

# Technical Basis Document

## Acceptable Knowledge Process Description

### Repackaging of JN-1 Transfer/Storage Pool Filter Change-Out Waste

**March 10, 1999**

TCP-98-03.1.1

***Prepared for:***

Battelle Columbus Laboratories  
Decommissioning Project (BCLDP)  
Columbus, Ohio

***Prepared by:***

*WASTREN, Inc.*  
1333 W. 120<sup>th</sup> Avenue, Suite 314  
Westminster, Colorado 80234

REVISION RECORD INDICATING  
LATEST DOCUMENT REVISION

Title Acceptable Knowledge Process Description -  
Repackaging of JN-1 Transfer/Storage Pool Filter  
Change-Out Waste

No. TCP-98-03.1.1

Page i of iii

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii							
Rev. No.	1	1	1							

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	1	1	1	1	1	1	1	1	1	1

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.	1									

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	4/12/99

REVISION RECORD	
Rev. No.	Date

REVISION RECORD	
Rev. No.	1
Issue Date	
Issued By	

**APPROVAL PAGE**

**Prepared By:**

\_\_\_\_\_  
K. Peters  
Wastren, Inc.

\_\_\_\_\_  
Date

This report, *TCP-98-03.1.1, Acceptable Knowledge Process Description - Repackaging of JN-1 Transfer/Storage Pool Filter Change-Out Waste*, has been reviewed and approved by the following.

**Approved By:**

\_\_\_\_\_  
J. Eide  
Manager, Waste Management Operations

\_\_\_\_\_  
Date

## LIST OF ACRONYMS & ABBREVIATIONS

AK	Acceptable Knowledge
BCLDP	Battelle Columbus Laboratories Decommissioning Project
EPA	Environmental Protection Agency
JN-1	West Jefferson North Hot Cell Laboratory (Building JN-1)
PCB	polychlorinated biphenyls
QAPjP	TRU Waste Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RH	Remote Handled
TRU	Transuranic
TSCA	Toxic Substances Control Act
WCP	Waste Certification Program
WIPP	Waste Isolation Pilot Plant

## 1.0 INTRODUCTION

This Acceptable Knowledge (AK) Process Description describes the operation to be performed by the Battelle Columbus Laboratories Decommissioning Project Transuranic Waste Certification Program (BCLDP TRU WCP) to repackage 34 drums of resin waste. This waste was originally generated during the change-out of resins in the Transfer/Storage Pool filtering system in Building JN-1 (Hot Cell Laboratory). In addition to describing the historical change-out procedure, this report summarizes the repackaging methodology and describes the inputs to and outputs from this process.

The purpose of this report is to provide the AK information required by TCP-98-02, *Transuranic Waste Characterization Quality Assurance Project Plan (QAPjP) for the BCLDP TRU WCP*<sup>(1)</sup>, to describe TRU waste generating processes and characterize TRU waste streams generated by these processes. This report was prepared in accordance with TC-AP-03.1, *Collection, Review, and Management of Acceptable Knowledge Documentation*<sup>(3)</sup>, to create an auditable record that serves as a road map to the sources of AK used to describe the processes and characterize each TRU waste stream.

