D004	—
		barium	7440-39-3	X	D005	—
		benzene	71-43-2	X	F005	—
		cadmium	7440-43-9	X	D006	—
		carbon tetrachloride	56-23-5	X	D019	—
		chlorobenzene	108-90-7	X	F002	—
		chromium	7440-47-3	X	D007	—
		ethyl acetate	141-78-6	X	F003 See Note 2	—
		ethyl benzene	100-41-4	X	F003 See Note 2	—
		ethyl ether	60-29-7	X	F003 See Note 2	—
		isobutanol	78-83-1	X	F005	—
		lead	7439-92-1	X	D008	—

Table A-1. (cont.) AE

AE IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
107	RH WASTE (cont.) (See Note 21)	mercury	7439-97-6	X	D009	—
		methanol	67-56-1	X	F003 See Note 2	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	—
		methyl isobutyl ketone	108-10-1	X	F003 See Note 2	—
		methylene chloride	75-09-2	X	F002	—
		n-butyl alcohol	71-36-3	X	F003 See Note 2	—
		nitrobenzene	98-95-3	X	F004	—
		pentachlorophenol	87-86-5	X	D037	—
		selenium	7782-49-2	X	D010	—
		silver	7440-22-4	X	D011	—
		tetrachloroethylene (perclene)	127-18-4	X	F002	—
		toluene	108-88-3	X	F005	—
		trichloroethylene (TCE)	79-01-6	X	F002	—
		xylene	1330-20-7	X	F003 See Note 2	—
110	RESEARCH GENERATED WASTE	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X (1, 4, 5, 108, 150, 151, 152, 182, 183) See Notes 4, 8, and 25	See Note 22
111	SOLIDIFIED WET SLUDGE	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X (1, 4, 5, 150, 151, 152)	—
120	D AND D WASTE COMPACTABLE AND COMBUSTIBLE SOLIDS	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X (1, 4, 5, 108, 150, 151, 152, 182, 183) See Notes 4, 8, and 25	See Note 22
121	TRU ORGANIC SOLID WASTE	See IDC AE-100 for constituents and HWNs	—	X (1, 4, 5, 150, 151, 152)	X (1, 4, 5, 150, 151, 152)	—
230	ARGONNE CH-DEBRIS	See Notes 9 and 15 (149)	See Note 9 (149)	See Note 9 (149)	See Note 9 (149)	—
254	ARGONNE CH HOMOGENEOUS SOLIDS	See Notes 9 and 15 (141)	See Note 9 (141)	See Note 9 (141)	See Note 9 (141)	—

Table A-2. Argonne National Laboratory – West (AW) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

AW IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
150	LABORATORY WASTE	See AW-167 for constituents and HWNs	—	X (1, 5, 105, 185)	X (1, 5, 105, 185) See Notes 2 and 3	See Note 22
		Potential corrosives if liquids exceed the WIPP-WAC limit	—	-	D002	—
153	COMBUSTIBLE LAB WASTE	See AW-150 for constituents and HWNs	—	X (1, 5, 105, 185)	X (1, 5, 105, 185)	—
154	SAMPLE FUEL	See AW-150	—	X (1, 4, 5, 105, 185)	X (1, 4, 5, 105, 185)	—
155	TRU SCRAP	See AW-150 for constituents and HWNs	—	X (1, 5, 105, 185)	X (1, 5, 105, 185)	—
160	AL/CL DEBRIS WASTE (See Note 15)	See AW-167 for constituents and HWNs	—	X (1, 5, 105, 185)	X (1, 5, 105, 185)	See Note 22
161	ACL GLASSWARE, PAPER, POLY, AND MISCELLANEOUS	See AW-167 for constituents and HWNs	—	X (1, 5, 18, 105) See AW-167	X (1, 5, 18, 105) See AW-167	See Note 22
162	ANL-W FMF EFL ZR-U-PU FUEL CASTING	See AW-167 for constituents and HWNs	—	X (1, 5, 18, 105) See AW-167	X (1, 5, 18, 105) See AW-167	See Note 22
163	ANL-W ACL COLD-LINE ABSORBED LIQUID AND DEBRIS	See AW-167 for constituents and HWNs	—	X (1, 5, 18, 105) See AW-167	X (1, 5, 18, 105) See AW-167	See Note 22
164	ANL-W HRA/WCA DEBRIS (See Note 15)	arsenic	7440-38-2	X (68, 69, 104, 105, 185)	D004 (68, 69,104,105,185)	See Note 22
		barium	7440-39-3	X	D005	
		beryllium (not beryllium powder)	7440-41-7	X		
		cadmium	7440-43-9	X	D006	
		chromium	7440-47-3	X	D007	
		hydrofluoric acid (used)	7664-39-3	X	—	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		selenium	7782-49-2	X	D010	
		silver	7440-22-4	X	D011	
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001/F002	
		1,1,2-trichloro-1,2,2-trifluorethane	76-13-1	X	F002	
		1,1,2-trichloroethane	79-00-5	X	F002	

Table A-2 (cont.) AW

AW IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
164	ANL-W HRA/WCA DEBRIS (See Note 15) (cont.)	1,4-dichlorobenzene (AKA p-dichlorobenzene)	106-46-7	X	D027	See Note 22
		1,2-dichloroethane	107-06-2	X	D028	
		1,1-dichlorethylene	75-35-4	X	D029	
		2,4-dinitrotoluene	121-14-2	X	D030	
		2-ethoxyethanol	110-80-5	X	F005	
		2-nitropropane	79-46-9	X	F005	
		acetone	67-64-1	X	F003 See Note 2	
		benzene	71-43-2	X	D018/F005	
		carbon disulfide	75-15-0	X	F005	
		carbon tetrachloride	56-23-5	X	D019/F001	
		chlorobenzene	108-90-7	X	D021/F002	
		chloroform (trichloromethane)	67-66-3	X	D022	
		cresols	1319-77-3	X	D026	
		cyanide- electroplating sludges	—		F006	
		cyanide plating bath solutions	—	X	F007	
		cyanide cleaning bath solutions	—	X	F009	
		cyclohexanone (cyclohexane)	110-82-7	X	F003 See Note 2	
		ethyl acetate (acetic acid)	141-78-6	X	F003 See Note 2	
		ethyl benzene	100-41-4	X	F003 See Note 2	
		ethyl ether	60-29-7	X	F003 See Note 2	
		hexachlorobenzene	118-74-1	X	D032	
		hexachloroethane	67-72-1	X	D034	
		isobutyl alcohol	78-83-1	X	F005	
		methanol	67-56-1	X	F003 See Note 2	
		methylene chloride	75-09-2	X	F001/F002	
		methyl ethyl ketone (2-butanone)	78-93-3	X	D035/F005	
		methyl isobutyl ketone	108-10-1	X	F003 See Note 2	
		nitrobenzene	98-95-3	X	D036/F004	
		n-butyl alcohol (butanol)	71-36-3	X	F003 See Note 2	
		pentachlorophenol	87-86-5	X	D037	
		pyridine	110-86-1	X	D038/ F005	
		tetrachloroethylene (perclene)	127-18-4	X	D039/F001/F002	
		toluene	108-88-3	X	F005	

Table A-2 (cont.) AW

AW IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
164	ANL-W HRA/WCA DEBRIS (See Note 15) (cont.)	trichloroethylene	79-01-6	X	D040/F001/F002	See Note 22
		trichloromonofluoromethane	75-69-4	X	F002	
		vinyl chloride	75-01-4	X	D043	
		xylenes	1330-20-7	X	F003 See Note 2	
165	ASH STABLIZATION & GGE DEBRIS (See Note 15)	arsenic	7440-38-2	X [104, 105, 185]	D004 [68, 105, 185]	See Note 22
		barium	7440-39-3	X	D005	
		beryllium (not beryllium powder)	7440-41-7	X	—	
		cadmium	7440-43-9	X	D006	
		chromium	7440-47-3	X	D007	
		lead	7439-92-1	X	D008	
		hydrofluoric acid (used)	7664-39-3	X	-	
		mercury	7439-97-6	X	D009	
		selenium	7782-49-2	X	D010	
		silver	7440-22-4	X	D011	
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001/F002	
		methylene chloride	75-09-2	X	F001/F002	
		xylene	1330-20-7	X	F003 (See Note 2)	
		toluene	108-88-3	X	F005	
167	MFC CH-TRU HETEROGENOUS DEBRIS (See Note 15)	arsenic	7440-38-2	X [104, 105, 185, 196, 197, 198]	D004 [104, 105, 185, 196, 197, 198]	See Note 22
		barium	7440-39-3	X	D005	
		beryllium (not beryllium powder)	7440-41-7	X	—	
		cadmium	7440-43-9	X	D006	
		chromium	7440-47-3	X	D007	
		hydrofluoric acid (used)	7664-39-3	X	—	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		selenium	7782-49-2	X	D010	
		silver	7440-22-4	X	D011	
		chloroform (trichloromethane)	67-66-3	X	D022	
		carbon tetrachloride	56-23-5	X	F001	

Table A-2 (cont.) AW

AW IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
167	MFC CH-TRU HETEROGENOUS DEBRIS (cont.) (See Note 15)	trichloroethylene	79-01-6	X	F002	See Note 22
		toluene	108-88-3	X	F005	
		pyridine	110-86-1	X	F005	
		various acids	—	—	—	
225	EFL LEAD GLOVES	See Notes 9 and 15 (144)	See Note 9 (144)	See Note 9 (144)		—

Table A-3. Battelle Columbus (BC) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

BC IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations) HI, WG See Note 26	Initial Gen Assigned HWN WG, PC See Note 29	WIPP WSPF Approved HWN WS, AK
201	NON-COMBUSTIBLE SOLIDS	lead	7439-92-1	X (1, 4, 177)	D008- (1, 4, 108, 177, 182, 183) See Notes 4, 8, and 25	See Note 22
		acetone	67-64-1	X	F003 See Note 2	
		alcohol (unspecified)	—	X	See Note 2	
		barium	7440-39-3	X	D005	
		cadmium	7440-43-9	X	D006	
		chromium	7440-47-3	X	D007	
		mercury	7439-97-6	X	D009	
		silver	7440-22-4	X	D011	
		benzene	71-43-2		F005	
		methanol	67-56-1	X	F003 See Note 2	
		n-butyl alcohol (butanol)	71-36-3	X	See Note 2	
		ethanol	—	x	See Note 2	
		hexane	110-54-3	X	See Note 2	
		various acids (H_2S0_4, HNO_2, HCL)	—	X	See Note 2	
		hydrofluoric acid (used)	7664-39-3	X	-	
		ethyl benzene	100-41-4	X	See Note 2	
		lithium metal	7439-93-2	X	See Note 8	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
		sodium (metal and sodium potassium)	7440-23-5	X	See Note 8	
		trichloroethylene	79-01-6	X	F001/F002	
		methylene chloride	75-09-2	X	F001/F002	
		toluene	108-88-3	X	F005	
		xylene	1330-20-7	X	See Note 2	
202	COMBUSTIBLE SOLIDS-PAPER/CLOTH	See BC 201 for constituents and HWNs	—	See BC 201	See BC 201 (108, 182, 183) See Notes 4, 8, 25	See Note 22
203	PAPER, CLOTH, METALS, GLASS	polychlorinated-biphenyls (PCBs)	1336-36-3	PCB (61)	N/A (61, 108, 182, 183) See Notes 4, 8, 25	—
		See BC 201 for constituents and HWNs	—	See BC 201	See BC 201	—
204	SOLIDIFIED SOLUTIONS	See BC 201 for constituents and HWNs	—	See BC 201	—	—

Table A-4. Bettis Atomic Power Laboratory (BL) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

BL IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
010	RAGS, GLOVES, POLY	1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X (1, 3, 5)	F001 (178)	—
		lead	7439-92-1	X	D008	—
		methylene chloride	75-09-2	X	F001	—
012	MISCELLANEOUS SOURCES	None (3, 5, 178)	—	None (3, 5, 178)	None (3, 5, 178)	—
015	NEUTRON SOURCES	beryllium (not beryllium powder)	7440-41-7	X (3)	None (178)	—
020	NON-COMPRESSIBLE, NON-COMBUSTIBLE	1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X (1, 3, 4, 5)	F001 (178)	—
		methylene chloride	75-09-2	X	F001	—
		lead	7439-92-1	X	D008	—
		nitrates	—	X	—	—
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	—
030	SOLIDIFIED GRINDING SLUDGE	1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X (3, 5)	F001 (178)	—
		methylene chloride	75-09-2	X	F001	—
		lead	7439-92-1	X	D008	—
040	SOLIDIFIED BINARY SCRAP POWDER	potential corrosives if liquids exceed the WIPP-WAC limit	—	X (1, 3, 4 5, 178)	D002	—
		lead (shielding only)	7439-92-1	X	D008 (178)	
050	SOLIDIFIED SOLUTIONS	None (3, 5, 178)	—	None (3, 5, 178)	None (3, 5, 178)	—
081	METAL SAMPLES FISSILE	None (3, 5, 178)	—	None (3, 5, 178)	None (3, 5, 178)	—
338	RWMC LEAD SHIELDED OVERPACK: EMPTY	lead	7439-92-1	X (1, 178)	D008 (178)	—

Table A-5. AMWTP (BN) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
180	PAD 1 CELLS 1, 2 AND 3 WASTE RETRIEVAL CONTAINERS See Note 13.	See BN-550 for temporary list of constituents [154]	—	See BN-550 [154]	See BN-550 list of HWNs [154]	—
		beryllium (not beryllium powder)	7440-41-7	PK	None	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB [154]	N/A	—
500	NEWLY GENERATED DEBRIS (NOT BN-508)	See Note 20	—	See Note 20	See Note 20	—
501	AMWTP PCB SOIL	See Note 20	—	See Note 20	See Note 20	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB [154]	See Note 20	—
505	INORGANIC HOMOGENEOUS SOLIDS	See Note 20	—	See Note 20	See Note 20	—
507	ABSORBED AQUEOUS SQUEEZANTS	See BN-550 and Note 20	—		See BN-550 and Note 20	—
508	AMWTP NEWLY GENERATED DEBRIS	See BN-550 [37, 114]	—	See BN-550 [37, 114]	See BN-550 [37, 108, 114 182, 183] See Notes 4, 8, 25	See Note 22
509	ABSORBED ORGANIC LIQUIDS (EXCLUDING SQUEEZANTS)	See Note 20	—	See Note 20	See Note 20	—
510	SUPERCOMPACTED DEBRIS (See Note 22)	arsenic	7440-38-2	X [37, 93]	D004 [37]	D004[37]
		asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	F005	F005
		cadmium	7440-43-9	X	D006	D006
		carbon disulfide	75-15-0	X	F005	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chromium	7440-47-3	X	D007	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		hexachlorobenzene	118-74-1	X	N/A	N/A
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	See Note 2	N/A
		methylene chloride	75-09-2	X	F002	F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	F005

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
510	SUPERCOMPACTED DEBRIS (cont.) (See Note 22)	selenium	7782-49-2	X	D010	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	F001/F002
		toluene	108-88-3	X	F005	F005
		trichloroethylene (TCE)	79-01-6	X	F001/F002	F001/F00
		xylene	1330-20-7	X	See Note 2	N/A
511	PCB ORGANIC HOMOGENEOUS SOLIDS	See Note 20	—	See Note 20	See Note 20	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB See Note 20. [154]	N/A	—
513	NON-PCB ORGANIC HOMOGENEOUS SOLIDS	See Note 20 [154]	—	See Note 20 [154]	See Note 20 [154]	—
514	ABSORBED ORGANIC SQUEEZANTS	See BN-550 and Note 20	—		See BN-550 and Note 20 [37, 75, 97]	—
515	ABSORBED AQUEOUS LIQUIDS (EXCLUDING SQUEEZANTS)	See Note 20	—	See Note 20	See Note 20	—
516	WMF-676 INORGANIC HOMOGENEOUS SOLIDS	See BN-550 and Note 20	See BN-550 and Note 20	See BN-550 and Note 20	See BN-550 and Note 20	—
517	TRU SUPERCOMPACTOR SQUEEZANTS (P/U LISTED)	See BN-550 and Note 20	See BN-550 and Note 20	See BN-550 and Note 20	See BN-550 and Note 20	—
518	TRU SUPERCOMPACTOR SQUEEZANTS	See BN-550 and Note 20	—		See BN-550 and Note 20 [37,75, 97, 114]	—
519	TRU SDOP to SUPERCOMPACTOR	IDC not used for characterization. Confirmed TRUW-83 feedstock only.[108] Temporary IDC for transport only. See IDC BN-550	—	IDC not used for characterization. Temporary IDC for transport only. Confirmed TRUW-83 feedstock only.[108] See IDC BN-550	IDC not used for characterization. Temporary IDC for transport only. Confirmed TRUW-83 feedstock only.[108] See IDC BN-550	—
520	TRU PCB SECONDARY DEBRIS GENERATED FROM OFFSITE WASTE (See Note 5)	See Note 20	—		See Note 20	—
521	TRU SECONDARY DEBRIS GENERATED FROM OFFSITE WASTE (See Note 5)	See Note 20	—		See Note 20	—
522	AMWTP NON-PCB SOIL	See Note 20	—	See Note 20	See Note 20	—

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
523	PAD 1 CELLS 1 AND 2 PCB DEBRIS	See BN-550 [154] and ID-150	—	See BN-550 [154] and ID-150	See BN-550 [154] and ID-150	—
		beryllium (not beryllium powder)	7440-41-7	PK	None	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB	N/A	—
524	PAD 1 CELLS 1 AND 2 NON-PCB DEBRIS	See BN-550 [154] and ID-150	—	See BN-550 [154] and ID-150	See BN-550 [154] and ID-150	—
		beryllium (not beryllium powder)	7440-41-7	PK	None	
525	P/U-LISTED LAB NON-PCB DEBRIS WASTE	See Note 20	—	See Note 20	See Note 20	—
526	LAB PCB DEBRIS WASTE (NOT P/U-LISTED)	See Note 20 [154]		See Note 20 [154]	See Note 20 [154]	—
527	LAB NON-PCB DEBRIS WASTE (NOT P/U-LISTED)	See Note 20 [154]		See Note 20 [154]	See Note 20 [154]	—
528	TRU PCB LIQUIDS	See Note 20		See Note 20	See Note 20	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB	N/A	—
529	TRU NON-PCB LIQUIDS	See Note 20	—	See Note 20	See Note 20	—
534	ORGANIC LIQUID FROM MAINTENANCE ACTIVITIES	See Note 20		See Note 20	See Note 20	—
536	TRU EMPTY CONTAINERS WITH PCBS	polychlorinated-biphenyls (PCBs)	1336-36-3	PCB	None	—
537	TRU EMPTY CONTAINERS	None identified	—	N/A	None	—
538	OVERSIZED DEBRIS ITEMS FROM SUPERCOMPACTOR FACILITY	See IDC BN-550 [37, 97, 114]		See IDC BN-550 [37, 97, 114]	See IDC BN-550 [37, 97, 114]	—
539	TRU RADIOACTIVE ONLY DEBRIS WASTE	N/A	N/A	PK	None	—
540	OVERSIZED DEBRIS ITEMS FROM SUPERCOMPACTOR FACILITY	See IDC BN-550 [37, 97, 114]		See IDC BN-550 [37, 97, 114]	See IDC BN-550 [37, 97, 114]	—

