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**RENEWAL APPLICATION  
APPENDIX B4**

**TRU MIXED WASTE CHARACTERIZATION USING  
ACCEPTABLE KNOWLEDGE**

Waste Isolation Pilot Plant  
Hazardous Waste Facility Permit  
Draft Renewal Application  
May 2009

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**RENEWAL APPLICATION  
APPENDIX B4**

**TRU MIXED WASTE CHARACTERIZATION USING  
ACCEPTABLE KNOWLEDGE**

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B4-1	Compilation of Acceptable Knowledge Documentation
B4-2	Acceptable Knowledge Auditing



1 Sampling and analysis may be performed to augment the characterization of wastes based on  
2 ~~acceptable knowledge~~ AK when an AK Sufficiency Determination has not been requested by the  
3 ~~generator/storage site~~ certified characterization program or, if requested, has not been granted by  
4 the New Mexico Environment Department (NMED) the Permittees (see Section B4-3d).  
5 Sampling and analysis consists of radiography, ~~visual examination~~ VE, ~~headspace gas~~ HSG, and  
6 homogeneous waste sampling and analysis. ~~The~~ TRU mixed waste streams shall undergo  
7 applicable provisions of the ~~acceptable knowledge~~ AK process prior to management, storage, or  
8 disposal by the Permittees at the Waste Isolation Pilot Plant (WIPP) ~~WIPP~~.

#### 10 B4-2 Acceptable Knowledge Documentation

11 The Permittees shall obtain from each Department of Energy (**DOE**) TRU ~~mixed waste~~  
12 ~~generator/storage site~~ (~~site~~) a logical sequence of ~~acceptable knowledge~~ AK information that  
13 progresses from general facility information (TRU Mixed Waste Management Program  
14 Information) to more detailed waste-specific information (TRU Mixed Waste Stream  
15 Information). Traceability of ~~acceptable knowledge~~ AK information for a selected container in  
16 the audited Waste Summary Category Group(s) will be examined during the Permittees' audit of  
17 a ~~site~~ certified characterization program (Section B4-3g). The consistent presentation of  
18 ~~acceptable knowledge~~ AK documentation among ~~sites~~ certified characterization programs in  
19 auditable records<sup>1</sup> will allow the Permittees to verify the completeness and adequacy of  
20 ~~acceptable knowledge~~ AK for TRU mixed waste characterization during the audit process. The  
21 Permittees shall implement the ~~acceptable knowledge~~ AK process as specified in the Renewal  
22 Application to characterize TRU mixed wastes and obtain sufficient waste characterization data  
23 to demonstrate compliance with the Renewal Application. ~~The New Mexico Environment~~  
24 ~~Department (NMED)~~ NMED may independently validate the implementation of and compliance  
25 with applicable provisions of the WAP at by each ~~generator/storage site~~ certified characterization  
26 program by participation as observers during site certification audits delineated in the Renewal  
27 Application Appendix B6, ~~(Permittees' Audit and Surveillance Program (Permit Appendix B6))~~.  
28 The Permittees shall provide NMED with current audit schedules and notify NMED in writing  
29 no later than ~~thirty (30)~~ calendar days prior to each audit. ~~The~~ NMED may choose to accompany  
30 the Permittees on any audit of the WAP implementation.

31  
32 The following sections include the information the Permittees will require for each ~~site~~ certified  
33 characterization program to characterize TRU mixed waste using ~~acceptable knowledge~~ AK.  
34 Because waste generating processes are site-specific, ~~sites~~ certified characterization programs  
35 shall, as necessary, augment the required ~~acceptable knowledge~~ AK records with additional  
36 supporting information (see Section B4-2c, Supporting Acceptable Knowledge Information). If  
37 the required information is not available for a particular waste stream, the waste stream will not  
38 be eligible for an AK Sufficiency Determination as specified in Section B4-3d.

---

<sup>1</sup> "Auditable records" mean those records which allow the Permittees to conduct a systematic assessment, analysis, and evaluation of the Permittees compliance with the WAP and the Permit.

1 B4-2a Required Transuranic TRU Mixed Waste Management Program Information

2 The TRU mixed waste management program information shall clearly define waste  
3 categorization schemes and terminology, provide a breakdown of the types and quantities of  
4 TRU mixed waste that are generated and stored at the site, and describe how waste is tracked and  
5 managed at the site, including historical and current operations. Information related to TRU  
6 mixed waste certification procedures and the types of documentation (e.g., waste profile forms)  
7 used to summarize ~~acceptable knowledge~~ AK shall also be provided. The following information  
8 shall be included as part of the ~~acceptable knowledge~~ AK written record:  
9

- 10 • Map of the site with the areas and facilities involved in TRU mixed waste generation,  
11 treatment, and storage identified
- 12 • Facility mission description as related to TRU mixed waste generation and management  
13 (e.g., nuclear weapons research may involve metallurgy, radiochemistry, and nuclear  
14 physics operations that result in specific waste streams)
- 15 • Description of the operations that generate TRU mixed waste at the site (e.g., plutonium  
16 recovery, weapons design, or weapons fabrication)
- 17 • Waste identification or categorization schemes used at the facility (e.g., item description  
18 codes, content codes)
- 19 • Types and quantities of TRU mixed waste generated, including historical generation  
20 through future projections
- 21 • Correlation of waste streams generated from the same building and process, as  
22 appropriate (e.g., sludge, combustibles, metals, and glass)
- 23 • Waste certification procedures for ~~retrievably stored and newly generated~~ TRU wastes to  
24 be sent to the WIPP facility

25 B4-2b Required Transuranic TRU Mixed Waste Stream Information

26 The Permittees ~~may~~ shall use ~~acceptable knowledge~~ AK to delineate site-specific waste streams.  
27 For each TRU mixed waste stream, the Permittees shall require sites certified characterization  
28 programs to compile all process information and data that support the ~~acceptable knowledge~~ AK  
29 used to characterize that waste stream. The type and quantity of supporting documentation will  
30 vary by waste stream, depending on the process generating the waste and site-specific  
31 requirements imposed by the Permittees. At a minimum, the waste process information shall  
32 include the following written information:  
33