## 2.0 HISTORY

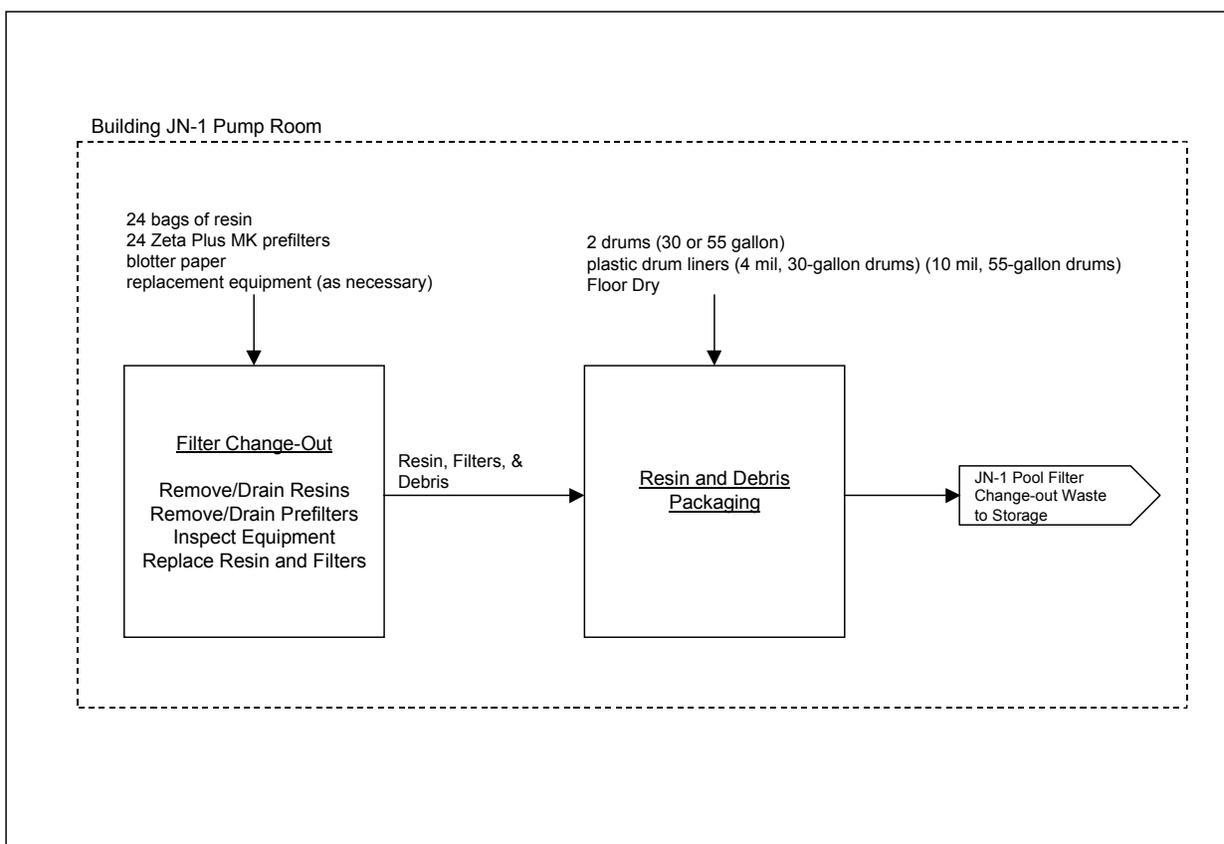
In 1971 and 1972 the High Bay (also known as JN-1B) was constructed to house the High Energy Cell, Transfer/Storage Pool, and supporting areas. The High Energy Cell and pool were specifically designed to accommodate the receipt, storage, transfer, and examination of entire fuel assemblies which was not feasible before this time. Prior to the construction of the High Bay, shipments of radioactive materials were received at the loading dock and introduced directly into the cells.<sup>(2)</sup>

After shipping casks containing fuel assemblies were cleaned in the Washdown Room, a 50-ton crane was used to transfer the casks into the Transfer/Storage Pool. Once in the pool, the casks were opened and the fuel assemblies were moved into the High Energy Cell through a transfer canal in the west wall of the pool. The pool was also used to store radioactive materials for the Hot Cell Laboratory.<sup>(2)</sup> In some instances, materials were stored for extended periods of time. For instance, defense-related N-reactor pressure tubes were received and stored in the pool from 1981 to 1987.<sup>P043,P044</sup>

The Transfer/Storage Pool measures 20 by 20 feet and is 49 feet deep. The pool contained nearly 150,000 gallons of water replenished from a 1,500-gallon tank of deionized water. The pool water was filtered by an ion-exchange system in the Pump Room. The system

consisted of 12 ion-exchange columns each containing CM-2 regenerated mixed bed ion exchange resin (two 5-pound bags) and two cellulose/glass fiber cartridge prefilters. Pool water passed through the prefilters to remove particulates then through the resin beds to remove minerals, salts, and other ions.<sup>C015,C017,P002,P025</sup>

When the radiation levels at contact on the ion-exchange tanks rose to approximately 200 mR/hr, the resins and prefilter were changed-out in accordance with procedure HL-OP-010, *Changing Resins and Filters in JN-1B Pump Room*. Figure 2-1 illustrates the process used to change-out the filter system resins.<sup>P002,P042</sup>



**Figure 2-1.** Change-Out of JN-1 Transfer/Storage Pool Filter Resins.

During the change-out operation, the resin bags (2) and composite (glass fiber/cellulose/melamine resin) prefilters (2) were removed from each of the ion-exchange