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
541	DEBRIS SDOP TO SUPERCOMPACTOR	IDC not used for characterization. Confirmed TRUW-83 feedstock only. [108] Temporary IDC for transport only. See IDC BN-550	—	IDC not used for characterization. Temporary IDC for transport only. Confirmed TRUW-83 feedstock only.[108] See IDC BN-550	IDC not used for characterization. Temporary IDC for transport only. Confirmed TRUW-83 feedstock only.[108] See IDC BN-550	—
550	SUPERCOMPACTED DEBRIS See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [37, 97, 114]	F001/F002 [37, 97, 114]	F001/F002 [37, 97, 114, 115]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	F001/F002
		1,1,2,2,-tetrachloro-1,2-difluoroethane	79-34-5	X	F001	F001 [97, 115]
		1,1,2-trichloroethane	79-00-5	X	F002	F002
		1,2-dichloroethane	107-06-2	X	D028	D028
		1,2-dichlorobenzene	95-50-1	X	F002	F002
		1,1-dichloroethylene	75-35-4	X	D029	D029
		1,4-dichlorobenzene	106-46-7	X	D027	D027
		2,4-dinitrotoluene	121-14-2	X	D030	D030
		2-ethoxyethanol	110-80-5	X	F005	F005
		2-nitropropane	79-46-9	X	F005 [97]	F005
		acetone	67-64-1	X	See Note 2	See Note 2
		arsenic	7440-38-2	X	D004	D004
		asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	F005	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	D006	D006
		carbon disulfide	75-15-0	X	F005	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chlorobenzene	108-90-7	X	F002	F002
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chromium	7440-47-3	X	D007	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		cresols	1319-77-3	X	F004	F004

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
550	SUPERCOMPACTED DEBRIS (cont.) See Note 22	electroplating sludges	—	X	F006	F006
		hexachlorobenzene	118-74-1	X	D032	D032
		hexachlorobutadiene	87-68-3	X	D033	D033
		hexachloroethane	67-72-1	X	D034	D034
		isobutanol (isobutyl alcohol)	78-83-1	X	F005	F005
		lead	7439-92-1	X	D008	D008 [(115)]
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	See Note 2	See Note 2
		methylene chloride	75-09-2	X	F001/F002	F001/F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	F005
		nitrobenzene	98-95-3	X	F004	F004
		pentachlorophenol	87-86-5	X	D037	D037
		petroleum ether/Naptha	64742-82-1	X[(208)]	D001 (see Notes 2 & 30)	—
		pyridine	110-86-1	X	F005	F005
		selenium	7782-49-2	X	D010	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	F001/F002
		toluene	108-88-3	X	F005	F005
		trichloroethylene (TCE)	79-01-6	X	F001/F002	F001/F002
		trichlorofluoromethane	75-69-4	X	F001/F002	F001/F002
		vinyl chloride	75-01-4	X	D043	D043
		xylene	1330-20-7	X	See Note 2	See Note 2
597	P/U-LISTED LAB PCB DEBRIS WASTE	See Note 20		See Note 20	See Note 20	—
598	P/U-LISTED LAB PCB HOMOGENEOUS SOLIDS WASTE	See Note 20		See Note 20	See Note 20	—
599	LAB NON- PCB HOMOGENEOUS SOLIDS WASTE (NOT P/U-LISTED)	See Note 20		See Note 20	See Note 20	—

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
600	WMF-676 PCB CONTAMINATED DEBRIS See Note 18	1,1,1-trichloroethane (TCA)	71-55-6	X [46, 114, 122]	F001/F002 [46, 114, 122]	F001/F002 [46, 114, 122]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	F001/F002
		1,1,2,2,-tetrachloro-1,2-difluoroethane	79-34-5	X	F001	F001
		1,1,2-trichloroethane	79-00-5	X	F002	
		1,2-dichloroethane	107-06-2	X	D028	D028
		1,2-dichlorobenzene	95-50-1	X	F002	F002
		1,1-dichloroethylene	75-35-4	X	D029	D029
		1,4-dichlorobenzene	106-46-7	X	D027	D027
		2,4-dinitrotoluene	121-14-2	X	D030	D030
		2-ethoxyethanol	110-80-5	X	F005	F005
		2-nitropropane	79-46-9	X	F005	F005
		acetone	67-64-1	X	See Note 2	See Note 2
		arsenic	7440-38-2	X	D004	D004
		asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	F005	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	D006	D006
		carbon disulfide	75-15-0	X	F005	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chlorobenzene	108-90-7	X	F002	F002
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chromium	7440-47-3	X	D007	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		cyclohexane	110-82-7	X	See Note 2	See Note 2
		cresols	1319-77-3	X	F004	F004
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	See Note 2
		ethyl ether	60-29-7	X	See Note 2	See Note 2
		hexachlorobenzene	118-74-1	X	D032	D032

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
600	WMF-676 PCB CONTAMINATED DEBRIS (cont.) See Note 18	hexachlorobutadiene	87-68-3	X	D033	
		hexachloroethane	67-72-1	X	D034	D034
		hexane	110-54-3	X	N/A	N/A
		hydrofluoric acid (hydrogen fluoride)	7664-39-3	X	N/A	N/A
		isobutanol (isobutyl alcohol)	78-83-1	X	F005	F005
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	See Note 2	See Note 2
		methylene chloride	75-09-2	X	F001/F002	F001/F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	F005
		methyl isobutyl ketone	108-10-1	X	N/A	N/A
		n-butyl alcohol (butanol)	71-36-3	X	See Note 2	See Note 2
		nitrobenzene	98-95-3	X	F004	F004
		pentachlorophenol	87-86-5	X	D037	D037
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB [(46)]	N/A	N/A
		pyridine	110-86-1	X	F005	F005
		selenium	7782-49-2	X	D010	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	F001/F002
		toluene	108-88-3	X	F005	F005
		trichloroethylene (TCE)	79-01-6	X	F001/F002	F001/F002
		trichlorofluoromethane	75-69-4	X	F001/F002	F001/F002
		vinyl chloride	75-01-4	X	D043	D043
		xylene	1330-20-7	X	See Note 2	See Note 2
602	P/U-LISTED LAB NON-PCB HOMOGENEOUS SOLIDS WASTE	See Note 20		See Note 20	See Note 20	—
603	LAB PCB HOMOGENEOUS SOLIDS WASTE (NOT P/U-LISTED)	See Note 20		See Note 20	See Note 20	—
604	DEBRIS TSCA/PCB	polychlorinated-biphenyls (PCBs)	1336-36-3	PCB See Note 20.	See Note 20	—
605	ABSORBED LIQUIDS TSCA/PCB	polychlorinated-biphenyls (PCBs)	1336-36-3	See Note 20	See Note 20	—
607	FIRST/SECOND STAGE SLUDGE LIQUID	Not generated to date		Not generated to date	Not generated to date	—

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
608	SPECIAL SETUPS LIQUID	Not generated to date		Not generated to date	Not generated to date	
609	BUILDING 374 SLUDGE LIQUID	Not generated to date		Not generated to date	Not generated to date	
610	MISC. HOMOGENEOUS SOLID LIQUID	Not generated to date		Not generated to date	Not generated to date	—
611	SEWAGE AND POND SLUDGE LIQUID	Not generated to date		Not generated to date	Not generated to date	—
612	CAUSTIC WASTE LIQUID	Not generated to date		Not generated to date	Not generated to date	—
613	ACID WASTE LIQUID	Not generated to date		Not generated to date	Not generated to date	—
614	CEMENTED SLUDGE LIQUID	Not generated to date		Not generated to date	Not generated to date	—
615	OASIS WASTE LIQUID	Not generated to date		Not generated to date	Not generated to date	—
616	ORGANIC SETUPS PCB LIQUID	Not generated to date		Not generated to date	Not generated to date	—
617	SOLIDIFIED SOLUTIONS LIQUID	Not generated to date		Not generated to date	Not generated to date	—
770	DEBRIS FROM RPT-TRUW-83 GENERATORS	1,1,1-trichloroethane (TCA)	71-55-6	X [114,192]	F001/F002 [114,192]	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	—
		1,1,2,2,-tetrachloro-1,2-difluoroethane	79-34-5	X	F001	—
		1,1,2-trichloroethane	79-00-5	X	F002	—
		1,2-dichloroethane	107-06-2	X	D028	—
		1,2-dichlorobenzene	95-50-1	X	F002	—
		1,1-dichloroethylene	75-35-4	X	D029	—
		1,4-dichlorobenzene	106-46-7	X	D027	—
		2,4-dinitrotoluene	121-14-2	X	D030	—
		2-ethoxyethanol	110-80-5	X	F005	—
		2-nitropropane	79-46-9	X	F005 [97]	—
		acetone	67-64-1	X	See Note 2	—
		arsenic	7440-38-2	X	D004	—
		asbestos	1332-21-4	X	N/A	—
		barium	7440-39-3	X	D005	—
		benzene	71-43-2	X	F005	—
		beryllium (not beryllium powder)	7440-41-7	X	N/A	—
		cadmium	7440-43-9	X	D006	—
		carbon disulfide	75-15-0	X	F005	—
		carbon tetrachloride	56-23-5	X	F001	—
		chlorobenzene	108-90-7	X	F002	—
		chloroform (trichloromethane)	67-66-3	X	D022	—
		chromium	7440-47-3	X	D007	—

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
770	DEBRIS FROM RPT-TRUW-83 GENERATORS (cont.)	cyanide cleaning bath solutions	—	X	F009	—
		cyanide plating bath solutions	—	X	F007	—
		cresols	1319-77-3	X	F004	—
		electroplating sludges	—	X	F006	—
		hexachlorobenzene	118-74-1	X	D032	—
		hexachlorobutadiene	87-68-3	X	D033	—
		hexachloroethane	67-72-1	X	D034	—
		isobutanol (isobutyl alcohol)	78-83-1	X	F005	—
		Lead	7439-92-1	X	D008	—
		mercury	7439-97-6	X	D009/U151	—
		methanol	67-56-1	X	See Note 2	—
		methylene chloride	75-09-2	X	F001/F002	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	—
		nitrobenzene	98-95-3	X	F004	—
		pentachlorophenol	87-86-5	X	D037	—
		petroleum ether/Naptha	64742-82-1	X[(208)]	D001 (see Notes 2 & 30)	—
		pyridine	110-86-1	X	F005	—
		selenium	7782-49-2	X	D010	—
		silver	7440-22-4	X	D011	—
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	—
		toluene	108-88-3	X	F005	—
		trichloroethylene (TCE)	79-01-6	X	F001/F002	—
		trichlorofluoromethane	75-69-4	X	F001/F002	—
		vinyl chloride	75-01-4	X	D043	—
		xylene	1330-20-7	X	See Note 2	—
		acetonitrile	75-05-8	X	U003	—
		cyanides (soluble cyanide salts) not otherwise specified	—-	X	P030	—
		dimethyl sulfate	77-78-1	X	U103	—
		hydrofluoric acid	7664-39-3	X	U134	—
		potassium cyanide	151-50-8	X	P098	—
		potassium silver cyanide	506-61-6	X	P099	—

Table A-5. (cont.) BN

BN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
770	DEBRIS FROM RPT-TRUW-83 GENERATORS (cont.)	sodium cyanide	143-33-9	X	P106	—
		1.4 dioxane	123-91-1	X	U108	—

Table A-6. Babcock and Wilcox hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

BW IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
515	PLASTICS, PAPER, CLOTH, ETC.	TBD	—	TBD	—	—
516	STEEL, AL, ELECTRICAL DEVICES-HANDHELD	TBD	—	TBD	—	—
517	HEAVY METALS, STEEL, AL, BRASS	TBD	—	TBD	—	—

Table A-7. Bendix (BX) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

BX IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
111	MISCELLANEOUS SOURCE MATERIAL	TBD	—	TBD	—	—

Table A-8. INL CH2M-WG (CW) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

CW IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
216	SLUDGE REPACKAGE PROJECT PCB CONTAMINATED INORGANIC SLUDGE	See Notes 9 and 15	See Notes 9 and 15	See Notes 9 and 15	See Notes 9 and 15	—

Table A-9. General Electric Vallecitos (GV) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

GV IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
222	GE VNC HOT CELL DEBRIS WASTE	See notes 9 and 15	—	See Note 9 [103]	See Note 15 [103]	—

Table A-10. INL Auxiliary Reactor Area (IA) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

IA IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
150	LABORATORY WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
152	PU NEUTRON SOURCES	See Note 27	See Note 27	See Note 27	See Note 27	—
		beryllium (not beryllium powder)	7440-41-7	X	N/A	—
153	COMBUSTIBLE LABORATORY WASTE	See ID-155 [51, 106, 192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
154	SAMPLE FUEL	See ID-155 [192]	See ID-155 [192]	See ID-155, [192]	See ID-155 [192]	—
155	TRU SCRAP	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
157	MISCELLANEOUS RADIONUCLIDE SOURCES	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22

Table A-11. INL INTEC (IC) Hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

IC IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
150	LABORATORY WASTE	See ID-150 [192]	See ID-150 [192]	See ID-150 [192]	See ID-150 [192]	See Note 22
151	SOLIDIFIED FUEL SLUDGE	See Note 27	See Note 27	See Note 27	See Note 27	—
152	PU NEUTRON SOURCES	See Note 27	See Note 27	See Note 27	See Note 27	—
		beryllium (not beryllium powder)	7440-41-7	X	N/A	—
153	COMBUSTIBLE LABORATORY WASTE	See ID-155 [51, 106, 192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
154	SAMPLE FUEL	See ID-155 [192]	See ID-155 [192]	See ID-155, [192]	See ID-155 [192]	—
155	TRU SCRAP	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
156	CHEM CELL RIP-OUT	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
157	MISCELLANEOUS RADIONUCLIDE SOURCES	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
526	INTEC LABORATORY PCB DEBRIS WASTE (See Note 5)	See ID-150 [51, 106, 192]	See ID-150 [51, 106, 192]	See ID-150 [51, 106, 192]	See ID-150 [51, 106, 192]	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB	N/A	—
527	LABORATORY NON-PCB DEBRIS	See ID-150 [51, 106, 192]	See ID-150 [51, 106, 192]	See ID-150 [51, 106, 192]	See ID-150 [51, 106, 192]	See Note 22
601	ALPHA LOW LEVEL LAB. WIPP ANALYTICAL WASTE	See ID-150 [192]	See ID-150 [192]	See ID-150 [192]	See ID-150 [192]	See Note 22
603	LABORATORY HOMOGENEOUS SOLIDS WASTE (see Note 5)	See ID-150 [51, 106, 192]	See ID-150[51, 106, 192]	See ID-150 [51, 106, 192]	See ID-150 [51, 106, 192]	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB	N/A	—
604	CWI CH DEBRIS FROM RE-PACKAGING AMWTP RH DEBRIS	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	
605	CWI CH DEBRIS FROM RE-PACKAGING AMWTP RH DEBRIS – NON-RPT-TRUW-83 IDCS	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	
606	CWI CH HOMOGENEOUS SOLIDS FROM RE-PACKAGING AMWTP RH DEBRIS - WIPP APPROVED IDCS	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
607	CWI CH HOMOGENEOUS SOLIDS FROM RE-PACKAGING AMWTP RH DEBRIS – NON-WIPP APPROVED IDCS	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—

Table A-12. Idaho National Laboratory (ID) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

ID IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent Chemical Property, or Hazardous Item (for supporting safe storage configurations) HI, WG See Note 26	Initial Gen Assigned HWN WG, PC See Note 29	WIPP WSPF Approved HWN WS, AK
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See Note 22
150	LABORATORY WASTE (192)	1,1,1-trichloroethane (TCA) (192)	71-55-6	X (51, 106, 192)	F001/F002 (106, 192)	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	
		1,1,2-trichloroethane	79-00-5	X	F002	
		1,1,2,2-tetrachloro-1,2-difluoroethane	76-12-0	X	F001	
		1,1-dichlorethylene	75-35-4	X	D029	
		1,2-dichlorobenzene	95-50-1	X	F002	
		1,2-dichloroethane	107-06-2	X	D028	
		1,4 dichlorobenzene	106-46-7	X	D027	
		1,4-diethyleneoxide	123-91-1	X	U108	
		2,4-dinitrotoluene	121-14-2	X	D030	
		2-ethoxyethanol	110-80-5	X	F005	
		2-nitropropane	79-46-9	X	F005	
		acetonitrile	75-05-8	X	U003	
		arsenic (various compounds)	7440-38-2	X	D004	
		barium (various compounds)	7440-39-3	X	D005	
		benzene	71-43-2	X	F005/D018	
		cadmium (various compounds)	7440-43-9	X	D006	
		carbon disulfide	75-15-0	X	F005/D019	
		carbon tetrachloride	56-23-5	X	F001	
		chlorobenzene	108-90-7	X	F002/D021	
		chloroform (trichloromethane)	67-66-3	X	D022	
		chromium (various compounds)	7440-47-3	X	D007	
		cresols	1319-77-3	X	F004/D026	
		cresylic acid	95-48-7	X	F004	
		cyanides (soluble cyanide salts) not otherwise specified	—	X	P030	
		dimethyl sulfate	77-78-1	X	U103	
		hexachlorobenzene	118-74-1	X	D032	
		hexachlorobutadiene	87-68-3	X	D033	
		hexachloroethane	67-72-1	X	D034	
		hydrofluoric acid	7664-39-3	X	U134	
		isobutanol	78-83-1	X	F005	
		lead (various compounds)	7439-92-1	X	D008	