- 34 • Area(s) and/or building(s) from which the waste stream was or is generated
- 35 • Waste stream volume and time period of generation (e.g., 100 standard waste boxes of  
36 ~~retrievably stored~~ waste generated from June 1977 through December 1977)

- 1           • Waste generating process described for each building (e.g., batch waste stream generated  
2           during decommissioning operations of glove boxes), including processes associated with  
3           U134 waste generation, if applicable-
- 4           • Process flow diagrams (e.g., a diagram illustrating glove boxes from a specific building  
5           to a size reduction facility to a container storage area). In the case of  
6           research/development, analytical laboratory waste, or other similar processes where  
7           process flow diagrams cannot be created, a description of the waste generating processes,  
8           rather than a formal process flow diagram, may be included if this modification is  
9           justified and the justification is placed in the auditable record
- 10          • Material inputs or other information that identifies the chemical content of the waste  
11          stream and the physical waste form (e.g., glove box materials and chemicals handled  
12          during glove box operations; events or processes that may have modified the chemical or  
13          physical properties of the waste stream after generation; data obtained through ~~visual~~  
14          ~~examination~~ VE of newly generated waste that later undergoes radiography; information  
15          demonstrating neutralization of U134 ~~{(hydrofluoric acid)}~~ and waste compatibility)

16          The ~~acceptable knowledge~~ AK written record shall include a summary that identifies all sources  
17          of waste characterization information used to delineate the waste stream. The basis and rationale  
18          for delineating each waste stream, based on the parameters of interest, shall be clearly  
19          summarized and traceable to referenced documents. Assumptions made in delineating each  
20          waste stream also shall be identified and justified. If discrepancies exist between required  
21          information, then sites certified characterization programs shall apply all hazardous waste  
22          numbers (HWNs) indicated by the information to the subject waste stream unless the sites  
23          certified characterization programs choose to justify an alternative assignment and document the  
24          justification in the auditable record. The Permittees shall obtain from each site certified  
25          characterization program, at a minimum, procedures that comply with the following ~~acceptable~~  
26          ~~knowledge~~ AK requirements:

- 27
- 28          • Procedures for identifying and assigning the physical waste form of the waste
- 29          • Procedures for delineating waste streams and assigning Waste Matrix Codes
- 30          • Procedures for resolving inconsistencies in ~~acceptable knowledge~~ AK documentation
- 31          • Procedures for ~~headspace gas~~ HSG sampling and analysis, ~~visual examination~~ VE and/or  
32          radiography, and homogeneous waste sampling and analysis, if applicable
- 33          • ~~For newly generated waste, p~~ Procedures describing process controls used to ensure  
34          prohibited items (specified in the WAP, ~~Permit Attachment B~~) are documented and  
35          ~~managed,~~ and/or remediated
- 36          • Procedures to ensure radiography and ~~visual examination~~ VE include a list of prohibited  
37          items that ~~the operators~~ shall verify are not present in each container of waste (e.g.,

1 liquids exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible  
2 wastes)

- 3 • Procedures to document how changes to Waste Matrix Codes, waste stream assignment,  
4 and associated ~~Environmental Protection Agency (EPA) EPA hazardous waste numbers~~  
5 HWNs based on material composition are documented for any waste
- 6 • Procedures for assigning EPA ~~hazardous waste numbers~~ HWNs numbers to TRU mixed  
7 waste streams
- 8 • Procedures for estimating waste material parameter weights

9 B4-2c Supporting Acceptable Knowledge Information

10 The generator/storage sites certified characterization programs shall obtain supporting acceptable  
11 knowledge AK information. The amount and type of supporting information is site-specific and  
12 cannot be mandated, but sites certified characterization programs shall collect information as  
13 appropriate to augment required information. Adequacy of supporting information shall be  
14 assessed by the Permittees during audits (Section B4-3g). Sites Certified characterization  
15 programs will use this information to compile the acceptable knowledge AK written record.  
16 Supporting acceptable knowledge AK documentation that may be used (if available) in addition  
17 to the required information specified above include, but are not limited to, the following  
18 information:

- 19 • Process design documents (e.g., Title II Design)
- 20 • Standard operating procedures that may include a list of raw materials or reagents, a  
21 description of the process or experiment generating the waste, and a description of wastes  
22 generated and how the wastes are managed at the point of generation
- 23 • Preliminary and final safety analysis reports and technical safety requirements
- 24 • Waste packaging logs
- 25 • Test plans or research project reports that describe reagents and other raw materials used  
26 in experiments
- 27 • The TRU waste Site databases (e.g., chemical inventory database for Superfund  
28 Amendments and Reauthorization Act Title III requirements)
- 29 • Information from site personnel (e.g., documented interviews)
- 30 • Standard industry documents (e.g., vendor information)
- 31 • Analytical data relevant to the waste stream, including results from fingerprint analyses,  
32 spot checks, or routine verification sampling. This may also include new information  
33

1 which augments required information (e.g., ~~visual examination~~ **VE** not performed in  
2 compliance with the WAP)

- 3 • Material Safety Data Sheets, product labels, or other product package information
- 4 • Sampling and analysis data from comparable or surrogate waste streams (e.g., equivalent  
5 nonradioactive materials)
- 6 • Laboratory notebooks that detail the research processes and raw materials used in an  
7 experiment

8 For waste containers that belong to **Los Alamos National Laboratory's LANL** sealed sources  
9 waste streams, these containers do not require ~~headspace gas~~ **HSG** sampling and analysis if the  
10 following information is part of the AK documentation:

- 11 • Documentation that the waste container contents meet the definition of sealed sources per  
12 10 CFR §30.4 and 10 CFR §835.2 (effective January 1, 2004).
- 13 • Documentation of the certification of the sealed sources as U.S. Department of  
14 Transportation Special Form Class 7 (Radioactive) Material per 49 CFR §173.403  
15 (effective October 1, 2003).
- 16 • Documentation of contamination survey results that validate the integrity of each sealed  
17 source per 10 CFR §34.27 (effective January 1, 2004).
- 18 • **The** AK documentation does not indicate the use of **volatile organic compounds (VOCs)**  
19 ~~VOCs~~ or VOC-bearing materials as constituents of the sealed sources.
- 20 • The outer casing of each sealed source must be of a non-VOC bearing material, which  
21 must be verified at the time of packaging.
- 22 • **The** AK ~~D~~documentation shall also include but shall not be limited to, as available and as  
23 necessary to determine the hazardous constituents associated with sealed sources, the  
24 following: source manufacturer's sales catalogues, original purchase records, source  
25 manufacturer's fabrication documents, source manufacturer's drawings, source  
26 manufacturer's fuel capture assembly reports, source manufacturer's operational  
27 procedures for cleanliness requirements, source manufacturer's shipping documents,  
28 source manufacturer's welding records, ~~transuranic~~ **TRU** batch material records, and  
29 information from national databases (e.g., ~~NMMSS~~ **Nuclear Material Management and**  
30 **Safeguards System**). All of this information may not and need not be available for each  
31 source, but sufficient information must be included in the auditable record to derive an  
32 adequate understanding of source construction and history to ensure that no VOCs are  
33 present in association with the sealed source itself that would render the source  
34 hazardous. If AK data indicate that assignment of a ~~hazardous waste number~~ **HWN**  
35 related to organic materials is required in association with a source, this specific source  
36 will be assigned to a separate waste stream and that waste stream will be subject to  
37

1 representative headspace gas **HSG** sampling unless a separate AK Sufficiency  
2 Determination is approved by the Permittees for the waste stream.

3 All specific, relevant supporting acceptable knowledge **AK** documentation assembled and used  
4 in the acceptable knowledge **AK** process, whether it supports or contradicts any required  
5 acceptable knowledge **AK** documentation, shall be identified and an explanation provided for its  
6 use (e.g., identification of a toxicity characteristic **(TC)**). Supporting documentation may be  
7 used to further document the rationale for the hazardous characterization results. The collection  
8 and use of supporting information shall be assessed by the Permittees during site **certified**  
9 **characterization program** audits to ensure that hazardous waste characterization is supported, as  
10 necessary, by supporting information. Similar to required information, if discrepancies exist  
11 between supporting information and the required information, then sites **certified**  
12 **characterization programs** shall apply all hazardous waste numbers **HWNs** indicated by the  
13 supporting information to the subject waste stream unless the sites **certified characterization**  
14 **programs** choose to justify an alternative assignment and document the justification in the  
15 auditable record.

#### 16 17 B4-3 Acceptable Knowledge Training, Procedures and Other Requirements

18 The Permittees shall require consistency among sites **certified characterization programs** in using  
19 acceptable knowledge **AK** information to characterize TRU mixed waste by the use of the  
20 following: 1) compiling the required and supporting acceptable knowledge **AK** documentation in  
21 an auditable record, 2) auditing acceptable knowledge **AK** records, and 3) **Waste Stream Profile**  
22 **Form (WSPF)** approval and waste confirmation. This section specifies qualification and training  
23 requirements, describes each phase of the process, specifies the procedures that the Permittees  
24 shall require all sites **certified characterization programs** to develop to implement the  
25 requirements for using acceptable knowledge **AK**, and specifies data quality requirements for  
26 acceptable knowledge **AK**.

#### 27 28 B4-3a Qualifications and Training Requirements

29 Site **Certified characterization program** personnel responsible for compiling acceptable  
30 knowledge **AK**, assessing acceptable knowledge **AK**, and resolving discrepancies associated  
31 with acceptable knowledge **AK** shall be qualified and trained in the following areas at a  
32 minimum:

- 33
- 34 • **The** WIPP WAP in Renewal Application Chapter B and the TSDF-WAC ~~specified in the~~  
35 ~~Permit~~
- 36 • State and Federal RCRA regulations associated with solid and hazardous waste  
37 characterization
- 38 • Discrepancy resolution and reporting processes
- 39 • **The** ~~S-site~~-specific procedures associated with waste characterization using acceptable  
40 knowledge **AK**

1 B4-3b Acceptable Knowledge Assembly and Compilation

2 The Permittees shall obtain from sites certified characterization programs ~~acceptable knowledge~~  
3 AK procedures which require consistent application of the ~~acceptable knowledge~~ AK process  
4 and requirements. Certified characterization program ~~Site-specific acceptable knowledge~~ AK  
5 procedures shall address the following:

- 6
- 7 • Sites Certified characterization programs shall prepare and implement a written  
8 procedure outlining the specific methodology used to assemble ~~acceptable knowledge~~  
9 AK records, including the origin of the documentation, how it will be used, and any  
10 limitations associated with the information (e.g., identify the purpose and scope of a  
11 study that included limited sampling and analysis data).
  - 12 • Sites Certified characterization programs shall develop and implement a written  
13 procedure to compile the required ~~acceptable knowledge~~ AK record.
  - 14 • Sites Certified characterization programs shall develop and implement a written  
15 procedure that ensures unacceptable wastes (e.g., reactive, ignitable, corrosive) are  
16 identified and segregated from TRU mixed waste populations sent to WIPP.
  - 17 • Sites Certified characterization programs shall prepare and implement a written  
18 procedure to evaluate ~~acceptable knowledge~~ AK and resolve discrepancies. If different  
19 sources of information indicate different hazardous wastes are present, then sites certified  
20 characterization programs shall include all sources of information in its records and  
21 conservatively assign the all potential appropriate hazardous waste numbers HWNs  
22 ~~unless the sites choose to justify an alternative assignment and document the justification~~  
23 ~~in the auditable record.~~ The assignment of ~~hazardous waste numbers~~ HWNs shall be  
24 tracked in the auditable record to all required documentation.
  - 25 • Sites Certified characterization programs shall prepare and implement a written  
26 procedure to identify hazardous wastes and assign the appropriate ~~hazardous waste~~  
27 ~~numbers~~ HWNs to each waste stream. The following are minimum baseline  
28 requirements/standards that certified characterization program ~~site-specific~~ procedures  
29 shall include to ensure comparable and consistent characterization of hazardous waste:
    - 30 – Compile all of the required information in an auditable record.
    - 31 – Review the compiled information and delineate TRU mixed waste streams.  
32 Delineation of waste streams must comply with the following definition: a waste  
33 stream is defined as waste material generated from a single process or from an  
34 activity that is similar in material, physical form, and hazardous constituents.
    - 35 – Review the compiled information to determine if the waste stream is compliant with  
36 the TSDF-WAC.
    - 37 – Review the required information to determine if the waste is listed under 20.4.1.200  
38 NMAC (incorporating 40 CFR §261), Subpart D. Assign ~~all~~ appropriate listed

1 ~~hazardous waste numbers~~ HWNs unless the sites choose to justify an alternative  
2 assignment and document the justification in the auditable record.