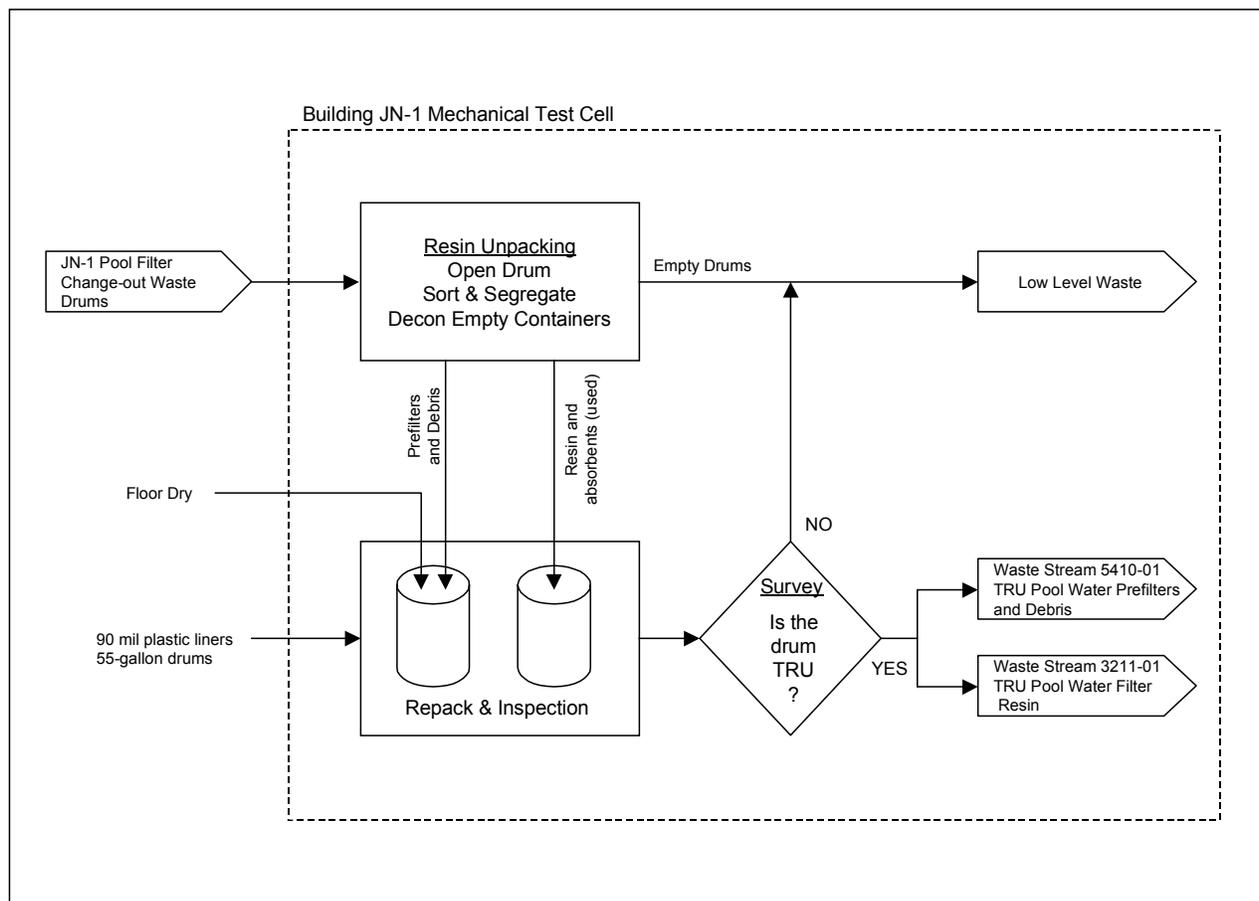
canisters. The resin bags and filters were allowed to drain then placed in 30- or 55-gallon drums lined with polyethylene bags (4 mil and 10 mil, respectively). Approximately, 10 pounds of Floor Dry absorbent (diatomaceous earth) was placed in the bottom of the liner and on top of the resin waste. In addition to the resin and filters, the drums may contain other miscellaneous material used during the process including blotter paper used to cover the floor, rubber gloves, Floor Dry bags, and equipment parts (seals, hoses, valves, clamps, etc.) that were replaced as necessary. The current inventory consists of 34 containers stored in Waste Shed and Waste Storage Vault. Some of the drums have been over packed due to the corrosion of the original containers.<sup>C015,C016,C018,P002,P042</sup>