Table A-12. (cont.) ID

ID IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
150	LABORATORY WASTE [(192)] (cont.)	mercury (various compounds)	7439-97-6	X	D009/U151	See Note 22
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
		methylene chloride	75-09-2	X	F001/F002/D035	
		nitrobenzene	98-95-3	X	F004/D036	
		pentachlorophenol	87-86-5	X	D037	
		potassium cyanide	151-50-8	X	P098	
		potassium silver cyanide	506-61-6	X	P099	
		pyridine	110-86-1	X	F005/D037	
		selenium (various compounds)	7782-49-2	X	D010	
		Silver (various compounds)	7440-22-4	X	D011	
		sodium cyanide	143-33-9	X	P106	
		spent cyanide plating bath solutions from electroplating operations [(192)]	—	X	F007	
		spent stripping and cleaning bath solutions from electroplating operations [(192)]	—	X	F009	
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002/D039	
		toluene [(192)]	108-88-3	X	F005	
		trichloroethylene (TCE) [(192)]	79-01-6	X	F001/F002/D040	
		trichlorofluoroethylene	359-29-5	X	F001	
		trichlorofluoromethane [(192)]	75-69-4	X	F001/F002	
		vinyl chloride [(192)]	75-01-4	X	D043	
		wastewater treatment sludges from electroplating operations [(192)]	—	X	F006	
152	PU NEUTRON SOURCES	See NOTE 27	See NOTE 27	See NOTE 27	See NOTE 27	—
		beryllium (not beryllium powder)	7440-41-7	X	N/A	
153	COMBUSTIBLE LABORATORY WASTE	See ID-155 [(51, 106, 192)]	See ID-155 [(192)]	See ID-155 [(192)]	See ID-155 [(192)]	See Note 22
154	SAMPLE FUEL	See ID-155 [(192)]	See ID-155 [(192)]	See ID-155, [(192)]	See ID-155 [(192)]	See Note 22
155	TRU SCRAP	1,1,1-trichloroethane (TCA)	71-55-6	X [(192)]	F001/F002 [(192, 193)]	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	
		1,1,2-trichloroethane	79-00-5	X	F002	
		1,1,2,2-tetrachloro-1,2-difluoroethane	76-12-0	X	F001	
		1,1-dichlorethylene	75-35-4	X	D029	

Table A-12. (cont.) ID

ID IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
155	TRU SCRAP (cont.)	1,2-dichlorobenzene	95-50-1	X	F002	—
		1,2-dichloroethane	107-06-2	X	D028	See Note 22
		1,4 dichlorobenzene	106-46-7	X	D027	
		2,4-dinitrotoluene	121-14-2	X	D030	
		2-ethoxyethanol	110-80-5	X	F005	
		2-nitropropane	79-46-9	X	F005	
		arsenic (various compounds)	7440-38-2	X	D004	
		barium (various compounds)	7440-39-3	X	D005	
		benzene	71-43-2	X	F005	
		cadmium (various compounds)	7440-43-9	X	D006	
		carbon disulfide	75-15-0	X	F005	
		carbon tetrachloride	56-23-5	X	F001	
		chlorobenzene	108-90-7	X	F002	
		chloroform (trichloromethane)	67-66-3	X	D022	
		chromium (various compounds)	7440-47-3	X	D007	
		cresols	1319-77-3	X	F004	
		cresylic acid	95-48-7	X	F004	
		cyanide cleaning bath solutions	—	X	F009	
		cyanide plating bath solutions	—	X	F007	
		hexachlorobenzene	118-74-1	X	D032	
		hexachloroethane	67-72-1	X	D034	
		isobutanol	78-83-1	X	F005	
		lead (various compounds)	7439-92-1	X	D008	
		mercury (various compounds)	7439-97-6	X	D009	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
		methylene chloride	75-09-2	X	F001/F002	
		nitrobenzene	98-95-3	X	F004	
		pentachlorophenol	87-86-5	X	D037	
		pyridine	110-86-1	X	F005	
		selenium (various compounds)	7782-49-2	X	D010	
		silver (various compounds)	7440-22-4	X	D011	
		toluene	108-88-3	X	F005	
		trichloroethylene (TCE)	79-01-6	X	F001/F002	
		trichlorofluoroethylene	359-29-5	X	F001	

Table A-12. (cont.) ID

ID IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
155	TRU SCRAP (cont.)	trichlorofluoromethane	75-69-4	X	F001/F002	See Note 22
		vinyl chloride	75-01-4	X	D043	
		wastewater treatment sludges from electroplating operations	—	X	F006	
157	MISCELLANEOUS RADIONUCLIDE SOURCES	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
175	DRCT SCRAP METAL WASTE FROM TAN	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
337	PLASTIC, TEFLON, WASH, PVC, RET. RF TRU	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22

Table A-13. INL – Central Facilities Area (IF) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

IF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
150	LABORATORY WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X [1]	D002	
152	PU NEUTRON SOURCES	See NOTE 27	See NOTE 27	See NOTE 27	See NOTE 27	—
		beryllium (not beryllium powder)	7440-41-7	X	N/A	
153	COMBUSTIBLE LABORATORY WASTE	See ID-155 [51, 106, 192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
154	SAMPLE FUEL	See ID-155 [192]	See ID-155 [192]	See ID-155, [192]	See ID-155 [192]	—
155	TRU SCRAP	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
157	MISC. RADIONUCLIDE SOURCES	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155, [192]	See Note 22

Table A-14. INL – Naval Reactors Facility (IN) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

IN IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See Note 22
150	LABORATORY WASTE	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	—
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X (1)	D002	
152	PU NEUTRON SOURCES	See NOTE 27	See NOTE 27	See NOTE 27	See NOTE 27	—
153	COMBUSTIBLE LAB WASTE	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See Note 22
154	SAMPLE FUEL	See ID-155 (192)	See ID-155 (192)	See ID-155, (192)	See ID-155 (192)	—
155	TRU SCRAP	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See Note 22

Table A-15. INL – Critical Infrastructure Test Range Complex (IP) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

IP IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	—
150	LABORATORY WASTE	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	—
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X (1)	D002	—
152	PU NEUTRON SOURCES	See NOTE 27	See NOTE 27	See NOTE 27	See NOTE 27	—
153	COMBUSTIBLE LAB WASTE	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	—
154	SAMPLE FUEL	See ID-155 (192)	See ID-155 (192)	See ID-155, (192)	See ID-155 (192)	—
155	TRU SCRAP	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	—
157	MISC. RADIONUCLIDE SOURCES	See ID-155 (192)	See ID-155 (192)	See ID-155 (192)	See ID-155, (192)	—

Table A-16. INL – Test Reactor Area (IR) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

IR IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
150	LABORATORY WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	—
152	PU NEUTRON SOURCES	See NOTE 27	See NOTE 27	See NOTE 27	See NOTE 27	—
153	COMBUSTIBLE LAB WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
154	SAMPLE FUEL	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
155	TRU SCRAP	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
157	MISCELLANEOUS RADIONUCLIDE SOURCES	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
603	Advanced Test Reactor (ATR) CH-TRU ABSORBED LIQUIDS	N/A [190] (see Note 5)	N/A	N/A [190] (see Note 5)	N/A [190] (see Note 5)	—

Table A-17. INL – Test Area North (IT) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

IT IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 - [192]	See ID-155 - [192]	—
150	LABORATORY WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	—
152	PU NEUTRON SOURCES	See NOTE 27	See NOTE 27	See NOTE 27	See NOTE 27	—
		beryllium (not beryllium powder)	7440-41-7	X [1]	N/A	—
153	COMBUSTIBLE LAB WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
154	SAMPLE FUEL	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
155	TRU SCRAP	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
157	MISC. RADIONUCLIDE SOURCES	See ID-155 [192]	See ID-155 [192]	See ID-155 [192	See ID-155 [192]	See Note 22
175	DRCT SCRAP METAL WASTE FROM TAN	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—

Table A-18. INL – Radioactive Waste Management Complex (IW) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

IW IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
005	EVAPORATOR SALTS-RETRIEVED RF TRU	IDC superseded. See SD-176	IDC superseded. See SD-176	IDC superseded. See SD-176	IDC superseded. See SD-176	—
021	RADIOACTIVE MIXED LEAD WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
150	LABORATORY WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	
152	PU NEUTRON SOURCES	See NOTE 27	See NOTE 27	See NOTE 27	See NOTE 27	—
153	COMBUSTIBLE LAB WASTE	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
154	SAMPLE FUEL	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
155	TRU SCRAP	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
157	MISCELLANEOUS RADIONUCLIDE SOURCES	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See Note 22
176	RWMC HOMOGENEOUS SOLIDS	See SD-176	See SD-176	See SD-176	See SD-176	
177	RWMC HETEROGENEOUS DEBRIS	See SD-177	See SD-177	See SD-177	See SD-177	
178	RWMC Soil	See SD-178	See SD-178	See SD-178	See SD-178	
179	PRE-1980 SDA WASTE RETRIEVAL BINS	IDC superseded. See SD-179	See SD-179	See SD-179	See SD-179	—
337	PLASTIC, TEFLON, WASHABLES, PVC	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	See ID-155 [192]	—
526	LABORATORY PCB DEBRIS WASTE	See ID-150 [51, 106, 145, 192]	See ID-150 [51, 106, 145, 192]	See ID-150 [51, 106, 145, 192]	See ID-150 [51, 106, 145, 192]	—
		polychlorinated byphenyls (PCBs)	1336-36-3	PCB	N/A	—
527	LABORATORY NON-PCB DEBRIS	See ID 150 [51, 106, 147, 192]	See ID 150 [51, 106, 147, 192]	See ID 150 [51, 106, 147, 192]	See ID 150 [51, 106, 147, 192]	See Note 22
603	LABORATORY HOMOGENEOUS SOLIDS WASTE	See ID-150 [51, 106, 147, 192]	See ID-150 [51, 106, 147, 192]	See ID-150 [51, 106, 147, 192]	See ID-150 [51, 106, 147, 192]	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB	N/A	—

Table A-19. J. C. Haynes (JH) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

JH IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
826	COMBUSTIBLE EQUIPMENT BOXES AND FLOOR SWEEPINGS	none identified	—	X [(13)]	—	—
827	SOLID TRASH AND DRY LAB. MATERIAL	lead	7439-92-1	X [(13)]	—	—

Table A-20. Los Alamos National Laboratory (LA) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

LA IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
007	MIXED HETEROGENEOUS DEBRIS FROM TA-55 (see Note 24)	1,1,1-trichloroethane (TCA) [(181, 187)]	71-55-6	X [(181, 187)]	F001/F002[(181, 187)]	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	
		acetone	67-64-1	X	See Note 2	
		arsenic	7440-38-2	X	D004	
		asbestos	1332-21-4	X	N/A	
		barium	7440-39-3	X	D005	
		benzene	71-43-2	X	F005/D018	
		beryllium (not beryllium powder)	7440-41-7	X	N/A	
		butanol	71-36-3	X	See Note 2	
		cadmium	7440-43-9	X	D006	
		carbon tetrachloride	56-23-5	X	F001/D019	
		chlorobenzene	108-90-7	X	F002/D021	
		chloroform (trichloromethane)	67-66-3	X	D022	
		chromium	7440-47-3	X	D007	
		ethyl ether	60-29-7	X	See Note 2	
		hydrofluoric acid	7664-39-3	X	N/A	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		methanol	67-56-1	X	See Note 2	
		methylene chloride	75-09-2	X	F001/F002	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005/D035	

Table A-20 (cont.) LA

LA IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
007	MIXED HETEROGENEOUS DEBRIS FROM TA-55 (cont.) (see Note 24)	nitrate salt	—	X	See Notes 2 and 8	See Note 22
		perchloric acid	7601-90-3	X	See Notes 2 and 8	
		pyridine	110-86-1	X	F005/D038	
		selenium	7782-49-2	X	D010	
		silver	7440-22-4	X	D011	
		sodium metal	7440-23-5	X	See Notes 2 and 8	
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002/ D039	
		toluene	108-88-3	X	F005	
		trichloroethylene (TCE)	79-01-6	X	F001/F002/D040	
		various corrosives (e.g., nitric acid and sodium and potassium hydroxide)	—	-	See Note 2	
		xylene	1330-20-7	X	See Note 2	
008	MIXED HETEROGENEOUS DEBRIS FROM TA-3 (see Notes 24 and 28)	1,1,1-trichloroethane (TCA) [184, 207]	71-55-6	X [184, 207]	F001/F002 [184, 207]	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	—
		arsenic	7440-38-2	X	D004	—
		barium	7440-39-3	X	D005	—
		benzene	71-43-2	X	F005/D018	—
		beryllium (not beryllium powder)	7440-41-7	X	N/A	—
						—
		cadmium	7440-43-9	X	D006	—
		carbon tetrachloride	56-23-5	X	F001/D019	—
		chlorobenzene	108-90-7	X	F002/D021	—
		chloroform (trichloromethane)	67-66-3	X	D022	—
		chromium	7440-47-3	X	D007	—
		cresol/cresylic acid	1319-77-3	X	F004/D026	—
		1,4-dichlorobenzene	106-46-7	X	D027	—
		1,2-dichloroethane	107-06-2	X	D028	—
		1,1-dichloroethylene	75-35-4	X	D029	—
		2,4-dinitrotoluene	121-14-2	X	D030	—
		lead	7439-92-1	X	D008	—
		mercury	7439-97-6	X	D009	—
		methylene chloride	75-09-2	X	F001/F002	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005/D035	—
		nitrobenzene	98-95-3	X	F004/D036	—

Table A-20 (cont.) LA

LA IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
008	MIXED HETEROGENEOUS DEBRIS FROM TA-3 (cont.) (see Notes 24 and 28)	pentachlorophenol	87-86-5	X	D037	—
		pyridine	110-86-1	X	F005/D038	—
		selenium	7782-49-2	X	D010	—
		silver	7440-22-4	X	D011	—
						—
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002/ D039	—
		toluene	108-88-3	X	F005	—
		trichloroethylene (TCE)	79-01-6	X	F001/F002/D040	—
		vinyl chloride	75-01-4	X	D043	—
009	HETEROGENEOUS DEBRIS FROM THE TA-21 DP WEST FACILITY (see Notes 24 and 25)	1,1,1-trichloroethane (TCA) [181, 186, 188]	71-55-6	X [181, 186, 188]	F001/F002[181, 186, 188]	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	
		1,1,2,2,-tetrachloroethane	79-34-5	X	N/A	
		methylene chloride	75-09-2	X	F001/F002	
		carbon tetrachloride	56-23-5	X	F001	
		chlorobenzene	108-90-7	X	F002	
		benzene	71-43-2	X	F005	
		arsenic	7440-38-2	X	D004	
		barium	7440-39-3	X	D005	
		cadmium	7440-43-9	X	D006	
		chromium	7440-47-3	X	D007	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		selenium	7782-49-2	X	D010	
		silver	7440-22-4	X	D011	
		chloroform (trichloromethane)	67-66-3	X	D022	
		hydrofluoric acid	7664-39-3	X	N/A	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
		pyridine	110-86-1	X	F005	
		REZ-N-bond (methylene chloride)	—	X	F002	
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	
		trichloroethylene	79-01-6	X	F001/F002	
		toluene	108-88-3	X	F005	

Table A-20 (cont.) LA

LA IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
009	HETEROGENEOUS DEBRIS FROM THE TA-21 DP WEST FACILITY (cont.) (see Notes 24 and 25)	acetone	67-64-1	X	See Note 2	See Note 22
		butanol	71-36-3	X	See Note 2	
		ethyl ether	60-29-7	X	See Note 2	
		methanol	67-56-1	X	See Note 2	
		methyl isobutyl ketone	108-10-1	X	See Note 2	
		unvented aerosol cans	—	X [186, 188]	D001	
		various corrosives (e.g., used HF nitric acid and sodium hydroxide)	—	-	See Note 2	
		various chloride salts (e.g., calcium)	—		See Note 2	
		xylene	1330-20-7	X	See Note 2	
010	HETEROGENEOUS DEBRIS WASTE FROM TA-50 (see Notes 24 and 25)	1,1,1-trichloroethane (TCA) [181, 186, 189]	71-55-6	X [181, 186, 189]	F001/F002[181,186, 189]	See Note 22
		1,1,2-trichloroethane	79-00-5	X	F002	
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	
		methylene chloride	75-09-2	X	F001/F002	
		chlorobenzene	108-90-7	X	F002	
		2-ethoxyethanol	110-80-5	X	F005	
		2-nitropropane	79-46-9	X	F005	
		benzene	71-43-2	X	F005	
		carbon disulfide	75-15-0	X	F005	
		carbon tetrachloride	56-23-5	X	F001	
		chloroform (trichloromethane)	67-66-3	X	D022	
		1,4-dichlorobenzene	106-46-7	X	D027	
		1,2-dichloroethane	107-06-2	X	D028	
		1,1-dichloroethylene	75-35-4	X	D029	
		1,2-dichlorobenzene	95-50-1	X	F002	
		2,4-dinitrotoluene	121-14-2	X	D030	
		pentachlorophenol	87-86-5	X	D037	
		cresol/cresylic acid	1319-77-3	X	F004	
		nitrobenzene	98-95-3	X	F004	
		hydrofluoric acid	7664-39-3	X	N/A	
		isobutanol (isobutyl alcohol)	78-83-1	X	F005	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
		arsenic	7440-38-2	X	D004	
		barium	7440-39-3	X	D005	

Table A-20 (cont.) LA

LA IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
010	HETEROGENEOUS DEBRIS WASTE FROM TA-50 (see Notes 24 and 25) (cont.)	cadmium	7440-43-9	X	D006	See Note 22
		chromium (various forms)	7440-47-3	X	D007	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		REZ-N-Bond (methylene chloride)	—	X	F002	
		selenium	7782-49-2	X	D010	
		silver	7440-22-4	X	D011	
		pyridine	110-86-1	X	F005	
		Tap Magic (1,1,1-trichloroethane)	—	X	F002	
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	
		trichloroethylene	79-01-6	X	F001/F002	
		trichlorofluoromethane	75-69-4	X	F001/F002	
		toluene	108-88-3	X	F005	
		electroplating sludges	—	X	F006	
		cyanide plating bath solutions	—	X	F007	
		cyanide cleaning bath solutions	—	X	F009	
		acetone	67-64-1	X	See Note 2	
		cyclohexane	110-82-7	X	See Note 2	
		ethyl benzene	100-41-4	X	See Note 2	
		ethyl ether	60-29-7	X	See Note 2	
		methanol	67-56-1	X	See Note 2	
		methyl isobutyl ketone	108-10-1	X	See Note 2	
		n-butyl alcohol (butanol)	71-36-3	X	See Note 2	
		unvented aerosol cans	—	X [186, 189]	D001	
		various nitrate oxidizers (aluminum and ferric)	—-	-	See Note 2	
		various corrosives	—	X	See Note 2	
		vinyl chloride	75-01-4	X	D043	

Table A-21. Lawrence Berkeley National Laboratory (LB) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

LB IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
229	LBNL MIXED HETEROGENEOUS DEBRIS	See Notes 9 and 15 (142)	—	See Note 9 (142)	See Note 15 (142)	—

Table A-22. Lawrence Livermore/Los Alamos (LL/LA) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

LL/LA IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
002	TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY	See Notes 9 and 15 (127)	—	See Note 9 (127)	See Note 15 (127)	—
003	SOLIDIFIED INORGANICS	See Notes 9 and 15 (128)	—	See Note 9 (128)	See Note 15 (128)	—
005	LANL MIXED SALT WASTE	See Notes 9 and 15 (129)	—	See Note 9 (129)	See Note 15 (129)	—
006	CEMENTED TRU WASTE	See Notes 9 and 15 (130)	—	See Note 9 (130)	See Note 15 (130)	—

Table A-23. Lawrence Livermore (LL) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