- 3 – Review the required information to determine if the waste exhibits a hazardous  
4 characteristic or may contain hazardous constituents included in the toxicity  
5 characteristics specified in 20.4.1.200 NMAC (incorporating 40 CFR §261),  
6 Subpart C. If a toxicity characteristic TC contaminant is identified and is not  
7 included as a listed waste, assign the toxicity characteristic TC HWN number unless  
8 data (excluding HSG data) are available that demonstrate that the concentration of the  
9 constituent in the waste is less than the toxicity characteristic TC regulatory threshold  
10 level. When data are not available, the toxicity characteristic TC hazardous waste  
11 number HWN for the identified hazardous constituent shall be applied to the mixed  
12 waste stream.
- 13 – When seeking a Scenario 1 or a Scenario 2 AKSD, Rreview the compiled information  
14 to provide an estimate of material parameter weights for the waste stream each  
15 container to be stored or disposed of at WIPP.

16 For newly generated wastes, procedures shall be developed and implemented to characterize  
17 hazardous waste using acceptable knowledge AK prior to packaging the waste.

- 18
- 19 • Sites Certified characterization programs shall ensure that results of audits of the TRU  
20 mixed waste characterization programs at the site are available in the records.
  - 21 • Sites Certified characterization programs shall identify all process controls (implemented  
22 to ensure that the waste contains no prohibited items and to control hazardous waste  
23 content and/or physical form) that may ~~have been applied to retrievably stored waste~~  
24 ~~and/or may presently be applied to newly generated~~ TRU waste. Process controls are  
25 applied at the time of waste generation/packaging to control waste content, whereas any  
26 activities performed after waste generation/packaging to identify prohibited items,  
27 hazardous waste content, or physical form are waste characterization activities, not  
28 process controls. The AK record must contain specific process controls and supporting  
29 documentation identifying when these process controls are used to control waste content.  
30 See Renewal Application Chapter B, Section B-2 for programmatic requirements related  
31 to process controls.

32 B4-3c Criteria for Assembling an Acceptable Knowledge Record and Delineating the Waste  
33 Stream

34 Figure B4-1 provides an overview of the process for assembling acceptable knowledge AK  
35 documentation into an auditable record. The first step is to assemble all of the required  
36 acceptable knowledge AK information and any supporting information regarding the materials  
37 and processes that generate a specific waste stream. The Permittees shall require the sites  
38 certified characterization programs to implement procedures which comply with the following  
39 criteria to establish acceptable knowledge AK records:  
40

- 1 • Acceptable knowledge information shall be compiled in an auditable record, including a  
2 road map for all applicable information.
- 3 • The overview of the facility and TRU mixed waste management operations in the context  
4 of the facility's mission shall be correlated to specific waste stream information.
- 5 • Correlations between waste streams, with regard to time of generation, waste generating  
6 processes, and site-specific facilities shall be clearly described. ~~For newly generated~~  
7 ~~wastes, t~~The rate and quantity of waste to be generated shall be defined, if applicable.
- 8 • A reference list shall be provided that identifies documents, databases, Quality Assurance  
9 protocols, and other sources of information that support the ~~acceptable knowledge~~ AK  
10 information.
- 11 • Container inventories for TRU mixed waste shall be delineated into waste streams based  
12 on required AK information.

13 ~~Container inventories for TRU mixed waste currently in retrievable storage shall be delineated~~  
14 ~~into waste streams by correlating the container identification to all of the required acceptable~~  
15 ~~knowledge information and any supporting acceptable knowledge information.~~

16  
17 B4-3d ~~AK~~ Acceptable Knowledge Sufficiency Determination Request Contents

18 Generator/storage sites Certified characterization programs may submit an ~~AK Sufficiency~~  
19 ~~Determination (AKSD) Request (Determination Request)~~ to meet all or part of the waste  
20 characterization requirements. The ~~Determination Request~~ AKSD request shall include, at a  
21 minimum:

- 22
- 23 • Identification of the scenario for which the approval is sought (Renewal Application  
24 Chapter B, Section B-0b).
- 25 • A complete AK Summary that addresses the following technical requirements:
  - 26 – Executive Summary;
  - 27 – Waste Stream Identification Summary, (including a demonstration that the waste  
28 stream has been properly delineated and meets the Permit definition of a waste stream  
29 (Renewal Application Chapter B, Introduction));
  - 30 – Mandatory Program Information, (including, but not limited to, facility location and  
31 description, mission, defense waste assessment, spent nuclear fuel and high-level  
32 waste assessment, description of waste generating processes, research/development  
33 [as necessary], facility support operations [as applicable], types and quantities of  
34 TRU waste generated, correlation of waste streams to buildings/processes, waste  
35 identification and categorization, physical form identifiers);

1 – Mandatory Waste Stream Information, (including, but not limited to, Area and  
2 Building of Generation, waste stream volume/period of generation (including, ~~for~~  
3 ~~newly generated waste~~, the rate and quantity of waste to be generated, if applicable),  
4 waste generating activities, types of waste generated, material input related to  
5 physical form and identification of percentage of each waste material parameter in the  
6 waste stream, chemical content information including hazardous constituents and  
7 hazardous waste identification, prohibited item content (~~including documented~~  
8 ~~evidence that the waste meets the TSDF WAC Permit Conditions II.C.3.a-h~~), waste  
9 packaging, presence of filter vents, number of layers of confinement);

10 – Types of supporting information gathered:

11 – Container specific data, (if available and relevant); and

12 – A complete reference list, including all mandatory and supporting information.

- 13 • An AK roadmap (defined as a cross reference between mandatory programmatic and  
14 mandatory waste stream information, with references supporting these requirements).

15 ~~• A complete reference list including all mandatory and supporting documentation.~~

- 16 • Relevant supporting information for the required programmatic and waste stream data  
17 addressed in the AK Summary, examples of which are presented in Permit Attachment  
18 B4, Section B4-2c.