### 3.0 PROCESS DESCRIPTION

Repackaging of the resin change-out waste will be performed in the Mechanical Test Cell in Building JN-1. The containers will be transferred using drum dollies from the Waste Shed and the Waste Storage Vault into the Mechanical Test Cell through the Controlled Access Area. Figure 3-1 summarizes the process to be used to repack the resin change-out waste.<sup>C016</sup>

Once the drums are in the Mechanical Test Cell, the containers will be opened and the contents will be transferred into 90-mil polyethylene rigid liners (no other confinement layers are to be used). The waste will be transferred to the liners either remotely using the manipulators in the cell or directly by personnel using tong, scoop, or vacuum techniques. The prefilters and other debris (including the original liners) will be segregated from the resins and placed in separate 90-mil (or thicker) rigid polyethylene liners. For the filters and debris waste, approximately 10 pounds of a 50:50 mixture of Floor-Dry and Radsorb will be added to the bottom of the liner to absorb any liquids that might be generated by dewatering or condensation. The waste will be inspected and packaged in accordance with TC-OP-01.4, *Segregation and Packaging of TRU Waste*, to verify AK and identify and segregate prohibited items.<sup>(4),C016</sup>

After the rigid liners are placed in 55-gallon drums, each drum is representatively sampled for the appropriate waste stream and surveyed to determine if the package is TRU in accordance with DD-98-04, *Waste Characterization, Classification, and Shipping Support Technical Basis*<sup>(6)</sup>, and to validate the JN-1 Pool mix is the correct waste stream model to use. The containers determined to be low level, empty drums, and empty Floor Dry bags will be managed in accordance with BCLDP-90-1, *The BCLDP Low-Level Waste Certification Plan*<sup>(5)</sup>. TRU pool water prefilters and debris (Waste Stream 5410-01) and TRU pool water filter resin (Waste Stream 3211-01) will be certified for disposal at the Waste Isolation Pilot Plant (WIPP).



**Figure 3-1.** Repackaging of Resin Change-Out Waste.

## 4.0 Pool Water Filter Resin Waste Stream Summary

<b>Waste Stream ID:</b>	3211-01
<b>Generation Building:</b>	Building JN-1, Mechanical Test Cell <sup>C016</sup>
<b>Waste Stream Volume (Projected):</b>	1.0 m <sup>3</sup> <sup>C018</sup>
<b>Generation Dates (Projected):</b>	April 1999 – July 1999
<b>EPA Hazardous Waste Numbers:</b>	D004, D005, D006, D007, D008, D009, D011 <sup>(D006)</sup>
<b>Radionuclides:</b>	JN-1 Pool Cleanup Isotopic Mix <sup>(6)</sup>
<b>TRUCON Content Codes:</b>	BC121 (RH-TRU)
<b>Summary Category:</b>	S3000 <sup>(7)</sup>
<b>Matrix Parameter Category:</b>	S3211 <sup>(7)</sup>

### 4.1 Waste Stream Description

The pool water filter resins were generated during repackaging of the waste materials generated from the change out of the system used to filter the water in the Transfer/Storage Pool. This stream includes nuclear grade resin, muslin (cotton) resin bags, and Floor Dry segregated during this process. Table 4-1 presents the matrix parameter category and waste material parameters for this waste stream.<sup>C015,C016</sup>

*Table 4-1. Pool Water Filter Resin Waste Matrix.*<sup>C018</sup>

Waste Stream	Matrix Parameter Category	Waste Material Parameters	Weight % (Range)
3211-01, Pool Water Filter Resin	S3211, Organic Resin	Organic Matrix (resin)	70-80%
		Other Inorganic Materials	20-30%
		Cellulosics	<5%

**Waste Stream 3211, Pool Water Filters Resin:** This waste consists of ion-exchange resin contained in bags which was used for deionizing the Transfer/Storage Pool water. The CM-2 Regenerated Mixed Bed Resin used was contained in muslin bags.<sup>(2),P025</sup> The waste matrix will also include Floor Dry (diatomaceous earth) used as an absorbent during the original packaging of this waste and 10 lbs. Of absorbent (50:50 Floor-Dry and Radsorb) added during repackaging to absorb any water from condensation or dewatering.<sup>D003 P042</sup>

### 4.2 Characterization Rationale

The resin wastes are characterized based on knowledge of the material (inputs) and knowledge of the processes generating the waste, and visual examination. This section provides a RCRA hazardous and TSCA waste determination for this waste stream.