LL IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
212	LLNL SOLIDIFIED SLUDGE AND LIQUIDS	See Notes 9 and 15	—	See Note 9 (100)	See Note 15 (100)	—
213	HETEROGENEOUS DEBRIS	See Notes 9 and 15	—	See Note 9 (101)	See Note 15 (101)	—
221	LLNL PYROCHEMICAL SALT WASTE	See Notes 9and 15	—	See Note 9 (102)	See Note 15 (102)	—

Table A-24. Mound Laboratory (MD) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

MD IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations) [HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
801	RAGS, PAPER, WOOD, ETC. See Note 22	1,1-dichloroethylene	75-35-4	X [4, 5, 42]	See Notes 4, 8, and 25 [108, 182, 183]	See Note 22 D029 [42]
		1,1,1-trichloroethane (TCA)	71-55-6	X	—	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		arsenic	7440-38-2	X	—	D004
		acetone	67-64-1	X	See Note 2	N/A
		asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide	57-12-5	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	X	—	F009
		cyanide plating bath solutions	—	X	—	F007
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	—	F001/F002
		nitrates (may be present in the container)	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	See Note 2	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A

Table A-24. (cont.) MD

MD IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
802	DRY BOX GLOVES AND O-RINGS	See MD-801 (191)	—	See MD-801 (1, 4, 5 42, 191)	See MD-801 and Notes 4, 8, and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
803	METAL, EQUIPMENT, PIPE, VALVES, ETC.	See MD-801 (191)	—	See MD-801 (42, 191)	See MD-801 and Notes 4, 8, and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
804	PLASTIC, TYGON, MANI-BOOTS, ETC.	See MD-801 (191)	—	See MD-801 (42, 191)	See Notes 4, 8, and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
805	ASBESTOS FILTERS	See MD-801 (191)	—	See MD-801 (1, 4, 5, 42, 191)	See Notes 4, 8, and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
810	GLASS, FLASKS, SAMPLE VIALS, ETC	See MD-801 (191)	—	See MD-801 (1, 4, 5, 42, 191)	See Notes 4, 8, and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
811	EVAPORATOR AND DISSOLVER SLUDGE	asbestos	1332-21-4	X (1, 4, 5)	—	—
		beryllium (not beryllium powder)	7440-41-7	X	—	—
		mercury	7439-97-6	X	D009	—
		nitrates (may be present in container)	—	X	—	—
812	SPENT ION EXCHANGE RESIN	See MD-801 (108, 191)	—	See MD-801 (4, 5, 108, 191)	See MD-801 (4, 5, 108, 191)	—
813	GLASS FILTERS AND FIBERGLASS	See MD-801 (191)	—	See MD-801(1, 4, 5 42, 191)	See Notes 8 and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
814	GRAPHITE WASTE	See MD-801 (191)	—	See MD-801 (1, 4, 5 42, 191)	See Notes 8 and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
815	CLASSIFIED PARTS	See Note 19	—	See Note 19	—	—
824	EQUIPMENT BOXES NON-COMBUSTIBLE	See MD-801 (191)	See MD-801	See MD-801 (4, 5 191)	See MD-801 and Notes 8 and 25 (108, 182, 183, 191)	See Note 22
825	EQUIPMENT DRUMS NON-COMBUSTIBLE	See MD-801 (191)	—	See MD-801 (20, 42, 191)	See Notes 8 and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
826	EQUIPMENT BOXES, COMBUSTIBLE (after 1980)	See MD-801 (191)	—	See MD-801 (191)	See MD-801 (191)	See Note 22
827	EQUIPMENT DRUMS, COMBUSTIBLE	See MD-801 (191)	—	See MD-801 (5, 42, 191)	See Notes 8 and 25 (108, 182, 183, 191)	See MD-801 (42) See Note 22
832	CONTAMINATED MERCURY	mercury	7439-97-6	X (1, 4, 5)	—	—
		beryllium (not beryllium powder)	7440-41-7	X	—	—

Table A-24. (cont.) MD

MD IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
834	HIGH LEVEL ACID	nitrates	—	X [1, 4, 5, 36]	See Note 2	N/A [36]
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		1,1,1-trichloroethane (TCA)	71-55-6	X	—	F001/F002
		asbestos	1332-21-4	X	N/A	N/A
		acetone	67-64-1	X	See Note 2	N/A
		beryllium (not beryllium powder)	7440-41-7	X	—	—
		chromium	7440-47-3	X	—	D007
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		carbon tetrachloride	56-23-5	X	—	F001
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
835	HIGH LEVEL CAUSTIC	potential corrosives if liquids exceed the WIPP-WAC limit	—	X [1, 4, 5, 36]	D002	N/A [36]
		1,1,1-trichloroethane (TCA)	71-55-6	X	—	F001/F002
		chromium	7440-47-3	X	—	D007
		asbestos	1332-21-4	X	N/A	N/A
		acetone	67-64-1	X	See Note 2	N/A
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		nitrates	—	X	N/A	N/A
		carbon tetrachloride	56-23-5	X	—	F001
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
836	HIGH LEVEL SLUDGE/CEMENT	1,1,1-trichloroethane (TCA)	71-55-6	X [5, 56]	—	F002 [56]
		acetone	67-64-1	X	See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A

Table A-24. (cont.) MD

MD IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
836	HIGH LEVEL SLUDGE/CEMENT (cont.)	cadmium	7440-43-9	X	—	D006
		chromium	7440-47-3	X	—	D007
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		nitrates	—	X	N/A	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
838	<10 NCI/G NON-COMBUSTIBLE	See MD-801 and Note 19 [191]	—	See MD-801 and Note 19 [191]	See Notes 8, 19 and 25 [108, 182, 183, 191]	See Note 22
842	CONTAMINATED SOIL	cadmium	7440-43-9	X [1, 4, 5]	—	—
		chromium	7440-47-3	X	—	—
		lead	7439-92-1	X	—	—
		mercury	7439-97-6	X	—	—
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	—
		selenium	7782-49-2	X	—	—
		silver	7440-22-4	X	—	—
847	LSA <100 NCI/G COMBUSTIBLE	See MD-801 [191]	See MD-801	See MD-801 [20, 191]	See MD-801 and Notes 8 and 25 [108, 182, 183, 191]	See Note 22
848	LSA <100 NCI/G NON-COMBUSTIBLE	See MD-801 [191]	—	See MD-801 [20, 42, 191]	See Notes 8 and 25 [108, 182, 183, 191]	See MD-801 [42] See Note 22

Table A-25. Monsanto (MO) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

MO IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
530	COMPACTED WASTE	none identified	—	X [(11)]	—	—
535	COMPACTED WASTE/LEAD	lead	7439-92-1	X [(11)]	—	—
540	NON-COMPACTED WASTE	lead	7439-92-1	X [(11)]	—	—
		2-methoxyethanol	109-86-4	X	—	—
		ether	60-29-7	X	—	—
		dichlorodifluorourethane	—	X	—	—
		polyphenylisocyanate	—	X	—	—
545	WEP SHIELDED WASTE	styrene	100-42-5	X [(11)]	—	—
550	SOLIDIFIED OIL	none identified	—	X [(11)]	—	—

Table A-26. Mexico (MX) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

MX IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
142	SCRAP PROCESSING EQUIPMENT	lead	7439-92-1	X [(1,4 5, 6, 8, 9, 16, 24, 57)]	X [(16)]	—
		nitrates	—	X	—	—
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	—
		barium	7440-39-3	X	—	—
		benzene	71-43-2	X	—	—
		beryllium (not beryllium powder)	7440-41-7	X	—	—
		cadmium	7440-43-9	X	D006	—
		carbon tetrachloride	56-23-5	X	F001	—
		chlorobenzene	108-90-7	X	—	—
		chloroform (trichloromethane)	67-66-3	X	—	—
		chromium	7440-47-3	X	—	—
		cyanide cleaning bath solutions	—	X	F009	—
		cyanide plating bath solutions	—	X	F007	—
		electroplating sludges	—	X	F006	—
		ethyl benzene	100-41-4	X	See Note 2	—

Table A-26. (cont.) MX

MX IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
142	SCRAP PROCESSING EQUIPMENT (cont.)	ethyl ether	60-29-7	X	See Note 2	—
		lead	7439-92-1	X	D008	—
		mercury	7439-97-6	X	—	—
		methanol	67-56-1	X	F003 See Note 2	—
		methylene chloride	75-09-2	X	F002	—
		nitrate	—	X	—	—
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	—
		selenium	7782-49-2	X	—	—
		silver	7440-22-4	X	—	—
		tetrachloroethylene (perclene)	127-18-4	X	F00	—
		toluene	108-88-3	X	—	—
		trichloroethylene (TCE)	79-01-6	X	F001	—
		xylene	1330-20-7	X	F003 See Note 2	—

Table A-27. Nuclear Radiation Development (ND) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

ND IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
228	NRD MIXED HETEROGENEOUS DEBRIS	See Notes 9 and 15	—	See Note 9 (143)	See Note 15 (143)	—

Table A-28. Nevada Test Site (NT) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

NT IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
210	NTS BERKELEY SOLIDIFIED LIQUIDS	See Notes 9 and 15	—	See Note 9 [71, 90]	See Note 15 [71, 90]	—
211	NTS LAWRENCE BERKELEY HETEROGENEOUS DEBRIS	See Notes 9 and 15	—	See Note 9 [71, 90]	See Note 15 [71, 90]	—
212	NTS LAWRENCE LIVERMORE NATIONAL LABORATORY (LLNL) SOLIDIFIED SLUDGE AND LIQUIDS	See Notes 9 and 15	—	See Note 9 [70, 84]	See Note 15 [70, 84]	—
213	NTS LLNL HETEROGENEOUS DEBRIS	See Notes 9 and 15	—	See Note 9 [70, 84]	See Note 15 [70, 84]	—
214	NTS LYNCHBURG HETEROGENEOUS DEBRIS	See Notes 9 and 15	—	See Note 9 [77]	See Note 15 [87]	—
215	NTS EG&G HETEROGENEOUS DEBRIS)	See Notes 9 and 15	—	See Note 9 [78, 86]	See Note 15 [78, 86]	—
216	NTS ROLLER COASTER DEBRIS	See Notes 9 and 15	—	See Note 9 [79]	See Note 15 [79, 89]	—
217	NTS RF DECON DEBRIS	See Notes 9 and 15	—	See Note 9 [80]	See Note 15 [80, 88]	—
218	NTS LIVERMORE AND BERKELEY COMBINED DEBRIS	See Notes 9 and 15	—	See Note 9 [81, 85]	See Note 15 [81, 85]	—
219	NTS ITRI DEBRIS	See Notes 9 and 15	—	See Note 9 [81, 85]	See Note 15 [81, 85]	—
220	NTS DECON AND MAINTENANCE DEBRIS	See Notes 9 and 15	—	See Note 9 [83, 92]	See Note 15 [83, 92]	—

Table A-29. Oak Ridge National Laboratory (OR) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

OR IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
250	OR-NFS-CH-SOIL	See Notes 9 and 15 [131]		See Note 9 [131]-	See Note 15 [131]	—

Table A-30. Rocky Flats Plant (RF) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
001	FIRST STAGE SLUDGE	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 4, 5, 6, 8, 9, 16, 24, 57]	F001 [16]	F001/F002 [24, 57]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F002 [24]
		1,1,2,2-trichloroethane	79-00-5	X	N/A	N/A
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	F003 See Notes 1 and 2
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	D006	D006
		carbon tetrachloride	56-23-5	X	F001	F001
		chlorobenzene	108-90-7	X	—	F002
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		ethyl ether	60-29-7	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	F003 See Note 2	F003 See Notes 1 and 2
		methylene chloride	75-09-2	X	F002	F001/F002
		nitrate	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	F001	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
001	FIRST STAGE SLUDGE (cont.)	xylene	1330-20-7	X	F003 See Note 2	F003 See Notes 1 and 2
002	SECOND STAGE SLUDGE	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 4, 5, 6, 9, 16, 24, 57]	F001 [16]	F001/F002 [24, 57]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F002
		1,1,2,2-trichloroethane	79-00-5	X	N/A	N/A
		1-butanol	71-36-3	X	F003 See Note 2	N/A
		acetone	67-64-1	X	See Note 2	F003 See Notes 1 and 2
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	D006	D006
		carbon tetrachloride	56-23-5	X	F001	F001
		chlorobenzene	108-90-7	X	—	F002
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F00	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		ethyl ether	60-29-7	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		lithium (discharged batteries)	7439-93-2	X	See Note 2	N/A
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	F003 See Note 2	F003 See Notes 1 and 2
		methylene chloride	75-09-2	X	F002	F001/F002
		nitrate	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	F001	F001/F002

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
002	SECOND STAGE SLUDGE (cont.)	toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	F003 See Notes 1 and 2
003	ORGANIC SETUPS, OIL SOLIDS	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 4, 5, 6, 8, 16, 46]	F001 [16]	F001/F002 [46]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F002
		1,1-dichloroethylene	75-35-4	X	D029	D029
		1,2-dichlorobenzene	95-50-1	X	—	F002
		1,2-dichloroethane	107-06-2	X	D028	D028
		1,4-dichlorobenzene	106-46-7	X	—	D027
		2-ethoxyethanol	110-80-5	X	—	F005
		2,4-dinitrotoluene	121-14-2	X	—	D030
		acetone	67-64-1	X	See Note 2	N/A
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		butanol	71-36-3	X	See Note 2	N/A
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		cresol	1319-77-3	X	—	D026
		ethyl benzene	100-41-4	X	See Note 2	N/A
		hexachlorobenzene	118-74-1	X	—	D032
		hexachloroethane	67-72-1	X	D034	D034
		methanol	67-56-1	X	F003 See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		nitrobenzene	98-95-3	X	—	D036
		nitrates	—	X	See Note 2	N/A
		pentachlorophenol	87-86-5	X	—	D037
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB	N/A	N/A
		pyridine	110-86-1	X	—	F005 [46]
		tetrachloroethylene (perclene)	127-18-4	X	F001	F002
		trichlorofluoromethane	75-69-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
003	ORGANIC SETUPS, OIL SOLIDS (cont.)	trichloroethylene (TCE)	79-01-6	X	F001	F002
		xylene	1330-20-7	X	F003 See Note 2	N/A
004	SPECIAL SETUPS	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5, 6, 16, 45]	F001 [16]	F001/F002 [45]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,1-dichloroethylene	75-35-4	X	—	D029
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon tetrachloride	56-23-5	X	F001	F001
		chromium	7440-47-3	X	—	D007
		cyanide	57-12-5	X	See Note 2	N/A
		ethyl benzene	100-41-4	X	F003See Note 2	N/A
		ethyl ether	60-29-7	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		methanol	67-56-1	X	F003 See Note 2	N/A
		methylene chloride	75-09-2	X	—	F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		nitrates	—	X	—	—
		silver	7440-22-4	X	—	D011
		toluene	108-88-3	X	—	F005
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	N/A
		electroplating sludges	—	X	—	F006
		cyanide plating bath solutions	—	X	—	F007
		cyanide cleaning bath solutions	—	X	—	F009
005	EVAPORATOR SALTS	nitrates	—	X [1, 4, 5]	—	—
		possible ignitable if deemed an oxidizer	—	X	—	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
007	BUILDING 374 DRY SLUDGE	1,1,1-trichloroethane (TCA)	71-55-6	X [(1, 5, 6, 8, 16, 25)]	F001 [(16)]	F001 [(25)]
		1,1,2,2-tetrachloroethane	79-34-5	X	N/A	N/A
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001
		1,2-dichloroethylene	540-59-0	X	N/A	N/A
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		benzene	71-43-2	X	—	F005 [(25)]
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		1-butanol	71-36-3	X	See Note 2	N/A
		cadmium	7440-43-9	X	D006	D006
		carbon tetrachloride	56-23-5	X	F001	F001
		chromium	7440-47-3	X	—	D007
		electroplating sludges	—	X	F006	F006
		cyanide plating bath solutions	—	X	F007	F007
		cyanide cleaning bath solutions	—	X	F009	F009
		ethyl benzene	100-41-4	X	See Note 2	N/A
		hexachlorobenzene	118-74-1	X	—	D032
		hexane	110-54-3	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methyl isobutyl ketone	108-10-1	X	See Note 2	N/A
		methylene chloride	75-09-2	X	F002	F002
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		styrene	100-42-5	X	See Note 2	N/A
		tetrachloroethylene (perclene)	127-18-4	X	F001	F001
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
010	PAPER & RAGS (Pre-1971)	See RF-336	—	See RF-336	See RF-336 See Notes 4, 8, 25 (108, 182, 183)	See Note 22
020	WOOD & BENELEX (Pre-1971)	See RF-970	—	See RF-970	See RF-970 See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
030	PLASTIC (Pre-1971)	See RF-337	—	See RF-337	See RF-337 See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
040	RUBBER (Pre-1971)	See RF-463	—	See RF-463	See RF-463 See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
050	METAL SCRAP (Pre-1971)	See RF-480	—	See RF-480	See RF-480 See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
060	GLASS (Pre-1971)	See RF-440	—	See RF-440	See RF-440 See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
070	GRAPHITE (Pre-1971)	See RF-300	—	See RF-300	See RF-300 See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
080	EQUIPMENT (Pre-1971)	See RF-980	—	See RF-980	See RF-980 See Notes 4, 8, and 25 (108, 182, 183)	—
090	DIRT	1,1,1-trichloroethane (TCA)	71-55-6	X[1, 5]	—	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	—
		1-butanol	71-36-3	X	—	—
		carbon tetrachloride	56-23-5	X	—	—
		methanol	67-56-1	X	—	—
		methylene chloride	75-09-2	X	—	—
		nitrates	—	X	—	—
		nitrobenzene	98-95-3	X	—	—
		tetrachloroethylene (perclene)	127-18-4	X	—	—
		trichloroethylene (TCE)	79-01-6	X	—	—
		xylene	1330-20-7	X	—	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
095	SEWER SLUDGE	See RF-995	See RF-995	See RF-995	See RF-995	—
241	AMERICIUM PROCESS RESIDUE	lead	7439-92-1	X [1, 4, 5, 16]	D008 [5, 16, 108, 182, 183] See Notes 8 and 25	See Note 22
		methylene chloride	75-09-2	X	F002	
		nitrates	—	X	—	
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	
		potential ignitable if deemed a DOT oxidizer	—	X	See Notes 2 and 3	
		xylene	1330-20-7	X [1, 5]	F003[5] See Note 2	
290	FILTER SLUDGE	See RF-292		See RF-292	See RF-292	—
292	CEMENTED SLUDGE	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5, 6, 8, 16, 26, 95]	—	F001/F002 [26, 95]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A See Notes 1 and 2
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	—	N/A
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide cleaning bath solutions	—	X	See Note 11	F009
		cyanide plating bath solutions	—	X	See Note 11	F007
		electroplating sludges	—	X	See Note 11	F006
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A See Notes 1 and 2
		methylene chloride	75-09-2	X	—	F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
292	CEMENTED SLUDGE (cont.)	potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A See Notes 1 and 2
300	GRAPHITE MOLDS See Notes 7 and 22	1,1,1-trichloroethane (TCA)	71-55-6	X [5, 6, 8, 16, 22, 49, 64]	See Notes 4, 8, and 25 [108, 182, 183]	F001/F002 [22, 49, 64]
		1,1-dichloroethylene	75-35-4	X	—	D029
		1,2-dichloroethylene	540-59-0	X	See Note 2	N/A
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002
		methylene chloride	75-09-2	X	—	F002
		carbon tetrachloride	56-23-5	X	—	F001
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	—	D008
		methanol	67-56-1	X	See Note 2	N/A
		nitrates	—	X	—	—
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F002
		xylene	1330-20-7	X	See Note 2	N/A
301	GRAPHITE CORES See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [5, 6, 16, 22, 49, 64]	See Notes 4, 8, and 25 [108, 182, 183]	F001/F002 [22, 49, 64]
		1,1-dichloroethylene	75-35-4	X	—	D029
		methylene chloride	75-09-2	X	—	F002
		carbon tetrachloride	56-23-5	X	—	F001
		lead	7439-92-1	X	—	D008
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002
		1,1,1-trichloroethane (TCA)	71-55-6	X [5, 6, 8, 16]	F001 [5, 16, 108, 182, 183] See Notes 4, 8, and 25	See Note 22