- 19 • Identification of any mandatory requirements supported only by upper tier documents  
20 (i.e., there is insufficient supporting data).

- 21 • Description or other means of demonstrating that the AK process described in the Permit  
22 Renewal Application was followed (for example, AK personnel were appropriately  
23 trained; discrepancies were documented, etc).

- 24 • Information showing that the generator/storage site certified characterization program has  
25 developed a written procedure for compiling the AK information and assigning  
26 ~~hazardous waste numbers~~ HWNs as required in Permit Attachment Section B4-3b.

- 27 • Information showing that the generator/storage site certified characterization program has  
28 assessed the AK process (e.g. internal audits, Permit Attachment Section B4-3b).

29 The Permittees shall evaluate the AKSD request Determination Request for completeness and  
30 technical adequacy as specified in Renewal Application Chapter B.

31  
32 B4-3e Requirements for Re-evaluating Acceptable Knowledge Information

33 Acceptable knowledge includes information regarding the physical form of the waste, the base  
34 materials composing the waste, and the process that generates the waste. Waste sampling and  
35 analysis (i.e., radiography or ~~visual examination~~ VE, ~~headsapce gas~~ HSG sampling and analysis,

1 and homogeneous waste sampling and analysis) may be used to augment acceptable knowledge  
2 AK information.

3  
4 The ~~Waste Stream Profile Form (WSPF)~~ and Characterization Information Summary (including  
5 the acceptable knowledge AK summary) will be reviewed for each waste stream prior to  
6 Permittee approval of the WSPF. The Permittees review will ensure that the submitted AK  
7 information was collected under procedures that ensure implementation of the WAP, provides  
8 data sufficient to meet the ~~DQOs~~ data quality objectives in Renewal Application Chapter B,  
9 Section B-4a(1), and allows the Permittees to demonstrate compliance with the waste analysis  
10 requirements of the Renewal Application Permit. A detailed discussion of the Permittees' waste  
11 stream review and approval process is provided in Renewal Application Chapter B,  
12 Section B-1d.

13  
14 The Permittees shall require sites certified characterization programs to establish procedures for  
15 reevaluating acceptable knowledge AK if the results of waste confirmation indicate that the  
16 waste to be shipped does not match the approved waste stream, or if data obtained from  
17 radiography or ~~visual examination~~ VE for waste streams without an AKSD ~~AK~~ Sufficiency  
18 ~~Determination~~ exhibit this discrepancy. Site Certified characterization program procedures shall  
19 describe how the waste is reassigned, acceptable knowledge AK reevaluated, and appropriate  
20 ~~hazardous waste numbers~~ HWNs assigned. If the reevaluation requires that the Waste Matrix  
21 Code be changed for the waste stream or the waste does not match the approved waste stream,  
22 the following minimum steps shall be taken to reevaluate acceptable knowledge AK:

- 23
- 24 • Review existing information based on the container identification number and document  
25 all differences in ~~hazardous waste number~~ HWN assignments
  - 26 • If differences exist in the ~~hazardous waste numbers~~ HWNs that were assigned, reassess  
27 and document all required acceptable knowledge AK information (Section B4-3b)  
28 associated with the new designation
  - 29 • Reassess and document all sampling and analytical data associated with the waste
  - 30 • Verify and document that the reassigned Waste Matrix Code was generated within the  
31 specified time period, area and buildings, waste generating process, and that the process  
32 material inputs are consistent with the waste material parameters identified during  
33 radiography or ~~visual examination~~ VE
  - 34 • Record all changes to acceptable knowledge AK records
  - 35 • If discrepancies exist in the acceptable knowledge AK information for the revised Waste  
36 Matrix Code, document the segregation of the affected portion of the waste stream, and  
37 define the actions necessary to fully characterize the waste

38 Potential ~~toxicity characteristics~~ TCs for base materials that compose TRU mixed heterogeneous  
39 debris (S5000) waste may be determined without destructive sampling and analysis via  
40 acceptable knowledge AK. Sites Certified characterization programs will assign a Waste Matrix

1 Code and waste stream to each container of waste using acceptable knowledge AK. In lieu of  
2 sampling and analytical or other data to the contrary (including headspace gas HSG and total/  
3 Toxicity Characteristic Leaching Procedure (TCLP) analysis of solids/soils), sites certified  
4 characterization programs shall assign the toxicity characteristic TC hazardous waste numbers  
5 HWNs based on the presence of the constituent identified by acceptable knowledge AK,  
6 regardless of the quantity or concentration. Procedures shall describe how additions to  
7 hazardous waste numbers HWNs based on material composition are documented, as necessary  
8 (Section B4-3b).

9  
10 ~~The Permittees shall require sites to use acceptable knowledge to identify spent solvents  
11 associated with each TRU mixed waste stream or waste stream lot. Headspace gas will be used  
12 to resolve the assignment of EPA F-listed hazardous waste numbers to debris waste streams  
13 when waste streams do not have an AK Sufficiency Determination approved by the Permittees.  
14 In this case, sites shall assign F-listed hazardous waste numbers (20.4.1.200 NMAC,  
15 incorporating 40 CFR §261.31) by evaluating the average concentrations of each VOC detected  
16 in container headspace gas for each waste stream or waste stream lot using the upper 90 percent  
17 confidence limit (UCL<sub>90</sub>). The UCL<sub>90</sub> for the mean concentration shall be compared to the  
18 program required quantitation limit (PRQL) for the constituent. If the UCL<sub>90</sub> for the mean  
19 concentration exceeds the PRQL, sites shall reevaluate their acceptable knowledge information  
20 and determine the potential source of the constituent. Sites shall provide documentation to  
21 support any determination that F-listed organic constituents are associated with packaging  
22 materials, radiolysis, or other uses not consistent with solvent use. If the source of the detected  
23 F-listed solvents can not be identified, the appropriate spent solvent hazardous waste number will  
24 be conservatively applied to the waste stream. In the case of applicable toxicity characteristic  
25 VOCs and non-toxic F003 constituents, generator/storage sites may assess whether the head  
26 space gas concentration would render the waste non-hazardous for those characteristics and  
27 change the initial acceptable knowledge determination accordingly.~~