#### 4.2.1 Characteristic Waste

Based on the acceptable knowledge documentation reviewed, the materials do not exhibit the characteristics of ignitability (40 CFR 261.21), corrosivity (40 CFR 261.22), reactivity (40 CFR 261.23) or toxicity (40 CFR 261.24), however D004, D005, D006, D007, D008, D009, and D011 have been conservatively assigned due to these constituents being detected at low concentrations in the pool water<sup>D005</sup> and supporting analytical data.<sup>D006</sup>

***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 visual examination is performed to ensure free liquids are not added to containers during repackaging. In addition, any free liquid would be water and absorbents have been added to the resins to absorb any liquids that may be generated due to condensation or dewatering. This material will not cause fire through friction, absorption of moisture, or spontaneous chemical changes. This material is not a compressed gas as defined in 49 CFR 173.151. This material is not an oxidizer as defined in 49 CFR 173.300. The materials in this waste stream are therefore not 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 visual examination is performed to ensure free liquids are not added to containers during repackaging. In addition, absorbents have been added to the resins to absorb any liquids that may be generated due to condensation or dewatering. The materials in this waste stream are therefore not corrosive wastes (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 in this waste stream are therefore not reactive wastes (D003).

***Toxicity:*** The materials in this waste stream do not meet the definition of toxicity as defined in 40 CFR 261.24. The toxicity characteristic contaminants fall into one of two categories: metals and organics. Organic compounds include halogenated and nonhalogenated solvents, pesticides, herbicides, and other toxic compounds. Based upon AK information a composite sample was taken from a resin drum. Both the Total and TCLP analytical results detected the presence of several RCRA regulated metals in small amounts<sup>D006</sup>. Based upon this data and the QAPP requirement, D004, D005, D006, D007, D008, D009 and D011 will be conservatively added to Waste Stream ID 3211-01.

#### 4.2.2 Listed Hazardous Waste

The material in this waste stream is not, or was not mixed with, a waste listed in 40 CFR 261, Subpart D as a hazardous waste from non-specific sources (40 CFR 261.31), as a hazardous waste from specific sources (40 CFR 261.32), or as a discarded commercial chemical product, an off-specification species, a container residue, or a spill residue thereof (40 CFR 261.33). These resins did not come in contact with listed solvents. Therefore, this waste stream is not a listed hazardous waste.

#### 4.2.3 TSCA Waste Determination

The material in this waste stream is not TSCA regulated waste as defined in 40 CFR 761. Review of AK identified no possible source of PCB contamination of this waste. Therefore, waste stream 3211-01, is not a TSCA regulated waste.

### 5.0 Pool Water Prefilter and Debris Waste Stream Summary

<b>Waste Stream ID:</b>	5410-01
<b>Generation Building:</b>	Building JN-1, Mechanical Test Cell <sup>C016</sup>
<b>Waste Stream Volume (Projected):</b>	0.8 m <sup>3</sup> <sup>C018</sup>
<b>Generation Dates (Projected):</b>	April 1999 – July 1999
<b>EPA Hazardous Waste Numbers:</b>	D004, D005, D006, D007, D008, D009, D011 <sup>(D006)</sup>
<b>Radionuclides:</b>	JN-1 Pool Cleanup Isotopic Mix <sup>(6)</sup>
<b>TRUCON Content Codes:</b>	BC121 (RH-TRU)
<b>Summary Category:</b>	S5000 <sup>(7)</sup>
<b>Matrix Parameter Category:</b>	S5410 <sup>(7)</sup>

#### 5.1 Waste Stream Description

The pool water filters and debris consists of the materials (except resins and Floor Dry) generated during repackaging of the waste materials generated from the change out of the resins in the system used to filter the water in the Transfer/Storage Pool. Table 5-1 presents the matrix parameter category and waste material parameters for this waste stream.<sup>C015,C016,C017</sup>

Table 5-1. Pool Water Prefilters and Debris.<sup>C018 D003</sup>

Waste Stream	Matrix Parameter Category	Waste Material Parameters	Weight % (Range)
5410-01, Pool Water Prefilters and Debris	S5410, Composite Filter Debris	Other Inorganic Material	59-69%
		Organic Matrix	6-16%
		Plastic	3-13%
		Cellulosics	2-12%