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
301	GRAPHITE CORES (cont.) See Note 22	barium	7440-39-3	X	D005	—
		carbon tetrachloride	56-23-5	X	F001	—
		isopropanol	67-63-0	X	—	—
		lead	7439-92-1	X	D008	—
		toluene	108-88-3	X [5, 6, 8, 16, 64]	X [5]	X [22, 49, 64]
		trichloroethylene (TCE)	79-01-6	X	F001	—
302	BENELEX AND PLEXIGLAS	1,1,1-trichloroethane (TCA)	71-55-6	X	—	F002
		1,1-dichloroethylene	75-35-4	X	—	D029
		methylene chloride	75-09-2	X	—	F002
		carbon tetrachloride	56-23-5	X	—	F001
		lead	7439-92-1	X	—	D008
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002
303	SCARFED GRAPHITE CHUNKS See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [49, 64]	See Notes 4, 8, and 25 [108, 182, 183]	F001/F002 [49, 64]
		1,1-dichloroethylene	75-35-4	X	—	D029
		methylene chloride	75-09-2	X	—	F002 [49]
		carbon tetrachloride	56-23-5	X	—	F001
		lead	7439-92-1	X	—	D008
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F002
310	GRAPHITE SCARFINGS See Note 22	1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002
		1,1,1-trichloroethane (TCA)	71-55-6	X [16, 49, 64]	See Notes 4, 8, and 25 [108, 182, 183]	F001/F002 [49, 64]
		1,1-dichloroethylene	75-35-4	X	—	D029
		methylene chloride	75-09-2	X	—	F002
		carbon tetrachloride	56-23-5	X	—	F001
		lead	7439-92-1	X	—	D008
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002
311	GRAPHITE HEELS	nitrates	—	X [1]	—	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
312	COARSE GRAPHITE See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [5, 6, 16]	See Notes 4, 8, and 25 [108, 182, 183]	F001/F002 [22, 49, 64]
		1,1-dichloroethylene	75-35-4	X	—	D029
		carbon tetrachloride	56-23-5	X	—	F001
		lead	7439-92-1	X	—	D008
		methylene chloride	75-09-2	X	—	F002
		toluene	108-88-3	X [5, 16]	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002
		xylene	1330-20-7	X	See Note 2	N/A
320	HEAVY NON-SPECIAL SOURCE METAL See Note 22	1,1-dichloroethylene	75-35-4	X [1, 2, 5, 6, 8, 16, 39]	X [5]	D029 [39]
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		acetone	67-64-1	X	See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chromium	7440-47-3	X	—	D007
		cyanide cleaning bath solutions	—	X	—	F009
		cyanide plating bath solutions	—	X	—	F007
		electroplating sludges	—	X	—	F006
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Notes 2, 4, 8, and 25 [108, 182, 183]	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
320	HEAVY NON-SPECIAL SOURCE METAL (cont.) See Note 22	tetrachloroethylene (perclene)	127-18-4	X	F001	F001/F002
		toluene	108-88-3	X	F005	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
321	LEAD See Note 22	1,1-dichloroethylene	75-35-4	X [2, 8, 16, 39]	—	D029 [39]
		1,1,1-trichloroethane (TCA)	71-55-6	X	—	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		acetone	67-64-1	X	See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide cleaning bath solutions	—	X	—	F009
		cyanide plating bath solutions	—	X	—	F007
		electroplating sludges	—	X	—	F006
		lead	7439-92-1	X	D008 [2, 8, 16]	D008
		mercury	7439-97-6	—	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	—	F002
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
328	FUL-FLO INCINERATOR FILTERS See Note 22	1,1-dichloroethylene	75-35-4	X [1, 5, 6, 16, 38]	See Notes 4, 8, and 25 [108, 182, 183]	D029 [38]
		1,1,1-trichloroethane (TCA)	71-55-6	X	—	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1-butanol	71-36-3	X	See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide	57-12-5	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	See Note 6	—	See Note 6
		cyanide plating bath solutions	—	See Note 6	—	See Note 6
		electroplating sludges	—	See Note 6	—	See Note 6
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	—	F002
		nitrates	—	X	N/A	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
330	PAPER AND RAGS – DRY See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5, 6, 8, 16]	F001 [16, 28, 108, 182, 183] See Notes 4, 8, and 25	F001/F002 [28, 50]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1,1-dichloroethylene	75-35-4	X	—	D029
		1,2-dichloropropane	78-87-5	X	See Note 2	N/A
		1-butanol	71-36-3	X	See Note 2	N/A
		2-ethoxyethanol	110-80-5	X	—	F005
		acetone	67-64-1	X	F003 See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chlorobenzene	108-90-7	X	—	F002
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide cleaning bath solutions	—	X	—	F009
		cyanide plating bath solutions	—	X	—	F007
		cyclohexane	110-82-7	X	See Note 2	N/A
		electroplating sludges	—	X	—	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		isobutanol	78-83-1	X	—	F005
		lead	7439-92-1	X	—	D008
		methanol	67-56-1	X [1, 5, 6, 8, 16, 50, 67]	F003 [16, 28] See Note 2	N/A [28, 50]
		methylene chloride	75-09-2		F002	F002
		mercury	7439-97-6	X	—	D009
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		nitrates	—	X	N/A	N/A
		pyridine	110-86-1	X	—	F005
		polychlorinated-biphenyls (ballast found in LLW box)	1336-36-3	PCB	N/A	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
330	PAPER AND RAGS - DRY See Note 22 (cont.)	selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	N/A
335	ABSOLUTE 8×8 FILTERS See Note 22	1,1-dichloroethylene	75-35-4	X [1, 2, 5, 8, 16, 31, 38]	X [16, 108, 182, 183] See Notes 4, 8, and 25	D029 [31, 38]
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chromium	7440-47-3	X	D007	D007
		cyanide	57-12-5	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	See Note 2	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		nitrates (only for waste generated in building 374 after 1984)	—	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
335	ABSOLUTE 8×8 FILTERS See Note 22 (cont.)	potential corrosive if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
336	PAPER AND RAGS MOIST See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 4, 5, 6, 8, 16, 28, 50]	F001 [16, 108, 182, 183] See Notes 4, 8, and 25	F001/F002 [28, 50]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1,1-dichloroethylene	75-35-4	X	—	D029
		1,2-dichloropropane	78-87-5	X	See Note 2	N/A
		2-ethoxyethanol	110-80-5	X	—	F005
		acetone	67-64-1	X	F003 See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	D006	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chlorobenzene	108-90-7	X	—	F002
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chromium	7440-47-3	X	D007	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		isobutanol (isobutyl alcohol)	78-83-1	X	—	F005
		lead	7439-92-1	X	D008	D008
		methanol	67-56-1	X	F003 See Note 2	N/A
		methylene chloride	75-09-2	X	F002	F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
336	PAPER AND RAGS MOIST (cont.) See Note 22	mercury	7439-97-6	X	D009	D009
		pyridine	110-86-1	X	—	F005
		nitrates (only for waste generated prior to 1975)	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit in waste packaged before 1974	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	N/A
337	PLASTIC, TEFLON, WASHABLES, PVC See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5, 6, 8, 16, 30, 50]	F001 [16, 29, 108, 182, 183] See Notes 4, 8, and 25	F001/F002 [30, 50]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1,1-dichloroethylene	75-35-4	X	—	D029
		1,2-dichloropropane	78-87-5	X	See Note 2	N/A
		2-ethoxyethanol	110-80-5	X	—	F005
		acetone	67-64-1	X	F003See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	D006	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chlorobenzene	108-90-7	X	—	F002
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	D007	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		cyclohexane	110-82-7	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
337	PLASTIC, TEFLON, WASHABLES, PVC (cont.) See Note 22	electroplating sludges	—	X	F006	F006
		Isobutanol (isobutyl alcohol)	78-83-1	X	—	F005
		lead	7439-92-1	X	D008	D008
		methanol	67-56-1	X	F003 See Note 2	N/A
		methylene chloride	75-09-2	X	F002	F002
		mercury	7439-97-6	X	D009	D009
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		nitrates (only for waste generated prior to 1974)	—	X	See Note 2	N/A
		pyridine	110-86-1	X	—	F005
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002
		xylene	1330-20-7	X	F003See Note 2	N/A
338	INSULATION AND CWS FILTER MEDIA See Note 22	1,1-dichloroethylene	75-35-4	X [1, 2, 4, 5, 16, 38]	X [16, 108, 182, 183] See Notes 4, 8, and 25	D029 [38]
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		asbestos	1332-21-4	X	N/A	N/A
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	D007	D007
		cyanide	57-12-5	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
338	INSULATION AND CWS FILTER MEDIA See Note 22 (cont.)	cyanide cleaning bath solutions	—	X	—	See Note 6
		cyanide plating bath solutions	—	X	—	See Note 6
		electroplating sludges	—	X	—	See Note 6
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		nitrates	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit in waste packaged before 1974	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
339	LEADED RUBBER GLOVES AND APRONS See Note 22	1,1-dichloroethylene	75-35-4	X [1, 2, 5, 6, 8, 16, 17, 33, 34, 41]	X [16, 33, 108, 182, 183] See Notes 4, 8, and 25	D029 [33, 41]
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		acetone	67-64-1	X	F003 See Note 2	N/A
		benzene	71-43-2	X	—	F005
		carbon disulfide	75-15-0	X	—	F005 [41]
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		cyclohexane	110-82-7	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	X	—	F009
		cyanide plating bath solutions	—	X	—	F007
		electroplating sludges	—	X	—	F006
		ethanol	64-17-5	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
339	LEADED RUBBER GLOVES AND APRONS See Note 22 (cont.)	ethyl benzene	100-41-4	X[5]	See Note 2	N/A
		isopropanol	67-63-0	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		nitrate	10099-74-8	X	N/A	N/A
		methanol	67-56-1	X	F003 See Note 2	N/A
		methyl chloride (chloromethane)	74-87-3	X	—	F001/F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		tetrachloroethylene (perclene)	127-18-4	X	F001	F001/F002
		toluene	108-88-3	X	F005	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	N/A
		zinc	7440-66-6	X	—	—
33A	WETP BIN PROGRAM - COMBUSTIBLES 33A (RF IDCs 335, 336, 337, and 339)	1,1,1-trichloroethane (TCA)	71-55-6	X [21]	F001 [21, 108, 182, 183] See Notes 4, 8, and 25	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002 See Note 4	
		barium	7440-39-3	X	—	
		cadmium	7440-43-9	X	—	
		carbon tetrachloride	56-23-5	X	F001 See Note 4	
		chloroform (trichloromethane)	67-66-3	X	—	
		chromium	7440-47-3	X	—	
		cyanide	57-12-5	X	—	
		cyanide cleaning bath solutions	—	X	—	
		cyanide plating bath solutions	—	X	—	
		cyclohexane	110-82-7	X	—	
		electroplating sludges	—	X	—	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		methylene chloride	75-09-2	X	F002 See Note 4	
		potential corrosives if liquids exceed the WIPP WAC limit in waste packaged before 1974	—	X	D002	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
33A	WETP BIN PROGRAM - COMBUSTIBLES 33A (cont.) (RF IDCs 335, 336, 337, and 339)	silver	7440-22-4	X	—	See Note 22
		tetrachloroethylene (perclene)	127-18-4	X	—	
		toluene	108-88-3	X	—	
		trichloroethylene (TCE)	79-01-6	X	—	
		xylene	1330-20-7	X	—	
33B	WETP BIN PROGRAM - COMBUSTIBLES B (RF IDCs 330, 337, and 339)	1,1,1-trichloroethane (TCA)	71-55-6	X [21]	F001 [21, 108, 182, 183] See Notes 4, 8, and 25	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002 See Note 4	
		cadmium	7440-43-9	X	—	
		carbon tetrachloride	56-23-5	X	F001 See Note 4	
		chloroform (trichloromethane)	67-66-3	X	—	
		chromium	7440-47-3	X	—	
		cis-1,2-dichloroethylene	156-59-2	X	—	
		cyanide cleaning bath solutions	—	X	—	
		cyanide plating bath solutions	—	X	—	
		cyclohexane	110-82-7	X	—	
		electroplating sludges	—	X	—	
		ethyl benzene	100-41-4	X	—	
		lead	7439-92-1	X	D008	
		methylene chloride	75-09-2	X	F002 See Note 4	
		silver	7440-22-4	X	—	
		tetrachloroethylene (perclene)	127-18-4	X	—	
		toluene	108-88-3	X	—	
		trans-1,2-dichloroethylene	156-60-5	X	—	
		trichloroethylene (TCE)	79-01-6	X	—	
		xylene	1330-20-7	X	—	
360	INSULATION See Note 22	1,1-dichloroethylene	75-35-4	X [1, 4, 5, 16, 38]	See Notes 4, 8, and 25 [108, 182, 183]	D029 [38]
		1,1,1-trichloroethane (TCA)	71-55-6	X	—	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		arsenic	7440-38-2	X	—	D004