28  
29 ~~The EPA TC hazardous waste numbers HWNs associated with S3000 and S4000 waste streams  
30 will be assigned based on the results of the total/TCLP analysis of a representative homogeneous  
31 waste sample when waste streams do not have an AKSD AK Sufficiency Determination  
32 approved by the Permittees. As with headspace gas HSG, if the total/TCLP results indicate that  
33 the concentration of a characteristic TC waste or non-toxic constituent of an F003 waste is below  
34 the regulatory thresholds levels, the hazardous waste number HWN assigned initially by  
35 acceptable knowledge AK may be changed. Otherwise, if an F-listed waste constituent is  
36 detected, the appropriate hazardous waste number shall be applied.~~

37  
38 ~~If the site determines that the source of the F-listed constituent is a spent solvent used in the  
39 process or is determined to be the result of mixing a listed waste with a solid waste during waste  
40 packaging, or applicable toxicity characteristic or non-toxic F003 wastes are present in excess of  
41 regulatory levels, then the site will either: 1) assign the applicable listed hazardous waste number  
42 to the entire waste stream, or 2) segregate the drums containing detectable concentrations of the  
43 solvent into a separate waste stream and assign applicable hazardous waste numbers. Each site  
44 shall document, justify, and consistently delineate waste streams and assign hazardous waste  
45 numbers based on site-specific permit requirements and other state-enforced agreements.~~

1 To determine the mean concentration of solvent VOCs, all ~~headspace gas~~ **HSG** data or  
2 homogeneous waste data for a waste stream or waste stream lot (i.e., the portion of the waste  
3 stream that is characterized as a unit) will be used, including data qualified with a 'J' flag (i.e.,  
4 less than the PRQL but greater than the method detection limit ~~{(MDL)}~~) or qualified with a 'U'  
5 flag (i.e., undetected). For data qualified with a 'U' flag, sites **certified characterization programs**  
6 shall use one-half the MDL in calculating the mean concentration. Because listed wastes are not  
7 defined based on concentration, sites **certified characterization programs** may not remove  
8 ~~hazardous waste numbers~~ **HWNs** assigned using acceptable knowledge **AK** if hazardous  
9 constituents are not detected in the ~~headspace gas~~ **HSG** or solids/soil analysis.

10  
11 **The** TRU mixed ~~waste~~ **headspace gas HSGs** and homogeneous **mixed** waste matrices may  
12 contain one or two constituents (e.g., carbon tetrachloride ~~and 1,1,1-trichloroethane~~) at  
13 concentrations that are orders of magnitude higher than the other target analytes. In these cases,  
14 samples shall be diluted to remain within the instrument calibration range for the elevated  
15 constituents. Sample dilution results in elevated MDLs for the constituents with elevated  
16 concentrations. Only the concentrations of detected constituents will be used to calculate the  
17 mean for the purpose of assigning F-listed ~~hazardous waste numbers~~ **HWNs**. Because the  
18 presence or absence of F-listed solvents can not be assigned based on the artificially high MDLs  
19 that are caused by sample dilution, data flagged as 'U' and showing an elevated MDL will not be  
20 used in calculating the mean concentration.

#### 21 22 B4-3f Acceptable Knowledge Data Quality Requirements

23 The data quality **assurance** objectives for sampling and analysis techniques are provided in  
24 Renewal Application Appendix B3, **Quality Assurance Objectives and Data Validation**  
25 **Techniques for Waste Characterization Sampling and Analytical Methods**. Analytical results  
26 will be used to augment the characterization of wastes based on acceptable knowledge **AK**. To  
27 ensure that the acceptable knowledge **AK** process is consistently applied, the Permittees shall  
28 require sites **certified characterization programs** to comply with the **quality assurance objectives**  
29 ~~data quality requirements~~ for acceptable knowledge **AK** documentation in Renewal Application  
30 Appendix B3, **Section B3-9**.

31  
32 Each site **certified characterization program** shall address quality control by tracking its  
33 performance with regard to the use of acceptable knowledge **AK** by: 1) assessing the frequency  
34 of inconsistencies among information, and 2) documenting the results of waste discrepancies  
35 identified by the ~~generator/storage site~~ **certified characterization program** during waste  
36 characterization or the Permittees during waste confirmation using radiography, review of  
37 radiography audio/video recordings, ~~visual examination~~ **VE**, or review of ~~visual examination~~ **VE**  
38 records. In addition, the acceptable knowledge **AK** process and waste stream documentation  
39 shall be evaluated through internal assessments by ~~generator/storage site~~ **the certified**  
40 **characterization program** quality assurance organization(s).

#### 41 B4-3g Audits of Acceptable Knowledge

42 The Permittees will conduct an initial audit of each site **characterization program** prior to  
43 certifying the site **characterization program** for shipment of TRU mixed waste to the WIPP  
44 facility. This initial audit will establish an approved baseline that will be reassessed annually by

1 the Permittees. These audits will verify compliance with the requirements specified in the WAP  
2 (Renewal Application Chapter B). The audits will be used to verify compliance with the  
3 compilation, application, and interpretation requirements of acceptable knowledge AK  
4 information specified in the Permit at by all sites certified characterization programs, and to  
5 evaluate the completeness and defensibility of site-specific acceptable knowledge AK  
6 documentation related to hazardous waste characterization. Renewal Application Appendix B6  
7 gives a description of the overall audit program and a required checklist. Figure B4-2 includes  
8 the primary steps associated with the audit process of acceptable knowledge AK.

9  
10 The Site-specific audit plans will be prepared by the Permittees and provided to NMED, and  
11 will identify the scope of the audit, requirements to be assessed, participating personnel,  
12 activities to be audited, organizations to be notified, applicable documents, and schedule. Audits  
13 will be performed in accordance with written procedures and site-specific checklists that will be  
14 developed by the Permittees prior to the audit and provided to NMED prior to the audit. The  
15 site-specific audit checklists will include items associated with the compilation and evaluation of  
16 the required acceptable knowledge AK information as specified in the checklist required by  
17 Renewal Application Appendix B6.