Waste Stream	Matrix Parameter Category	Waste Material Parameters	Weight % (Range)
		Rubber	2-12%
		Iron-based metal/alloys	<10%

**Waste Stream 5410, Pool Water Prefilters and Debris:** This waste consists of the cartridge prefilters and debris generated during the change-out of resin used for filtering the Transfer/Storage Pool water. The filter matrix is composed of glass and cellulose fibers combined with melamine resin. The end caps are polypropylene and the filters are placed in the canisters with rubber gaskets (butyl/nitrile).<sup>C017</sup> Other debris that may be present from the original packaging may include paper (blotter paper and Floor Dry bags), plastic liners, rubber gaskets, muslin resin bags, rubber gloves, and other miscellaneous plastic, cellulosic, and metal materials. The waste matrix will also include Floor Dry (diatomaceous earth) and RadSorb added during repackaging to absorb any water from condensation or dewatering.<sup>C015,C016,P042</sup>

## 5.2 Characterization Rationale

The prefilter and debris wastes are characterized based on knowledge of the material (inputs) and knowledge of the processes generating the waste, and visual examination. This section provides a RCRA hazardous and TSCA waste determination for this waste stream.

### 5.2.1 Characteristic Waste

Based on the acceptable knowledge documentation reviewed, the materials do not exhibit the characteristics of ignitability (40 CFR 261.21), corrosivity (40 CFR 261.22), reactivity (40 CFR 261.23) or toxicity (40 CFR 261.24), however D004, D005, D006, D007, D008, D009, and D011 have been conservatively assigned due to these constituents being detected at low concentrations in the pool water<sup>D005</sup> and supporting analytical data.<sup>D006</sup>

**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 visual examination is performed to ensure free liquids are not added to containers during repackaging. In addition, any free liquid would be water and absorbents have been added to absorb any liquids that may be generated due to condensation or dewatering. This material will not cause fire through friction, absorption of moisture, or spontaneous chemical changes. This material is not a compressed gas as defined in 49 CFR 173.300. This material is not an oxidizer as defined in 49 CFR 173.151. The materials in this waste stream are therefore not ignitable wastes (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 visual examination is performed to ensure free liquids are not added to containers during repackaging. This

waste contains absorbents that have been added to absorb any liquids that may be generated due to condensation or dewatering. The materials in this waste stream are therefore not corrosive wastes (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 in this waste stream are therefore not reactive wastes (D003).

**Toxicity:** The materials in this waste stream do not meet the definition of toxicity as defined in 40 CFR 261.24. The toxicity characteristic contaminants fall into one of two categories: metals and organics. Organic compounds include halogenated and nonhalogenated solvents, pesticides, herbicides, and other toxic compounds. Based upon AK information, a composite sample was taken from a filter drum. Both the Total and TCLP analytical results detected the presence of several RCRA regulated metals in small amounts.<sup>(D006)</sup> Based upon this data and the QAPP requirement, D004, D005, D006, D007, D008, D009, and D011 will be conservatively added to Waste Stream ID 5410-01.

### 5.2.2 Listed Hazardous Waste

The material in this waste stream is not, or was not mixed with, a waste listed in 40 CFR 261, Subpart D as a hazardous waste from non-specific sources (40 CFR 261.31), as a hazardous waste from specific sources (40 CFR 261.32), or as a discarded commercial chemical product, an off-specification species, a container residue, or a spill residue thereof (40 CFR 261.33). These resins did not come in contact with listed solvents. Therefore, this waste stream is not a listed hazardous waste.

### 5.2.3 TSCA Waste Determination

The material in this waste stream is not TSCA regulated waste as defined in 40 CFR 761. Review of AK identified no possible source of PCB contamination of this waste. Therefore, waste stream 5410-01, is not a TSCA regulated waste.