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
360	INSULATION See Note 22 (cont.)	asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide	57-12-5	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	See Note 6	—	See Note 6
		cyanide plating bath solutions	—	See Note 6	—	See Note 6
		electroplating sludges	—	See Note 6	—	See Note 6
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	—	F002
		nitrates	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP WAC limit in waste packaged before 1974	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
361	INSULATION HEEL	See RF-360	—	X [(1)]	See RF-360	—
368	MAGNESIUM OXIDE CRUCIBLES	calcium	7440-70-2	X [(16)]	See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
		magnesium	7439-95-4	X	See Note 8	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
370	LECO CRUCIBLE See Note 22	chromium	7440-47-3	X [6, 16]	See Notes 4, 8, and 25 [108, 182, 183]	See Note 22
		lead	7439-92-1	X	—	
371	FIRE BRICK See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [5, 6, 8, 16, 32, 35, 44, 62]	See Notes 4, 8, and 25 [108, 182, 183]	F001/F002 [35, 44]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		acetone	67-64-1	X	F003 See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		asbestos	1332-21-4	X	—	—
		1,2-dichloroethane	107-06-2	X	—	D028
		1,1-dichloroethylene	75-35-4	X	—	D029
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		carbon disulfide	75-15-0	—	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide cleaning bath solutions	—	X	See Note 17	N/A
		cyanide plating bath solutions	—	X	See Note 17	N/A
		electroplating sludges	—	X	See Note 17	N/A
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	F003 See Note 2	N/A
		methylene chloride	75-09-2	X	—	F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		nitrates	—	X	—	—
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
372	GRIT	beryllium (not beryllium powder)	7440-41-7	X [1, 4, 5, 16]	See Notes 8 and 25 [108, 182, 183]	See Note 22
		chromium	7440-47-3	X	D007 [16]	
374	BLACKTOP, CONCRETE, AND CONSTRUCTION RUBBLE	1,1,1-trichloroethane (TCA)	71-55-6	X [2, 5, 8, 16, 66]	F001 [16, 108, 182, 183] See Notes 8 and 25	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	
		acetone	67-64-1	X	—	
		arsenic	7440-38-2	X	—	
		barium	7440-39-3	X	—	
		benzene	71-43-2	X	—	
		cadmium	7440-43-9	X	—	
		carbon tetrachloride	56-23-5	X	F001	
		chromium	7440-47-3	X	—	
		cyanide	57-12-5	X	—	
		cyanide cleaning bath solutions	—	X	—	
		cyanide plating bath solutions	—	X	—	
		electroplating sludges	—	X	—	
		ethyl benzene	100-41-4	X	—	
		lead	7439-92-1	X	—	
		mercury	7439-97-6	X	—	
		methanol	67-56-1	X	—	
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	
		methylene chloride	75-09-2	X	F002	
		multi-source leachate (F039)	—	X	—	
		nitrobenzene	98-95-3	X	—	
		selenium	7782-49-2	X	—	
		silver	7440-22-4	X	—	
		tetrachloroethylene (perclene)	127-18-4	X	—	
		toluene	108-88-3	X	—	
		trichloroethylene (TCE)	79-01-6	X	—	
		xylene	1330-20-7	X	—	
375	OIL-DRI (Residues from incinerator)	See RF-292	71-55-6	X [1, 2, 5, 16]	See RF-292	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
376	CEMENTED INSULATION AND FILTER MEDIA See Note 22	1,1-dichloroethylene	75-35-4	X [1, 2, 4, 5, 8,16, 31, 38]	See Notes 4, 8, and 25 [108, 182, 183]	D029 [31, 38]
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001 [16]	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide	57-12-5	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	X	—	F009
		cyanide plating bath solutions	—	X	—	F007
		electroplating sludges	—	X	—	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		nitrates	—	X	—	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
377	COARSE FIRE BRICK See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [8,16, 32,35, 44, 62]	See Notes 4, 8, and 25 [108, 182, 183]	F001/F002 [32, 35, 44]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1,1-dichloroethylene	75-35-4	X	—	D029
		acetone	67-64-1	—	F003 [35] See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		asbestos	1332-21-4	X	—	N/A
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X [16]	—	D007
		cyanide cleaning bath solutions	—	X	See Note 17	N/A
		cyanide plating bath solutions	—	X	See Note 17	N/A
		electroplating sludges	—	X	See Note 17	N/A
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	F003 See Note 2	N/A
		methylene chloride	75-09-2	X	—	F002
		nitrates	—	X	See Note 2	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	N/A
391	CRUCIBLES AND SAND	magnesium	7439-95-4	X [16]	See Notes 4, 8, and 25 [108, 182, 183]	See Note 22
392	SAND, SLAG, AND CRUCIBLE	calcium	7440-70-2	X [1, 5, 6, 8, 16]	See Notes 4, 8, and 25 [108, 182, 183]	See Note 22
		magnesium	7439-95-4	X	See Note 8	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
393	SAND, SLAG, AND CRUCIBLE HEELS	calcium	7440-70-2	X	See Note 8	—
		chromium	7440-47-3	X	D007	—
		methylene chloride	75-09-2	X	F002	—
		nitrates	—	X	—	—
409	MOLTEN SALT – 30% UNPULVERIZED	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5, 6, 8, 16]	F001/F002	—
		1,2-dichloroethane	107-06-2	X	D028	—
		lead	7439-92-1	X [8]	D008	—
		mercury	7439-97-6	X	D009	—
		methylene chloride	75-09-2	X	F002	—
		carbon tetrachloride	56-23-5	X	F001	—
		chromium	7440-47-3	X	D007	—
		calcium	7440-70-2	X	See Note 8	—
		potassium	7440-09-7	X	See Note 8	—
		magnesium	7439-95-4	X	See Note 8	—
		sodium	7440-23-5	X	See Note 8	—
		zinc	7440-66-6	X	—	—
		toluene	108-88-3	X	F005	—
410	MOLTEN SALT – 30% PULVERIZED	mercury	7439-97-6	X [1, 9]	D009	—
411	ELECTROREFINING SALT	1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X [1, 5, 8, 16]	F001/F002 [193]	—
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001/F002	—
		benzene	71-43-2	X	F005	—
		chloroform (trichloromethane)	67-66-3	X	D022	—
		carbon tetrachloride	56-23-5	X	F001	—
		arsenic	7440-38-2	X	D004	—
		barium	7440-39-3	X	D005	—
		cadmium	7440-43-9	X	D006	—
		chromium	7440-47-3	X	D007	—
		calcium	7440-70-2	X	—	—
		lead	7439-92-1	X	D008	—
		mercury	7439-97-6	X	D009	—
		selenium	7782-49-2	X	D010	—
		silver	7440-22-4	X	D011	—
		potassium	7440-09-7	X	See Note 8	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
411	ELECTROREFINING SALT (cont.)	magnesium	7439-95-4	X	See Note 8	—
		sodium	7440-23-5	X	See Note 8	—
		zinc	7440-66-6	X	—	—
		trichloroethylene (TCE)	79-01-6	X	F001/F002	—
		methylene chloride	75-09-2	X	F002	—
		toluene	108-88-3	X	F005	—
		xylene	1330-20-7	X	See Note 2	—
412	GIBSON SALTS	potential corrosive if wet	—	X [4, 16]	D002 (See Note 2)	—
		carbon tetrachloride	56-23-5	X	F001 [193]	—
		chromium	7440-47-3	X	D007	—
		calcium	7440-70-2	X	See Note 8	—
		potassium	7440-09-7	X	See Note 8	—
		magnesium	7439-95-4	X	See Note 8	—
		sodium	7440-23-5	X	See Note 8	—
		zinc	7440-66-6	X	—	—
414	DIRECT OXIDE REDUCTION SALT	1,1,1-trichloroethane (TCA)	71-55-6	X [5, 6, 8, 16]	F001/F002 [193]	—
		carbon tetrachloride	56-23-5	X	F001	—
		chromium	7440-47-3	X	D007	—
		calcium	7440-70-2	X	See Note 8	—
		potassium	7440-09-7	X	See Note 8	—
		magnesium	7439-95-4	X	See Note 8	—
		sodium	7440-23-5	X	See Note 8	—
		zinc	7440-66-6	X	—	—
		ethyl benzene	100-41-4	X	F003 (See Note 2)	—
		trichloroethylene (TCE)	79-01-6	X	F001/F002	—
		toluene	108-88-3	X	F005	—
		xylene	1330-20-7	X	F003 (See Note 2)	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
416	ZINC MAGNESIUM ALLOY METALS	carbon tetrachloride	56-23-5	X [9, 16]	See Notes 4, 8, and 25 [108, 182, 183]	See Note 22
		chromium	7440-47-3	X	—	
		calcium	7440-70-2	X	See Note 8	
		potassium	7440-09-7	X	See Note 8	
		magnesium	7439-95-4	X	See Note 8	
		sodium	7440-23-5	X	See Note 8	
		zinc	7440-66-6	X	—	
420	ASH, INCINERATOR (VIRGIN)	See RF-292	71-55-6	X [16]	See RF-292	—
421	ASH HEELS	See RF-292	71-55-6	X [16]	See RF-292	—
422	SOOT	See RF-292	71-55-6	X [8, 16]	See RF-292	—
425	FLUID BED ASH	chromium	7440-47-3	X [16]	D007 [16, 193]	—
		methanol	67-56-1	X	F003 (See Note 2)	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	—
		acetone	67-64-1	X	F003 (See Note 2)	—
		benzene	71-43-2	X	F005	—
		barium (not TCLP)	7440-39-3	X	—	—
		cadmium (not TCLP)	7440-43-9	X	—	—
		carbon tetrachloride	56-23-5	X	F001	—
		lead (not TCLP)	7439-92-1	X	—	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	—
		methylene chloride	75-09-2	X	F002—	—
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	—
		trichloroethylene (TCE)	79-01-6	X	F001/F002	—
		toluene	108-88-3	X	F005	—
		xylene	1330-20-7	X	F003 (See Note 2)	—
430	ION COLUMN UNLEACHED RESIN	nitrates	—	X [1, 4, 5]	—	See Note 22
		potential ignitable if deemed a DOT oxidizer	—	X	—	
431	LEACHED RESIN	nitrates	—	X [1, 9]	—	See Note 22
		potential ignitable if deemed a DOT oxidizer	—	X	—	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
432	RESIN, LEACHED AND CEMENTED	1,1,1-trichloroethane (TCA)	71-55-6	X [5, 6, 8, 16, 43]	F001/F002 [5, 16]	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002 [5]	—
		benzene	71-43-2	X	F005	—
		chloroform (trichloromethane)	67-66-3	X	D022	—
		1,2-dichloroethane	107-06-2	X	D028	—
			75-35-4	X	D029	—
		chromium	7440-47-3	X	D007	—
		carbon tetrachloride	56-23-5	X	F001	—
		ethyl benzene	100-41-4	X	F003 (See Note 2)	—
		isopropanol	67-63-0	X	F003 (See Note 2)	—
		lead	7439-92-1	X	D008	—
		methylene chloride	75-09-2	X	F002	—
		nitrates	—	X	—	—
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	—
		toluene	108-88-3	X	F005	—
		trichloroethylene (TCE)	79-01-6	X	F001	—
		xylene	1330-20-7	X	F003 (See Note 2)	—
440	GLASS See Note 22	1,1-dichloroethylene	75-35-4	X [5, 6, 8, 16, 28, 40]	See Notes 8 and 25 [108, 182, 183]	D029 [28, 40]
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001 [5, 16]	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		acetone	67-64-1	X	See Note 2	N/A
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	—	F005
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001 [5]	F001
		chloroform (trichloromethane)	67-66-3	X	D022 [5]	D022
		cyclohexane (ignitable liquid)	110-82-7	X	See Note 2	N/A
		ethanol	64-17-5	X	See Note 2	N/A
		ethyl benzene	100-41-4	X	See Note 2	N/A
		isooctane	26635-64-3	X	See Note 2	N/A
		isopropanol	67-63-0	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
440	GLASS (cont.) See Note 22	magnesium	7439-95-4	X	See Notes 2 and 8	N/A
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
		zinc	7440-66-6	X	N/A	N/A
441	RASCHIG RINGS, UNLEACHED See Note 22	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5, 6, 8, 16, 23, 48]	See Notes 8 and 25 [108, 182, 183]	F001/F002 [23, 48]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002
		acetone	67-64-1	X	See Note 2	N/A
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	—	F002
		nitrates	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		tetrachloroethylene (perclene)	127-18-4	X	—	F002
		trichloroethylene (TCE)	79-01-6	X	—	F002
		1,1,1-trichloroethane (TCA)	71-55-6	X [5, 8, 16, 23]	F001 [21] See Note 4	F001/F002 [23, 48]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F002
		acetone	67-64-1	X	See Note 2	N/A
		carbon tetrachloride	56-23-5	X	F001 See Note 4	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
441	RASCHIG RINGS, UNLEACHED (cont.) See Note 22	ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002 See Note 4	F002
		nitrates	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		tetrachloroethylene (perclene)	127-18-4	X	—	F002
		trichloroethylene (TCE)	79-01-6	X	—	F002
442	RASCHIG RINGS, LEACHED See Note 22	See RF-441	See RF-441	See RF-441	See RF-441 See Notes 4, 8, and 25 (108, 182, 183)	See RF-441
44A	WETP BIN PROGRAM - GLASS (RF IDCs 440 and 442)	1,1,1-trichloroethane (TCA)	71-55-6	X (21)	F001 (21, 108, 182, 183) See Notes 4, 8, and 25	See Note 22
		barium	7440-39-3	X	—	
		carbon tetrachloride	56-23-5	X	F001	
		cyclohexane (ignitable liquid)	110-82-7	X	See Notes 2 and 3	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		methylene chloride	75-09-2	X	F002	
		potential corrosives if liquids exceed the WIPP WAC limit	—	X	D002	
		toluene	108-88-3	X	See Note 4	
		trichloroethylene (TCE)	79-01-6	X	See Note 4	
460	WASHABLES, RUBBER, PLASTIC	1,1,1-trichloroethane (TCA)	71-55-6	X (1, 5)	See Notes 8 and 25 (108, 182, 183)	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	
		carbon tetrachloride	56-23-5	X	—	
		methylene chloride	75-09-2	X	—	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
463	LEADED RUBBER GLOVES AND APRONS See Note 22	1,1-dichloroethylene	75-35-4	X [5, 41]	See Notes 8 and 25 (108, 182, 183)	D029 [41]
		1,1,1-trichloroethane (TCA)	71-55-6	X	—	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		benzene	71-43-2	X	—	F005
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		cyanide cleaning bath solutions	—	X	—	F009
		cyanide plating bath solutions	—	X [1, 5, 41]	—	F007 [41]
		electroplating sludges	—	X	—	F006
		ethanol	64-17-5	X	See Note 2	N/A
		isopropanol	67-63-0	X	See Note 2	N/A
		lead	7439-92-1	X	D008 [1]	D008
		magnesium	7439-95-4	X	See Note 2 and 8	N/A
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	—	F002
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
		zinc	7440-66-6	X	—	—
464	BENELEX AND PLEXIGLASS	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5, 16]	See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
		barium	7440-39-3	X	—	
		carbon tetrachloride	56-23-5	X	—	
		lead	7439-92-1	X	D008 [16]	
		toluene	108-88-3	X	—	
		trichloroethylene (TCE)	79-01-6	X	—	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
480	NON-SPECIAL SOURCE METAL See Note 22	1,1-dichloroethylene	75-35-4	X [1, 2, 5, 6, 8, 16, 21, 27, 39]	See Notes 4, 8, and 25 [108, 182, 183]	D029 [27, 39, 193]
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001 [16, 21] See Note 4	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002 See Note 4	F001/F002
		1,2-dichloroethane	107-06-2	X	D028	D028
		1-butanol	71-36-3	X	—	See Note 2
		acetone	67-64-1	X	F003 See Note 2	F003 See Notes 1 and 2
		asbestos	1332-21-4	X	N/A	N/A
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	—	—
		cadmium	7440-43-9	X	D006	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	D007	D007
		cyanide	57-12-5	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		cyclohexane (ignitable liquid)	110-82-7	X	See Note 2	N/A
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	D009	D009
		methane	74-82-8	X	See Note 2	N/A
		methanol	67-56-1	X	F003 See Note 2	F003 See Notes 1 and 2
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methyl isobutyl ketone	108-10-1	X	See Note 2	N/A
		methylene chloride	75-09-2	X	F002	F002
		nitrates	—	X	See Note 2	N/A
		potential ignitable if liquid present	—	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
480	NON-SPECIAL SOURCE METAL See Note 22 (cont.)	polychlorinated-biphenyls (PCBs)	1336-36-3	X	N/A	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002
		xylenes (m, p, & o)	1330-20-7	X	F003 See Note 2	F003 See Notes 1 and 2
481	LEACHED NON-SPECIAL SOURCE METAL See Note 22	1,1-dichloroethylene	75-35-4	X [5, 6, 8, 16, 27, 39]	See Notes 4, 8, and 25 [108, 182, 183]	D029
		1,1,1-trichloroethane (TCA)	71-55-6	X	—	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002 [16]	F001/F002
		1,2-dichloroethane	107-06-2	X	D028	D028
		acetone	67-64-1	X	—	F003 See Notes 1 and 2
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	D006	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	D007	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	—	F003 See Notes 1 and 2
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
481	LEACHED NON-SPECIAL SOURCE METAL See Note 22 (cont.)	selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F001	F001/F002
		xylenes (m, p, & o)	1330-20-7	X	See Note 2	F003 See Notes 1 and 2
488	GLOVEBOX PARTS W/LEAD	lead	7439-92-1	X [2, 8]	D008 See Notes 4, 8, and 25 [108, 182, 183]	See Note 22
48A	WETP BIN PROGRAM - METAL (RF IDCs 480 and 481)	1,1,1-trichloroethane (TCA)	71-55-6	X [21]	F001 [21, 108, 182, 183] See Notes 4, 8, and 25	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002 See Note 4	
		1,1-dichloroethylene	75-35-4	X	—	
		1,2-dichloroethane	107-06-2	X	D028	
		arsenic	7440-38-2	X	—	
		barium	7440-39-3	X	—	
		beryllium (not beryllium powder)	7440-41-7	X	—	
		cadmium	7440-43-9	X	—	
		carbon tetrachloride	56-23-5	X	F001 See Note 4	
		chromium	7440-47-3	X	—	
		cyanide	57-12-5	X	—	
		cyanide cleaning bath solutions	—	X	—	
		cyanide plating bath solutions	—	X	—	
		cyclohexane (ignitable liquid)	110-82-7	X	See Notes 2 and 3	
		dichloroethylene	25323-30-2	X	—	
		electroplating sludges	—	X	—	
		ethyl benzene	100-41-4	X	—	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		methane	74-82-8	X	—	
		methylene chloride	75-09-2	X	F002 See Note 4	
		selenium	7782-49-2	X	—	
		silver	7440-22-4	X	—	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
48A	WETP BIN PROGRAM - METAL (RF IDCs 480 and 481) (cont.)	toluene	108-88-3	X	—	See Note 22
		trichloroethylene (TCE)	79-01-6	X	—	
		xylene	1330-20-7	X	—	
490	HEPA FILTERS AND CWS FILTERS See Note 22	1,1-dichloroethylene	75-35-4	—	See Notes 4, 8, and 25 (108, 182, 183)	D029 (31, 38)
		1,1,1-trichloroethane (TCA)	71-55-6	X (1, 2, 5, 16, 31, 38)	F001 (16)	F001/F002
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		arsenic	7440-38-2	X	—	D004
		asbestos	1332-21-4	X	N/A	N/A
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	—	N/A
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	F005	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chromium	7440-47-3	X	D007	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		nitrates (only for waste generated in Bldg 374 after 1984)	—	X	See Note 2	N/A
		polychlorinated-biphenyls (ballast found in LLW box)	1336-36-3	PCB (67)	N/A	N/A
		selenium	7782-49-2	X	—	D010

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
490	HEPA FILTERS AND CWS FILTERS (cont.) See Note 22	silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
491	PLENUM PREFILTERS	1,1,1-trichloroethane (TCA)	71-55-6	X [(2)]	F001 [(2, 108, 182, 183)] See Notes 4, 8, and 25	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	
		carbon tetrachloride	56-23-5	X	F001	
		methylene chloride	75-09-2	X	F002	
696	CEMENTED INCINERATOR SLUDGE (Bldg 771 generated prior to March 21, 1987)	1,1,1-trichloroethane (TCA)	71-55-6	X [(16, 26, 72)]	—	F001/F002 [(26, 95)]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	—	N/A See Notes 1 and 2
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	—	N/A
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	—	F001
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	—	D007
		cyanide cleaning bath solutions	—	X	—	F009 See Note 11
		cyanide plating bath solutions	—	X	—	F007 See Note 11
		electroplating sludges	—	X	—	F006See Note 11
		lead	7439-92-1	X	—	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	—	N/A See Notes 1 and 2
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	—	F002
		selenium	7782-49-2	X	—	D010