18  
19 Audit checklists shall include Table B6-3 in Renewal Application Appendix B6, and will include  
20 but not be limited to the following elements for review during the audit:

- 21  
22
- 23 • Documentation of the process used to compile, evaluate, and record acceptable  
knowledge AK is available and implemented;
  - 24 • Personnel qualifications and training are documented;
  - 25 • All of the required acceptable knowledge AK documentation specified in Section B4-2  
26 has been compiled in an auditable record;
  - 27 • All of the required procedures specified in Section B4-3 have been developed and  
28 implemented, including but not limited to:
    - 29 – A procedure exists for assigning hazardous waste numbers HWNs to waste streams in  
30 accordance with Section B4-3;
    - 31 – A procedure exists for resolving discrepancies in acceptable knowledge AK  
32 documentation in accordance with Section B4-3; and
  - 33 • Results of other audits of the TRU mixed waste characterization programs at the site are  
34 available in site certified characterization program records.

35 Members of the audit team will be knowledgeable regarding the required acceptable knowledge  
36 AK information, RCRA regulations and EPA guidance regarding the use of acceptable  
37 knowledge AK for waste characterization, RCRA hazardous waste characterization, and the  
38 WAP requirements in (Renewal Application Chapter B). Audit team members will be

1 independent of all TRU mixed waste management operations at of the site certified  
2 characterization program being audited.

3  
4 Auditors will evaluate ~~acceptable knowledge~~ AK documentation for at least one waste stream  
5 from the Summary Category Group(s) being audited, and will audit ~~acceptable knowledge~~ AK  
6 traceability for at least one container from the audited Summary Category Group(s). For these  
7 waste streams, auditors will review all procedures and associated processes developed by the site  
8 certified characterization program for documenting the process of compiling ~~acceptable~~  
9 ~~knowledge~~ AK documentation; correlating information to specific waste inventories; assigning  
10 ~~hazardous waste numbers~~ HWNs; and identifying, resolving, and documenting discrepancies in  
11 ~~acceptable knowledge~~ AK records. The adequacy of ~~acceptable knowledge~~ AK procedures and  
12 processes will be assessed and any deficiencies in procedures documented in the audit report.

13  
14 Auditors will review the ~~acceptable knowledge~~ AK documentation for selected waste streams for  
15 logic, completeness, and defensibility. The criteria that will be used by auditors to evaluate the  
16 logic and defensibility of the ~~acceptable knowledge~~ AK documentation include completeness  
17 and traceability of the information, consistency of application of information, clarity of  
18 presentation, degree of compliance with this Renewal Application Appendix with regard to  
19 ~~acceptable knowledge~~ AK data, nonconformance procedures, and oversight procedures.

20 Auditors will evaluate compliance with written site certified characterization program procedures  
21 for developing the ~~acceptable knowledge~~ AK record. A completeness review will evaluate the  
22 availability of all required TRU mixed waste management program information and TRU mixed  
23 waste stream information (Section B4-2). Records will be reviewed for correlation to specific  
24 waste streams and the basis for characterizing hazardous waste. Auditors will verify that sites  
25 certified characterization programs include all required information and ~~conservatively include~~  
26 ~~all potential~~ the appropriate ~~hazardous waste numbers~~ HWNs indicated by the ~~acceptable~~  
27 ~~knowledge~~ AK records. All deficiencies in the ~~acceptable knowledge~~ AK documentation will be  
28 included in the audit report.

29  
30 Auditors will verify and document that sites certified characterization programs use  
31 administrative controls and follow written procedures to characterize hazardous waste ~~for newly-~~  
32 ~~generated and retrievably stored wastes~~. Procedures to document changes in ~~acceptable~~  
33 ~~knowledge~~ AK documentation and changes to ~~hazardous waste number~~ HWN assignments to  
34 specific waste streams also will be evaluated for compliance with the WAP.

35  
36 After the audit is complete, the Permittees will provide the site certified characterization program  
37 with preliminary results at a close-out meeting. The Permittees will prepare a final audit report  
38 that includes all observations and findings identified during the audit. Sites Certified  
39 characterization programs shall respond to all audit findings and identify corrective actions.  
40 Audit results will be included in the final audit report in (Renewal Application Appendix B6). If  
41 ~~acceptable knowledge~~ AK procedures do not exist, the required information is not available, or  
42 corrective actions (i.e., ~~CARs~~ Corrective Action Reports) are identified associated with  
43 ~~acceptable knowledge~~ AK compilation, and/or hazardous waste characterization, the Permittees  
44 will not manage, store, or dispose TRU mixed waste for the subject waste summary category.  
45 Management, storage, or disposal of the subject waste summary category at WIPP will not

1 resume until the Permittees find that all corrective actions have been implemented and the site  
2 certified characterization program complies with all applicable requirements of the WAP.

3  
4 The National TRU Program disseminates information regarding TRU mixed waste  
5 characterization requirements and program status through the WIPP Home Page. The Permittees  
6 will use this web page to disseminate information regarding TRU mixed waste streams, RCRA  
7 compliance, and operational and programmatic issues, methods development, and waste  
8 characterization information, including the application of ~~acceptable knowledge~~ AK. The  
9 Permittees are provided the required waste characterization information prior to management,  
10 storage, or disposal of that waste at WIPP and also will conduct audits at least annually. The  
11 Permittees will maintain an operating record for review during regulatory agency audits. The  
12 NMED may also review any information relevant to the scope of the audit during site certified  
13 characterization program audits. The Permittees will notify NMED regarding any site's certified  
14 characterization program's failure to implement corrective actions associated with hazardous  
15 waste characterization under this WAP, ~~as specified in Modules I and II and Permit Attachment~~  
16 ~~B3~~.