## 6.0 References and AK Sources

1. TCP-98-02, *Transuranic Waste Characterization Quality Assurance Project Plan for the BCLDP TRU Waste Certification Program.*
2. TCP-98-03, *Building JN-1 Hot Cell Laboratory Acceptable Knowledge Document.*

3. TC-AP-03.1, *Collection, Review, and Management of Acceptable Knowledge Documentation.*
4. TC-OP-01.4, *Segregation and Packaging of TRU Waste.*
5. BCLDP-90-1, *The BCLDP Low-Level Waste Certification Plan.*
6. DD-98-04, *Waste Characterization, Classification, and Shipping Support Technical Basis.*
7. DOE 1995. *DOE Waste Treatability Group Guidance.* DOE/LLW-217

**TABLE 6-1.** Acceptable Knowledge Source Documents

Ref No.	Title / Author	Summary	Date
C015	Interview Record of Max Berchtold, BCL, conducted by Kevin Peters. WASTREN, Inc.	Discussion of the process used to change-out the JN-1 Pool filter resins.	1999. February 19.
C016	Interview Record of Scott Kitts, BCL, conducted by Kevin Peters. WASTREN, Inc.	Discussion of the planned methodology to be used to repackage ion exchange resins and prefilters generated during the change-out of the JN-1 Pool filtering system resin beds in the JN-1 Pump Room.	1999. February 24.
C017	Interview Record of Pete Wilson, Cuno Industrial Filters, conducted by Kevin Peters. WASTREN, Inc.	Description of JN-1 Pool filtering system prefilters and estimated composition of the prefilters based on Cuno specifications and information from a Cuno Technical Service Representative.	1999. March 4.
C018	Letter to AK Record authored by Kevin Peters. WASTREN, Inc.	Estimates of Waste Material Parameter Weights for packaged JN-1 pool filter resins and debris and assigning Matrix Parameter Categories based on manufactures information MSDSs and interviews.	1999. March 5.
P002	Fuel Storage Pool, Pump Room and Washdown Room JN-1B. Decontamination and Decommissioning Operations. Louis B. Myers, Max B. Berchtold, and James L. Stickel.	This report describes general operations and configuration of the fuel storage pool, pump room, and washdown room in JN-1B. Operations include fuel storage (assemblies, strongbacks, rod bundles, rod holders and tools), deionization of pool water, and washing of casks. Attachments include 1996 update, miscellaneous drawings/photos, and health physics survey reports and data (including isotopics).	1995. January.
P025	Miscellaneous Materials Safety Data Sheets (MSDSs). Authored by Manufacturers.	Miscellaneous MSDS sheets collected from numerous sources collected during AK research at the West Jefferson site.	
P042	Decontamination and Decommissioning Operations Hot Laboratory Operating Procedure, Changing Resins and Filters in JN-1B Pump Room (HL-OP-010). Battelle Columbus Laboratories.	Procedure describing the method used to change out the resins in the JN-1 Pool Filtering System, including inputs, outputs, and packaging descriptions.	1993. June 4. Revision 1

Ref No.	Title / Author	Summary	Date
P043	Final Report on Research to Develop and Evaluate effects of Hydrogen on Irradiated Pressure Tube Toughness. Battelle Columbus Laboratories. L.M. Lowry and A.A. Lawrence.	This report and attachments documents research performed for Battelle Pacific Northwest Division on N-reactor pressure tubes. This research was defense related and documents the receipt, storage, and examination of these materials from 1981 to 1986. Additionally, the report documents that these materials were stored in the Transfer/Storage Pool supporting the defense waste determination for the pool resins and other related streams.	1986 August 15
P044	Final Report on Research to Develop and Evaluate effects of Hydrogen on Irradiated Pressure Tube Toughness. Battelle Columbus Laboratories. L.M. Lowry.	This report and attachments documents research performed Battelle Pacific Northwest Division on N-reactor pressure tubes. This research was defense related and documents the receipt, storage, and examination of these materials as late as 1987. Additionally, the report documents that these materials were stored in the Transfer/Storage Pool supporting the defense waste determination for the pool resins and other related streams.	1987 September 28
D003	Letter to AK Record authored by Kevin Peters, Wastren, Inc.	This report recalculates the material parameter weights for pool filter resin and debris, assuming a 50/50 mixture of Floor-Dry and Radsorb	1999 April 8
D006	Letter to AK Record authored by Kevin Peters, Wastren, Inc.	This letter was written to address the detection of RCRA metals in samples taken of the Transfer/Storage pool filters and resins. The data indicates the presence of several RCRA metals. Based upon this data, D004, D005, D006, D007, D008, D009, and D011 will be conservatively added to the filter and resin waste streams used to filter the pool water (3211-01, 5410-01, and 5410-02).	1999 June 29