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
696	CEMENTED INCINERATOR SLUDGE (Bldg 771 generated prior to March 21, 1987) (cont.)	silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	—	N/A See Notes 1 and 2
697	DIRT	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 2, 16]	F001 [16]	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	—
		acetone	67-64-1	X	—	—
		arsenic	7440-38-2	X	—	—
		barium	7440-39-3	X	—	—
		benzene	71-43-2	X	—	—
		1-butanol	71-36-3	X	—	—
		cadmium	7440-43-9	X	—	—
		carbon tetrachloride	56-23-5	X	F001	—
		chromium	7440-47-3	X	—	—
		cyanide	57-12-5	X	—	—
		cyanide cleaning bath solutions	—	X	—	—
		cyanide plating bath solutions	—	X	—	—
		electroplating sludges	—	X	—	—
		ethyl benzene	100-41-4	X	—	—
		lead	7439-92-1	X	—	—
		mercury	7439-97-6	X	—	—
		methanol	67-56-1	X	—	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	—
		methylene chloride	75-09-2	X	F002	—
		nitrobenzene	98-95-3	X	—	—
		selenium	7782-49-2	X	—	—
		silver	7440-22-4	X	—	—
		tetrachloroethylene (perclene)	127-18-4	X	—	—
		toluene	108-88-3	X	—	—
		trichloroethylene (TCE)	79-01-6	X	—	—
		xylene	1330-20-7	X	—	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
700	OASIS WASTE	1,1,1-trichloroethane (TCA)	71-55-6	X [(5, 8, 16 46, 47)]	F001 [(5)]	F001/F002 [(46, 47)]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F002
		1,2-dichloroethane	107-06-2	X	—	D028
		1,1-dichloroethylene	75-35-4	X	—	D029
		2,4-dinitrotoluene	121-14-2	X	—	D030
		2-ethoxyethanol	110-80-5	X	—	F005
		acetone	67-64-1	X	See Note 2	N/A
		benzene	71-43-2	X	—	F005
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chlorobenzene	108-90-7	X	—	F002
		hexachlorobenzene	118-74-1	X	—	D032
		hexachloroethane	67-72-1	X	—	D034
		methanol	67-56-1	X	See Note 2	N/A
		methylene chloride	75-09-2	X	—	F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		nitrobenzene	98-95-3	X	—	D036
		tetrachloroethylene (perclene)	127-18-4	X	—	F002
		trichloroethylene (TCE)	79-01-6	X	—	F002
		toluene	108-88-3	X	—	F005
		vinyl chloride	75-01-4	X	—	D043
		xylene	1330-20-7	X	F003 [(5)] See Note 2	N/A
741	PITS 11 & 12 FIRST STAGE SLUDGE	See RF-001	—	X [(126)] See RF-001	See RF-001	See RF-001
742	PITS 11 & 12 SECOND STAGE SLUDGE	See RF-002	—	X [(126)] See RF-002	See RF-002	See RF-002
743	PITS 11 & 12 ORGANIC SETUPS	See RF-003	—	X [(126)] See RF-003	See RF-003	See RF-003
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB [(126)]	See RF-003	See RF-003
744	PITS 11 & 12 SPECIAL SETUPS	See RF-004	—	X [(126)] See RF-004	See RF-004	See RF-004
745	PITS 11 & 12 EVAPORATOR SALTS	See RF-005	—	X [(126)] See RF-005	See RF-005	—
746	PITS 11 & 12 903 PAD OIL DRUMS	See SD-176		See SD-176	See SD-176	—
					N/A	—
747	RFP MISCELLANEOUS SLUDGE	See RF-823	—	X [(126)] See RF-823	See RF-823	—
					N/A	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
749	PITS 11 AND 12 SEWER SLUDGE	See RF-995	—	See RF-995	See RF-995	—
750	PITS 11 & 12 DEBRIS	See BN-510	—	X [126] See BN-510	See BN-510 See Notes 8 and 25 [108, 182, 183]	See Note 22
751	PITS 11 & 12 ROASTER OXIDE	See RF-751 (See Note 12)	—	See Note 12 [126]	See RF-751 (See Note 12)	—
752	PITS 11 & 12 DEBRIS WASTE FROM NON-RF FACILITIES	See SD-177[108]		See SD-177[108]	See SD-177[108]	—
753	PITS 11 & 12 LEGACY DIRT	See RF-990	—	See RF-990 [126]	See RF-990	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB [126]	N/A	—
760	RFP DEBRIS	See BN-510		X [126] See BN-510	See BN-510 See Notes 8 and 25 [108, 182, 183]	See Note 22
800	FIRST STAGE SLUDGE – CEMENTED	1,1,1-trichloroethane (TCA)	71-55-6	X [2, 8, 9, 16, 24, 57]	F001 [16]	F001/F002 [24, 57]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F002
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	—	F003 See Note 2
		arsenic	7440-38-2	X	D004	D004
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	F005	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	D006	D006
		carbon tetrachloride	56-23-5	X	F001	F001
		chlorobenzene	108-90-7	X	—	F002
		chloroform (trichloromethane)	67-66-3	X	—	D022
		chromium	7440-47-3	X	D007	D007
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	See Note 2	N/A
		ethyl ether	60-29-7	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
800	FIRST STAGE SLUDGE – CEMENTED (cont.)	lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	—	F003 See Note 2
		methylene chloride	75-09-2	X	F002	F001/F002
		nitrate	—	X	See Note 2	N/A
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	D010	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	F001	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	—	F003 See Note 2
801	SOLIDIFIED ORGANICS	1,1,1-trichloroethane (TCA)	71-55-6	X [2, 8, 16 46, 47]	F001 [16]	F001/F002 [46, 47]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F002
		1,2-dichloroethane	107-06-2	X	D028	D028
		1,1-dichloroethylene	75-35-4	X	D029	D029
		2,4-dinitrotoluene	121-14-2	X	D030	D030
		acetone	67-64-1	X	F003 See Note 2	N/A
		carbon tetrachloride	56-23-5	X	F001	F001
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		carbon disulfide	75-15-0	X	—	F005
		chloroform (trichloromethane)	67-66-3	X	D022	D022
		chlorobenzene	108-90-7	X	—	F002
		hexachlorobenzene	118-74-1	X	D032	D032
		hexachloroethane	67-72-1	X	D034	D034
		methanol	67-56-1	X	F003 See Note 2	N/A
		methylene chloride	75-09-2	X	F002	F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		nitrobenzene	98-95-3	X	D036	D036
		tetrachloroethylene (perclene)	127-18-4	X	F002	F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	F002	F002

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
801	SOLIDIFIED ORGANICS (cont.)	vinyl chloride	75-01-4	X	D043	D043
		xylene	1330-20-7	X	F003 See Note 2	N/A
802	SOLIDIFIED LABORATORY WASTE	1,1,1-trichloroethane (TCA)	71-55-6	X [16, 45]	—	F001/F002 [45]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	F001/F002
		1,1-dichloroethylene	75-35-4	X	—	D029
		benzene	71-43-2	X	—	F005
		cadmium	7440-43-9	X	—	D006
		carbon tetrachloride	56-23-5	X	—	F001
		chromium	7440-47-3	X	—	D007
		cyanide	57-12-5	X	See Note 2	N/A
		cyclohexane (if waste contains free liquids)	110-82-7	X	See Note 2	N/A
		ethyl benzene	100-41-4	X	See Note 2	N/A
		lead	7439-92-1	X	—	D008
		methanol	67-56-1	X	See Note 2	N/A
		methylene chloride	75-09-2	X	—	F002
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	X	—	F009
		cyanide plating bath solutions	—	X	—	F007
		electroplating sludges	—	X	—	F006
803	SOLIDIFIED DCP SLUDGE	1,1,1-trichloroethane (TCA)	71-55-6	X [2, 8, 16, 25]	F001 [2]	F001 [25]
		1,1,2,2-tetrachloroethane	79-34-5	X	—	N/A
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001
		1-butanol	71-36-3	X	F003 See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		1-butanol	71-36-3	X	See Note 2	N/A
		cadmium	7440-43-9	X	D006	D006

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
803	SOLIDIFIED DCP SLUDGE (cont.)	carbon tetrachloride	56-23-5	X	F001	F001
		chromium	7440-47-3	X	—	D007
		chloroform (trichloromethane)	67-66-3	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	F003 [(2)] See Note 2	N/A
		hexachlorobenzene	118-74-1	X	—	D032
		lead	7439-92-1	X	D008 [(2)]	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	F003 [(2)] See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methyl isobutyl ketone	108-10-1	X	See Note 2	N/A
		methylene chloride	75-09-2	X	F002 [(2)]	F002 [(25)]
		potential corrosives if liquids exceed the WIPP-WAC limit	—	X	D002	N/A
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001
		toluene	108-88-3	X	F005	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	N/A
806	SOLIDIFIED PROCESS SOLIDS	1,1,1-trichloroethane (TCA)	71-55-6	X [(2, 16)]	F001/F002 [(2)]	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	—
		1-butanol	71-36-3	X	F003 [(2)] (See Note 2)	—
		acetone	67-64-1	X	F003 [(2)] (See Note 2)	—
		arsenic	7440-38-2	X	D004	—
		barium	7440-39-3	X	D005	—
		cadmium	7440-43-9	X	D006	—
		carbon tetrachloride	56-23-5	X	F001	—
		chromium	7440-47-3	X	D007	—
		lead	7439-92-1	X	D008	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
806	SOLIDIFIED PROCESS SOLIDS (cont.)	mercury	7439-97-6	X	D009	—
		methanol	67-56-1	X	F003 [(2)] (See Note 2)	—
		methylene chloride	75-09-2	X	F002	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	—
		selenium	7782-49-2	X	D010	—
		silver	7440-22-4	X	D011	—
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	—
		trichloroethylene (TCE)	79-01-6	X	F001/F002	—
		cyanide cleaning bath solutions	—	X	F009 (See Note 23)	—
		cyanide plating bath solutions	—	X	F007 (See Note 23)	—
		electroplating sludges	—	X	F006 (See Note 23)	—
		xylene	1330-20-7	X	F003 [(2)] (See Note 2)	N/A
807	BYPASS SLUDGE (After 3/21/87)	1,1,1-trichloroethane (TCA)	71-55-6	X [(2, 8, 16, 25)]	F001 [(2, 16)]	F001 [(25)]
		1,1,2,2-tetrachloroethane	79-34-5	X	N/A	N/A
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001
		trans-1,3-dichloropropene	542-75-6	X	N/A	N/A
		1-butanol	71-36-3	X	F003 See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	D006	D006
		carbon tetrachloride	56-23-5	X	F001	F001
		chromium	7440-47-3	X	—	D007
		cyanide	57-12-5	X	See Note 2	N/A
		cyanide cleaning bath solutions	—	X	F009	F009
		cyanide plating bath solutions	—	X	F007	F007
		electroplating sludges	—	X	F006	F006
		ethyl benzene	100-41-4	X	F003 See Note 2	N/A
		hexachlorobenzene	118-74-1	X	—	D032
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	—	D009
		methanol	67-56-1	X	F003 See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methyl isobutyl ketone	108-10-1	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
807	BYPASS SLUDGE (After 3/21/87) (cont.)	methylene chloride	75-09-2	X	F002	F002
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	F001	F001
		toluene	108-88-3	X	F005	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	F003 See Note 2	N/A
817	CEMENTED SS AND C HEELS	See RF-393	7440-47-3	X [8, 16]	See RF-393 [8, 16]	See RF-393
		nitrates	—	X	—	N/A
		1,1,1-trichloroethane (TCA)	71-55-6	X [8, 16, 95]	F001 [16]	F001/F002 [95]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002 [16]	F001/F002
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		benzene	71-43-2	X	—	F005
		arsenic	7440-38-2	X	—	D004
		barium	7440-39-3	X	—	D005
		beryllium (not beryllium powder)	7440-41-7	X	—	N/A
		cadmium	7440-43-9	X	—	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F001
818	CEMENTED INCINERATOR ASH	chromium	7440-47-3	X	—	D007
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	—	D009
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methanol	67-56-1	X	See Note 2	N/A
		methylene chloride	75-09-2	X	F002	F002
		selenium	7782-49-2	X	—	D010
		silver	7440-22-4	X	—	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005 [95]
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
820	CEMENTED SOOT	1,1,1-trichloroethane (TCA)	71-55-6	X [8, 16, 95]	F001 [16]	F001/F002 [95]
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	F001/F002
		1-butanol	71-36-3	X	See Note 2	N/A
		acetone	67-64-1	X	See Note 2	N/A
		arsenic	7440-38-2	X	D004	D004
		barium	7440-39-3	X	D005	D005
		benzene	71-43-2	X	—	F005
		beryllium (not beryllium powder)	7440-41-7	X	N/A	N/A
		cadmium	7440-43-9	X	D006	D006
		carbon disulfide	75-15-0	X	—	F005
		carbon tetrachloride	56-23-5	X	F001	F005
		chromium	7440-47-3	X	D007	D007
		lead	7439-92-1	X	D008	D008
		mercury	7439-97-6	X	D009	D009
		methanol	67-56-1	X	See Note 2	N/A
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	F005
		methylene chloride	75-09-2	X	F002	F002
		selenium	7782-49-2	X	D010	D010
		silver	7440-22-4	X	D011	D011
		tetrachloroethylene (perclene)	127-18-4	X	—	F001/F002
		toluene	108-88-3	X	—	F005
		trichloroethylene (TCE)	79-01-6	X	—	F001/F002
		xylene	1330-20-7	X	See Note 2	N/A
822	CEMENTED RESINS	See RF-432	67-66-3	X [19, 43]	See RF-432	—
823	CEMENTED MISCELLANEOUS SLUDGE	1,1,1-trichloroethane (TCA)	71-55-6	X [8, 16]	F001/F002 [8, 16]	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	—
		acetone	67-64-1	X	F003 (See Note 2)	—
		arsenic	7440-38-2	X	D004	—
		barium	7440-39-3	X	D005	—
		cadmium	7440-43-9	X	D006	—
		carbon tetrachloride	56-23-5	X	F001	—
		chromium	7440-47-3	X	D007	—
		lead	7439-92-1	X	D008	—
		mercury	7439-97-6	X	D009	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
823	CEMENTED MISCELLANEOUS SLUDGE (cont.)	methanol	67-56-1	X	F003 (See Note 2)	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	—
		methylene chloride	75-09-2	X	F002	—
		selenium	7782-49-2	X	D010	—
		silver	7440-22-4	X	D011	—
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	—
		trichloroethylene (TCE)	79-01-6	X	F001/F002	—
		cyanide cleaning bath solutions	—	X	F009 (See Note 23)	—
		cyanide plating bath solutions	—	X	F007 (See Note 23)	—
		electroplating sludges	—	X	F006 (See Note 23)	—
		xylene	1330-20-7	X	F003 (See Note 2)	—
831	DRY COMBUSTIBLES	1,1,1-trichloroethane (TCA)	71-55-6	X [2, 8]	F001 [2, 8, 108, 182, 183] See Notes 4, 8, and 25	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	
		1,1-dichloroethylene	75-35-4	X	—	
		carbon tetrachloride	56-23-5	X	F001	
		cyclohexane	110-82-7	X	—	
		ethyl benzene	100-41-4	X	—	
		methylene chloride	75-09-2	X	F002	
		toluene	108-88-3	X	—	
		xylene	1330-20-7	X	—	
832	WET COMBUSTIBLES	1,1,1-trichloroethane (TCA)	71-55-6	X [2, 8]	F001 [2, 8, 108, 182, 183] See Notes 4, 8, and 25	See Note 22
		1,1,2,2-tetrachloroethane	79-34-5	X	—	
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	
		1,2,4-trimethylbenzene	95-63-6	X	—	
		benzene	71-43-2	X	—	
		carbon tetrachloride	56-23-5	X	F001	
		chloroform (trichloromethane)	67-66-3	X	—	
		cyclohexane	110-82-7	X	—	
		ethyl benzene	100-41-4	X	—	
		methane	74-82-8	X	—	
		methylene chloride	75-09-2	X	F002	
		toluene	108-88-3	X	—	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
832	WET COMBUSTIBLES (cont.)	xylene	1330-20-7	X	—	See Note 22
833	PLASTICS, TRU MIXED	1,1,1-trichloroethane (TCA)	71-55-6	X [2, 8]	F001 [2, 8, 108, 182, 183] See Notes 4, 8, and 25	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002 [2]	
		carbon tetrachloride	56-23-5	X	F001	
		Chloroform (trichloromethane)	67-66-3	X	—	
		cyclohexane	110-82-7	X	—	
		methylene chloride	75-09-2	X	F002	
		toluene	108-88-3	X	—	
		trichloroethylene (TCE)	79-01-6	X	—	
		xylene	1330-20-7	X	—	
900	LSA PAPER, PLASTIC, ETC.	1,1,1-trichloroethane (TCA)	71-55-6	X [5, 6, 16]	F001 See Notes 4, 8, and 25 (108, 182, 183)	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	
		1,1-dichloroethylene	75-35-4	X	—	
		arsenic	7440-38-2	X	—	
		barium	7440-39-3	X	—	
		cadmium	7440-43-9	X	—	
		carbon tetrachloride	56-23-5	X	F001	
		chromium	7440-47-3	X	—	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	—	
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	
		methylene chloride	75-09-2	X	F002	
		selenium	7782-49-2	X	—	
		silver	7440-22-4	X	—	
		tetrachloroethylene (perclene)	127-18-4	X	—	
		toluene	108-88-3	X	—	
		trichloroethylene (TCE)	79-01-6	X	F001	
		xylene	1330-20-7	X	F003 See Note 2	

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
950	LSA METAL, GLASS, ETC.	(see RF-440)	(see RF-440)	(see RF-440) [1, 4, 5, 16, 67]	(see RF-440) See Notes 8 and 25 [108, 182, 183]	See Note 22
		aerosol cans	—	See Notes 8 and 25 [108]	See Notes 8 and 25 [108, 182, 183]	
960	CONCRETE, ASPHALT, ETC.	(see RF-371 and 374) [5]	(see RF-371 and 374) [5]	(see RF-371 and 374) [5]	(see RF-371 and 374) [5, 16, 108]	See Note 22
		aerosol cans	—	See Notes 8 and 25 [108, 182, 183]	See Notes 8 and 25 [108, 182, 183]	
970	WOOD	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5, 6, 16, 67]	F001 See Notes 4, 8, 25 [108, 182, 183]	See Note 22
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F002	
		carbon tetrachloride	56-23-5	X	F001	
		lead	7439-92-1	X	D008	
		methyl ethyl ketone (2-butanone)	78-93-3	X	—	
		methylene chloride	75-09-2	X	F002	
		polychlorinated-biphenyls (ballast found in LLW box)	1336-36-3	X	—	
		tetrachloroethylene (perclene)	127-18-4	X	—	
		toluene	108-88-3	X	—	
		trichloroethylene (TCE)	79-01-6	X	F001	
		xylene	1330-20-7	X	F003 See Note 2	
976	BUILDING 776 PROCESS SLUDGE	1,1,1-trichloroethane (TCA)	71-55-6	X [1, 5]	F001/F002	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	—
		1,2-dichloroethylene	540-59-0	X	D028	—
		1-butanol	71-36-3	X	F003 (See Note 2)	—
		cadmium	7440-43-9	X	D006	—
		carbon tetrachloride	56-23-5	X	F001	—
		chloroform (trichloromethane)	67-66-3	X	D022	—
		chromium	7440-47-3	X	D007	—
		lead	7439-92-1	X	D008	—
		mercury	7439-97-6	X	D009	—
		methanol	67-56-1	X	F003 (See Note 2)	—
		methylene chloride	75-09-2	X	F002	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
976	BUILDING 776 PROCESS SLUDGE (cont.)	tetrachloroethylene (perclene)	127-18-4	X	F001	—
		trans-1,2-dichloroethylene	156-60-5	X	—	—
		trichloroethylene (TCE)	79-01-6	X	F001	—
		xylene	1330-20-7	X	F003 (See Note 2)	—
978	LAUNDRY SLUDGE	1,1,1-trichloroethane (TCA)	71-55-6	X [(5)]	F001/F002 [(193)]	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	—
		1-butanol	71-36-3	X	F003 (See Note 2)	—
		beryllium (not beryllium powder)	7440-41-7	X	—	—
		cadmium	7440-43-9	X	D006	—
		carbon tetrachloride	56-23-5	X	F001	—
		chromium	7440-47-3	X	D006	—
		lead	7439-92-1	X	D008	—
		mercury	7439-97-6	X	D009	—
		methanol	67-56-1	X	F003 (See Note 2)	—
		methylene chloride	75-09-2	X	F002	—
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	—
		trichloroethylene (TCE)	79-01-6	X	F001/F002	—
		xylene	1330-20-7	X	F003 (See Note 2)	—
980	EQUIPMENT	1,1,1-trichloroethane (TCA)	71-55-6	X [(1, 5)]	—	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	—
		carbon tetrachloride	56-23-5	X	—	—
		lead	7439-92-1	X	—	—
		methylene chloride	75-09-2	X	—	—
990	DIRT	1,1,1-trichloroethane (TCA)	71-55-6	X [(1, 5)]	—	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	—	—
		1-butanol	71-36-3	X	—	—
		aerosol cans	—	—	See Notes 8 and 25 [(108)]	—
		carbon tetrachloride	56-23-5	X	—	—
		methanol	67-56-1	X	See Note 2	—
		methylene chloride	75-09-2	X	—	—
		nitrobenzene	98-95-3	X	—	—
		nitrates	—	X	—	—
		tetrachloroethylene (perclene)	127-18-4	X	—	—
		trichloroethylene (TCE)	79-01-6	X	—	—