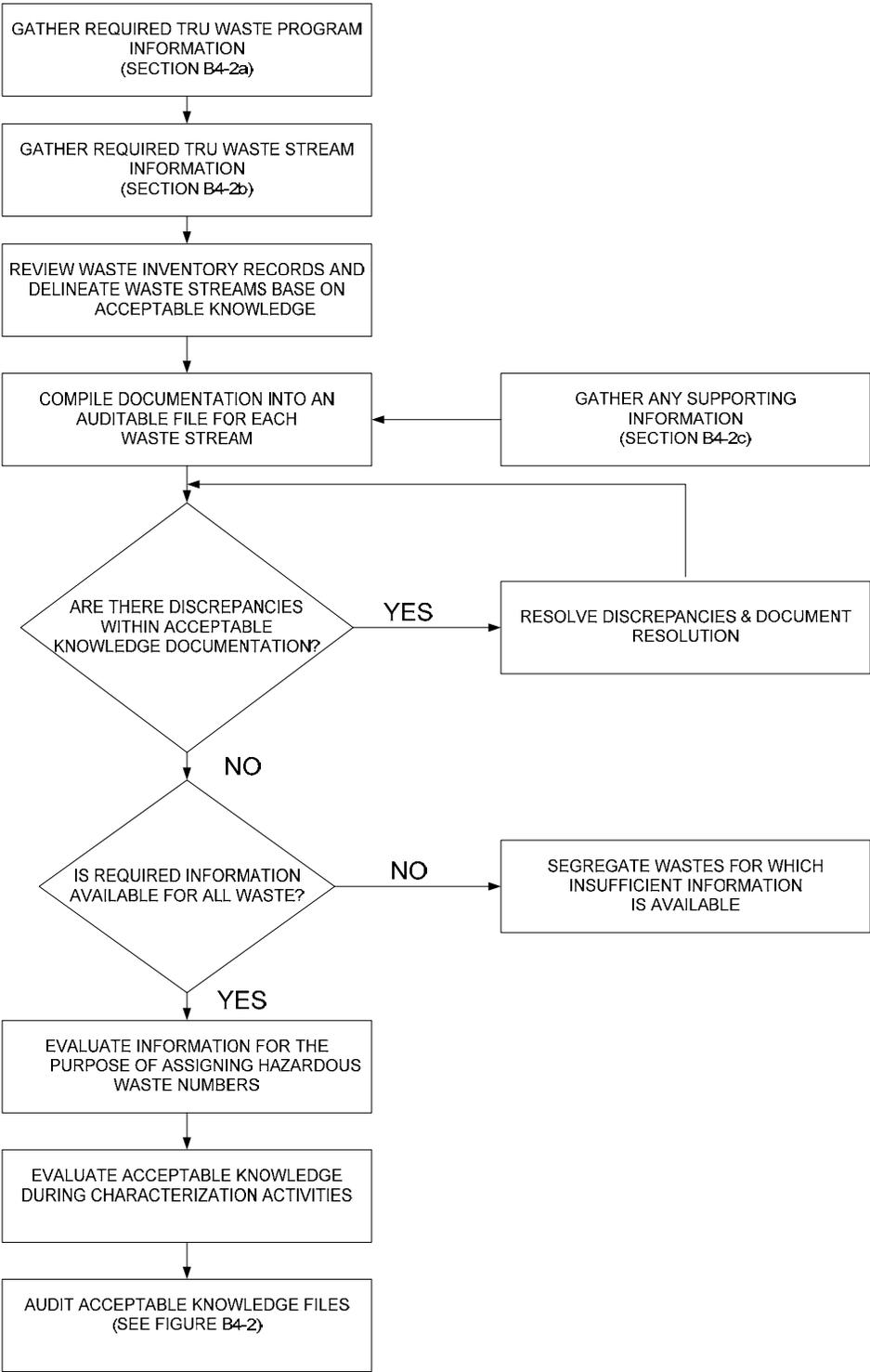
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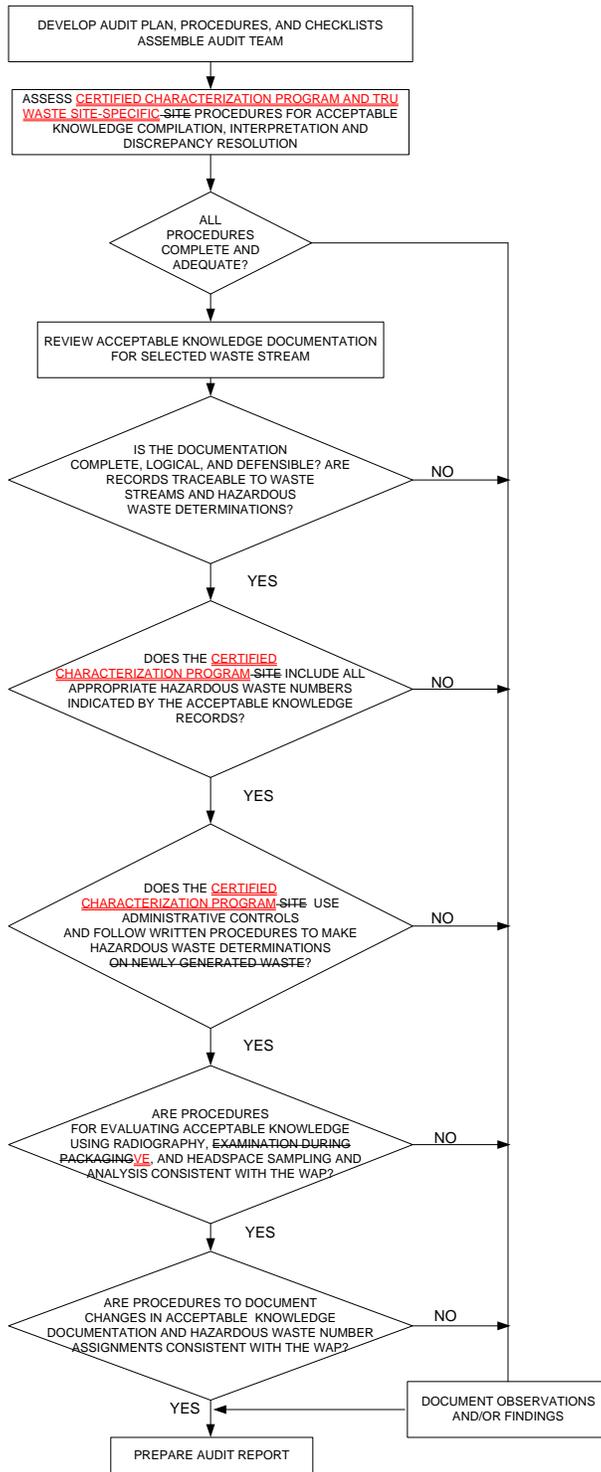
**FIGURES**

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Figure B4-1  
 Compilation of Acceptable Knowledge Documentation



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Figure B4-2  
 Acceptable Knowledge Auditing