Table A-30. (cont.) RF

RF IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
990	DIRT (cont.)	xylene	1330-20-7	X	—	—
995	SEWER SLUDGE	None [(158)]		—	None [(158)]	—
998	PITS 11 & 12 CARGOS AND BINS (WITHOUT ROASTER OXIDE)	polychlorinated-biphenyls (PCBs)	1336-36-3	PCB See Notes 10 and 13 [(126)]	See Notes 10 and 13	—
999	PITS 11 & 12 CARGOS AND BINS WITH ROASTER OXIDE	polychlorinated-biphenyls (PCBs)	1336-36-3	PCB See Notes 10 and 13 [(126)]	See Notes 10 and 13	—

Table A-31. Hanford (RL) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

RL IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations) HI, WG See Note 26	Initial Gen Assigned HWN WG, PC See Note 29	WIPP WSPF Approved HWN WS, AK
712	HANFORD PLUTONIUM FINISHING PLANT DEBRIS (i.e., MFPDD)	arsenic	7440-38-2	X (97, 116)	D004 (97, 116)	See Note 22
		barium	7440-39-3	X	D005	
		cadmium	7440-43-9	X	D006	
		chromium	7440-47-3	X	D007	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		selenium	7782-49-2	X	D010	
		silver	7440-22-4	X	D011	
		chloroform (trichloromethane)	67-66-3	X	D022	
		2,4-dinitrotoluene	121-14-2	X	D030	
		carbon tetrachloride	56-23-5	X	F001	
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001/F002	
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	
		methylene chloride	75-09-2	X	F001/F002	
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	
		trichlorofluoromethane	75-69-4	X	F001/F002	
		trichloroethylene (TCE)	79-01-6	X	F001/F002	
		nitrobenzene	98-95-3	X	F004	
		benzene	71-43-2	X	F005	
		carbon disulfide	75-15-0	X	F005	
		pyridine	110-86-1	X	F005	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
		toluene	108-88-3	X	F005	
714	HANFORD RADIOCHEMICAL PROCESSING LAB 325 BLDG DEBRIS (i.e., RLM325D.001)	arsenic	7440-38-2	X (97, 117)	D004 (97, 117)	See Note 22
		barium	7440-39-3	X	D005	
		cadmium	7440-43-9	X	D006	
		chromium	7440-47-3	X	D007	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		selenium	7782-49-2	X	D010	
		silver	7440-22-4	X	D011	
		chloroform (trichloromethane)	67-66-3	X	D022	
		1,4-dichlorobenzene	106-46-7	X	D027	
		1,2-dichloroethane	107-06-2	X	D028	

Table A-31. (cont.) RL

RL IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
714	HANFORD RADIOCHEMICAL PROCESSING LAB 325 BLDG DEBRIS (i.e., RLM325D.001; cont.)	1,2-dichlorobenzene	95-50-1	X	F002	See Note 22
		1,1-dichloroethylene	75-35-4	X	D029	
		2,4-dinitrotoluene	121-14-2	X	D030	
		hexachloroethane	67-72-1	X	D034	
		pentachlorophenol	87-86-5	X	D037	
		vinyl chloride	75-01-4	X	D043	
		carbon tetrachloride	56-23-5	X	F001	
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001/F002	
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	
		1,1,2,2-tetrachloro-1,2-difluoroethane	79-34-5	X	F001	
		methylene chloride	75-09-2	X	F001/F002	
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	
		chlorobenzene	108-90-7	X	F002	
		cresol	1319-77-3	X	F004	
		nitrobenzene	98-95-3	X	F004	
		2-nitropropane	79-46-9	X	F005	
		benzene	71-43-2	X	F005	
		Isobutyl alcohol (isobutanol)	78-83-1	X	F005	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
		pyridine	110-86-1	X	F005	
		toluene	108-88-3	X	F005	
715	HANFORD HOMOGENEOUS SOLID WASTE	See Note 9 and 15 (132)		See Note 9 (132)	See Note 15 (132)	—

Table A-31. (cont.) RL

RL IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
716	HANFORD 231-Z BUILDING DEBRIS (i.e., RLM321ZD.001)	See Note 9 and 15 [97, 118]		See Note 9 and 15 [97, 118]	See Note 9 and 15 [97, 118]	See Note 22
		cadmium	7440-43-9	X	D006	
		chromium	7440-47-3	X	D007	
		lead	7439-92-1	X	D008	
		mercury	7439-97-6	X	D009	
		carbon tetrachloride	56-23-5	X	F001	
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001/F002	
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	
		methylene chloride	75-09-2	X	F001/F002	
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	
		trichloroethylene (TCE)	79-01-6	X	F001/F002	
		benzene	71-43-2	X	F005	
		carbon disulfide	75-15-0	X	F005	
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	
720	HANFORD KE BASIN NORTH LOADOUT PIT SLUDGE	See Note 9 and 15 [133]		See Note 9 [133]	See Note 15 [133]	—

Table A-32. INL – Subsurface Disposal Area (SD) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

SD IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
176	PRE-1980 INL-EXHUMED SDA HOMOGENEOUS SOLIDS	arsenic	7440-38-2	X [51, 159]	D004 [51, 159]	—
		barium	7440-39-3	X	D005	—
		cadmium	7440-43-9	X	D006	—
		chromium	7440-47-3	X	D007	—
		lead	7439-92-1	X	D008	—
		mercury	7439-97-6	X	D009	—
		selenium	7782-49-2	X	D010	—
		silver	7440-22-4	X	D011	—
		chloroform	67-66-3	X	D022	—
		1,4-dichlorobenzene	106-46-7	X	D027	—
		1,2-dichloroethane	107-06-2	X	D028	—
		1,1-dichloroethylene	75-35-4	X	D029	—
		2,4-dinitrotoluene	121-14-2	X	D030	—
		hexachlorobenzene	118-74-1	X	D032	—
		hexachlorobutadiene	87-68-3	X	D033	—
		hexachloroethane	67-72-1	X	D034	—
		pentachlorophenol	87-86-5	X	D037	—
		vinyl chloride	75-01-4	X	D043	—
		carbon tetrachloride	56-23-5	X	F001	—
		carbon disulfide	75-15-0	X	F005	—
		methylene chloride	75-09-2	X	F001/F002	—
		tetrachloroethylene (perclene)	127-18-4	X	F001/F002	—
		1,1,1-trichloroethane (TCA)	71-55-6	X	F001/F002	—
		trichloroethylene	79-01-6	X	F001/F002	—
		trichlorofluoromethane	75-69-4	X	F001/F002	—
		1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	X	F001/F002	—
		chlorobenzene	108-90-7	X	F002	—
		1,2-dichlorobenzene	95-50-1	X	F002	—
		1,1,2-trichloroethane	79-00-5	X	F002	—
		acetone	67-64-1	X	F003 See Note 2	—
		1-butanol	71-36-3	X	F003 See Note 2	—
		ethanol	64-17-5	X	See Note 2	—
		ethyl acetate	141-78-6	X	F003 See Note 2	—
		ethyl benzene	100-41-4	X	F003 See Note 2	—

Table A-32. (cont.) SD

SD IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
176	PRE-1980 INL-EXHUMED SDA HOMOGENEOUS SOLIDS (cont.)	ethyl ether	60-29-7	X	F003 See Note 2	—
		methanol	67-56-1	X	F003 See Note 2	—
		methyl isobutyl ketone	108-10-1	X	F003 See Note 2	—
		xylene	1330-20-7	X	F003 See Note 2	—
		cresol	1319-77-3	X	F004	—
		nitrobenzene	98-95-3	X	F004	—
		benzene	71-43-2	X	F005	—
		isobutanol	78-83-1	X	F005	—
		2-ethoxyethanol	110-80-5	X	F005	—
		methyl ethyl ketone (2-butanone)	78-93-3	X	F005	—
		2-nitropropane	79-46-9	X	F005	—
		pyridine	110-86-1	X	F005	—
		toluene	108-88-3	X	F005	—
		electroplating sludges	—	X	F006	—
		cyanide plating bath solutions	—	X	F007	—
		stripping and cleaning bath solutions cyanide electroplating	—	X	F009	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCBs (SD-176 and SD-178 only)	N/A	—
177	PRE-1980 INL-EXHUMED SDA HETEROGENEOUS DEBRIS	See SD-176 [159]		See SD-176 [159]	See SD-176 [159]	See Note 22
178	PRE-1980 INL-EXHUMED SDA SOIL	See SD-176 [159]		See SD-176 [159]	See SD-176 [159]	—
		polychlorinated-biphenyls (PCBs)	1336-36-3	PCB	N/A	—
179	PRE-1980 INL-EXHUMED SDA WASTE RETRIEVAL CONTAINERS See Note 14	See SD-176 [74, 159]		See SD-176 [74, 159]	See SD-176 [74, 159]	—
703	SDA WASTE CONTAINING NITRATE SALT	See Notes 9, 15, and 16 [51]		See Note 9 [51	See Note 15 [51	—
704	SDA HOMOGENEOUS SOLIDS	See Notes 9, 15, and 16 [51]		See Note 9 [51]	See Note 15 [51]	—
705	SDA HETEROGENEOUS DEBRIS	See Notes 9, 15, and 16 [51]		See Note 9 [51]	See Note 15 [51]	—
706	SDA SOIL	See Notes 9, 15, and 16 [51]		See Note 9 [51]	See Note 15 [51]	—

Table A-33. Sandia National Laboratory – East (SL) hazardous constituents, chemical properties, or hazardous items identified in TRU waste.

SL IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
223	SNL LRRI HETEROGENEOUS DEBRIS	See Note 9 and 15 [138]		See Note 9 [138]	See Note 15 [138]	—
224	SNL HFC HETEROGENEOUS DEBRIS	See Note 9 and 15 [139]		See Note 9 [139]	See Note 15 [139]	—
227	SANDIA SOURCES	See Note 9 and 15 [140]		See Note 9 [140]	See Note 15 [140]	—

Table A-34. Hazardous constituents, chemical properties, or hazardous items identified in Savannah River Site (SR) TRU waste.

SR IDC Numeric Code	Waste Description	Constituent/Compound/Item	CAS	Potential Hazardous Constituent, Chemical Property, or Hazardous Item (for supporting safe storage configurations)[HI, WG] See Note 26	Initial Gen Assigned HWN [WG, PC] See Note 29	WIPP WSPF Approved HWN [WS, AK]
251	SRS BARNWELL SOLIDIFIED INORGANIC WASTE	See Note 9 and 15 [135]		See Note 9 [135]	See Note 15 [135]	—
252	SRS F-CANYON AND FB-LINE ABSORBED WASTES	See Note 9 and 15 [136]		See Note 9 [136]	See Note 15 [136]	—
253	SRS MOUND SITE INORGANIC PARTICULATES	See Note 9 and 15 [137]		See Note 9 [137]	See Note 15 [137]	—
255	SRS INORGANIC SLUDGE FROM 235F	(See Notes 9 and 15) [174, 180]		See Notes 9 [174, 180]	See Note 15 [174, 180]	—
256	SRS INORGANIC PARTICULATES FROM 221H	(See Notes 9 and 15) [175]		See Notes 9 [175]	See Note 15 [175]	—
257	SRS SOLIDIFIED INORGANICS FROM 773A	(See Notes 9 and 15) [167, 168]		See Notes 9 [167, 168]	See Note 15 [167, 168]	—
258	SRS SOLIDIFIED ORGANICS FROM 211F	(See Notes 9 and 15) [170]		See Notes 9 [170]	See Note 15 [170]	—
259	SRS SOLIDIFIED INORGANICS FROM 211F	(See Notes 9 and 15) ([171])		See Notes 9 [171]	See Note 15 [171]	—
260	SRS SOLIDIFIED ORGANICS FROM 321M	(See Notes 9 and 15) [173, 176]		See Notes 9 [173, 176]	See Note 15 [173, 176]	—
261	BCLDP ABSORBED HYDRAULIC SLUDGE FROM JN-1	(See Notes 9 and 15) [169, 179]		See Notes 9 [169, 179]	See Note 15 [169, 179]	—
835	SRS HIGH LEVEL CAUSTIC	See Note 9 and 15 [134]		See Note 9 [134]	See Note 15 [134]	—
842	SRS MOUND SITE SOIL/DEBRIS	See Note 9 and 15 [148]		See Note 9 [148]	See Note 15 [148]	—

Table A-35. Notes applicable to Tables A-1 through A-34.

NOTES

NOTE 1: *The 3100 m^3 Project conservatively assigned the F003 HWN to RF-292 and RF-696 within the WIPP-approved 3,100 m^3 Project WSP for this waste stream (i.e., ININW222). All HWNs previously assigned that are associated with the corrosivity (i.e., D002) and/or ignitability (i.e., D001/F003) characteristics will not exhibit that characteristic at the time of shipment to WIPP.*

NOTE 2: *A potential WIPP-prohibited characteristic HWN is associated with the hazardous constituent. The constituent was identified through historical generator information.*

NOTE 3: *Containers of waste remaining in storage at the TSA that have excess liquids will retain the applicable characteristic code (as indicated) until the waste no longer exhibits that characteristic.*

NOTE 4: *General statement within AK records reflects that the waste may contain a constituent associated with F001, F002, or F005 (i.e., specific contaminant may not be identified).*

NOTE 5: *Waste is subject to periodic change due to routine receipt of off-site waste. See off-site waste program waste profile and AMWTP HWDs for current list of HWNs. Applicable WIPP HWNs and hazardous constituents will be determined at the time of WIPP profiling.*

NOTE 6: *These HWNs do not apply to this IDC; however, because the F006, F007, and F009 HWNs do apply to RF-376 and RF-490 filters and these wastes are included in BN211 approved WSPF, all filters shipped under the approved BN211 WSPF are assigned the F006, F007, and F009 HWNs at the time of shipment.*

NOTE 7: *The waste was previously profiled by CCP and is Supercompactor feedstock. See also the applicable CCP WSPF.*

NOTE 8: *According to AK documentation the original generator did not assign a D001 or D003 HWN (i.e., the waste was not classified by the generator as an ignitable or reactive waste).*

NOTE 9: *The constituents associated with AMWTP storage requirements are identified in the AMWTP off-site waste profile supporting documentation.*

NOTE 10: *This is an IDC assigned to the overpack containers (i.e., bins/cargo containers only) and is used to support AMWTP operations. The IDC reflects that the overpack containers include inner containers of legacy debris and non-debris wastes that have a high or low probability of roaster oxide (RF-999 [roaster oxide designator] and RF-998 roaster oxide not designated). The inner containers were retrieved from the INL SDA pits 11 and 12 during the timeframe 1974–1979. The inner waste containers may contain a variety of waste IDCs (e.g., RF-741, RF-742, RF-743, RF-744, RF-745, RF-750, and RF-751).*

NOTE 11: *This HWN was assigned by the INL 3,100 m^3 Project due to the presence of Ful-Flo filters within RF-292.*

NOTE 12: *Roaster oxide has been determined to be non-hazardous if at the time of retrieval the container is intact. If the container is breached an evaluation of applicable EPA HWNs will be performed. HWNs will be assigned to breached containers on a case-by-case basis and will be based on the type and source of waste within close proximity of the parent container.*[73]

NOTE 13: *The IDC is not to be used for characterization. The IDC is only used for internal AMWTP container management.* [108, 159]

NOTE 14: *IDC SD-179 is assigned to Pre-1980 INL-Exhumed SDA Waste Retrieval Containers. The waste is associated with exhumed, generated, and/or repackaged during the Early Waste Retrieval (EWR) Project and placed into M-III bins and during the Initial Drum Retrieval (IDR) Project. The waste may be packaged into 85-gallon drums, FRP boxes, M-III bins and cargos and may include a primary waste form that is unknown at the time of TSA retrieval. The waste also includes waste previously identified as IW-179 and any combination of inner containers associated with IDCs SD-176 through SD-178.* [108]

NOTE 15: *See specific AMWTP off-site WSP for HWNs.*

NOTE 16: *Some containers within this IDC are classified as PCB and some are non-PCB. PCB status is determined based on information from CCP.*

NOTE 17: *The combustion/incineration of cyanide plating waste has not been confirmed by AMWTP AK. Prior profiling of the same waste by RF (i.e. the original generator) did not result in assignment of F006, F007, or F009 HWNs.* [9, 62]

NOTE 18: *Hazardous waste numbers and constituents are the same as BN-508.*

NOTE 19: *Temporarily assigned HWNs the same as MD-801.*

NOTE 20: *Contact Waste Services for the list of HWNs/hazardous constituents and PCB status.*

NOTE 21: *See P1381A for AK information on ANL-E remote-handled waste.*

NOTE 22: *This IDC is (or was) a Supercompactor feedstock IDC. See RPT-TRUW-83 for current approved feedstock IDCs.*

NOTE 23: *The F006, F007, and F009 have been conservatively applied due to the variety of sources that might have entered the wastes.*

NOTE 24: *See AMWTP RPT-TRUW-93.*

NOTE 25: *Waste may contain unvented aerosol cans.*

NOTE 26: *Any RF, MD, BC, RL, LA, or ID waste may contain aerosol cans.* [108]

NOTE 27: *RH waste see applicable RH document.*

NOTE 28: *Currently not in AMWTP inventory. HWNs and constituents will be completed prior to acceptance.*

NOTE 29: *HWNs initially assigned are reflective of generator supplied information. The initial HWNs may or may not represent the actual HWNs eventually applied to the waste stream. HWNs initially assigned to the waste apply until waste is shipped offsite to WIPP.* [195]

NOTE 30: *Unused reagent bottles of petroleum ether found during box line operations. Not previously reported by ANL-E.*

TBD Wastes identified as TBD have not had HWN assigned for purposes of WIPP profiling under an AMWTP WSP and/or have not undergone AK characterization evaluation.

WG Waste Generator's assignment of HWNs.

HI Hazardous constituent information relating to potential EPA hazardous constituent (e.g., listed or characteristic) or potential EPA hazardous characteristic property. The information is unconfirmed and was obtained from an interpretation of previously identified historical documents. Potential hazardous constituents do not necessarily reflect generator-assigned or final WIPP-assigned HWNs. These hazardous constituents were identified based on historical reviews of previously identified AK documents for purposes of supporting safe storage.

AK Confirmed AK information used to assign HWNs to an AMWTP waste stream, including any conservative HWN assignment that has been confirmed by AK.

WS WIPP-approved WSPF assigned HWNs.

PC Potential characterization information. Unless otherwise noted, wastes with no generator assigned HWNs are considered to be a mixed waste and are temporarily assigned HWNs associated with the identified hazardous constituent(s) for the IDC. Note the temporary HWN does not include P, K, or U-listed waste assumptions.