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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 • To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40  
2 CFR §261 Subpart D)
- 3 • To estimate waste material parameter weights when seeking a Scenario 1 or a Scenario 2  
4 Acceptable Knowledge Sufficiency Determination (AKSD)

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

#### 13 14 B4-2 Acceptable Knowledge Documentation

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

35  
36 The following sections include the information the Permittees will require for each site certified  
37 characterization program to characterize TRU mixed waste using acceptable knowledge AK.  
38 Because waste generating processes are site-specific, sites certified characterization programs  
39 shall, as necessary, augment the required acceptable knowledge AK records with additional

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<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 Renewal Application WAP.

1 supporting information (see Section B4-2c, ~~Supporting Acceptable Knowledge Information~~). If  
2 the required information is not available for a particular waste stream, the waste stream will not  
3 be eligible for an ~~AK Sufficiency Determination~~ **AKSD** as specified in Section B4-3d.

4  
5 B4-2a Required **Transuranic** TRU Mixed Waste Management Program Information

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

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

29 B4-2b Required **Transuranic** TRU Mixed Waste Stream Information

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

- 1       • Area(s) and/or building(s) from which the waste stream was or is generated
- 2       • Waste stream volume and time period of generation (e.g., 100 standard waste boxes of
- 3       ~~retrievable stored~~ waste generated from June 1977 through December 1977)
- 4       • Waste generating process described for each building (e.g., batch waste stream generated
- 5       during decommissioning operations of glove boxes), including processes associated with
- 6       U134 waste generation, if applicable:
- 7       • Process flow diagrams (e.g., a diagram illustrating glove boxes from a specific building
- 8       to a size reduction facility to a container storage area). In the case of
- 9       research/development, analytical laboratory waste, or other similar processes where
- 10      process flow diagrams cannot be created, a description of the waste generating processes,
- 11      rather than a formal process flow diagram, may be included if this modification is
- 12      justified and the justification is placed in the auditable record
- 13      • Material inputs or other information that identifies the chemical content of the waste
- 14      stream and the physical waste form (e.g., glove box materials and chemicals handled
- 15      during glove box operations; events or processes that may have modified the chemical or
- 16      physical properties of the waste stream after generation; data obtained through ~~visual~~
- 17      ~~examination~~ VE of ~~newly generated~~ waste that later undergoes radiography; information
- 18      demonstrating neutralization of U134 ~~{hydrofluoric acid}~~ and waste compatibility)

19      The ~~acceptable knowledge~~ AK written record shall include a summary that identifies all sources

20      of waste characterization information used to delineate the waste stream. The basis and rationale

21      for delineating each waste stream, based on the parameters of interest, shall be clearly

22      summarized and traceable to referenced documents. Assumptions made in delineating each

23      waste stream also shall be identified and justified. If discrepancies exist between required

24      information, then sites certified characterization programs shall apply all hazardous waste

25      numbers (HWNs) indicated by the information to the subject waste stream unless the sites

26      certified characterization programs choose to justify an alternative assignment and document the

27      justification in the auditable record. The Permittees shall obtain from each site certified

28      characterization program, at a minimum, procedures that comply with the following ~~acceptable~~

29      ~~knowledge~~ AK requirements:

- 30
- 31      • Procedures for identifying and assigning the physical waste form of the waste
- 32      • Procedures for delineating waste streams and assigning Waste Matrix Codes
- 33      • Procedures for resolving inconsistencies in ~~acceptable knowledge~~ AK documentation
- 34      • Procedures for ~~headspace gas~~ HSG sampling and analysis, ~~visual examination~~ VE and/or
- 35      radiography, and homogeneous waste sampling and analysis, if applicable
- 36      • ~~For newly generated waste, p~~ Procedures describing process controls used to ensure
- 37      prohibited items (specified in the WAP, ~~Permit Attachment B~~) are documented and
- 38      ~~managed,~~ and/or remediated

- 1 • Procedures to ensure radiography and ~~visual examination~~ **VE** include a list of prohibited  
2 items that ~~the operators~~ shall verify are not present in each container of waste (e.g.,  
3 liquids exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible  
4 wastes)
- 5 • Procedures to document how changes to Waste Matrix Codes, waste stream assignment,  
6 and associated ~~Environmental Protection Agency (EPA) EPA hazardous waste numbers~~  
7 **HWNs** based on material composition are documented for any waste
- 8 • Procedures for assigning EPA ~~hazardous waste numbers~~ **HWNs** numbers to TRU mixed  
9 waste streams
- 10 • Procedures for estimating waste material parameter weights

#### 11 B4-2c Supporting Acceptable Knowledge Information

12 The ~~generator/storage sites~~ **certified characterization programs** shall obtain supporting acceptable  
13 knowledge **AK** information. The amount and type of supporting information is site-specific and  
14 cannot be mandated, but sites **certified characterization programs** shall collect information as  
15 appropriate to augment required information. Adequacy of supporting information shall be  
16 assessed by the Permittees during audits (Section B4-3g). Sites **Certified characterization**  
17 **programs** will use this information to compile the acceptable knowledge **AK** written record.  
18 Supporting acceptable knowledge **AK** documentation that may be used (if available) in addition  
19 to the required information specified above include, but are not limited to, the following  
20 information:  
21

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

- 1 • Analytical data relevant to the waste stream, including results from fingerprint analyses,  
2 spot checks, or routine verification sampling. This may also include new information  
3 which augments required information (e.g., ~~visual examination~~ **VE** not performed in  
4 compliance with the WAP)
- 5 • Material Safety Data Sheets, product labels, or other product package information
- 6 • Sampling and analysis data from comparable or surrogate waste streams (e.g., equivalent  
7 nonradioactive materials)
- 8 • Laboratory notebooks that detail the research processes and raw materials used in an  
9 experiment

10 For waste containers that belong to **Los Alamos National Laboratory's LANL** sealed sources  
11 waste streams, these containers do not require ~~headspace gas~~ **HSG** sampling and analysis if the  
12 following information is part of the AK documentation:  
13

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

1 will be assigned to a separate waste stream and that waste stream will be subject to  
2 representative headspace gas HSG sampling unless a separate AK Sufficiency  
3 Determination AKSD is approved by the Permittees for the waste stream.

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

#### 17 18 B4-3 Acceptable Knowledge Training, Procedures and Other Requirements

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

#### 28 29 B4-3a Qualifications and Training Requirements

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

- 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

- 1 • The S-site-specific procedures associated with waste characterization using acceptable  
2 knowledge AK

### 3 B4-3b Acceptable Knowledge Assembly and Compilation

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

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

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

18 ~~For newly generated wastes, procedures shall be developed and implemented to characterize~~  
19 ~~hazardous waste using acceptable knowledge prior to packaging the waste.~~

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

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

36 Figure B4-1 provides an overview of the process for assembling ~~acceptable knowledge AK~~  
37 ~~documentation into an auditable record. The first step is to assemble all of the required~~  
38 ~~acceptable knowledge AK information and any supporting information regarding the materials~~  
39 ~~and processes that generate a specific waste stream. The Permittees shall require the sites~~

1 certified characterization programs to implement procedures which comply with the following  
2 criteria to establish ~~acceptable knowledge~~ AK records:

- 3
- 4 • Acceptable knowledge information shall be compiled in an auditable record, including a  
5 road map for all applicable information.
- 6 • The overview of the facility and TRU mixed waste management operations in the context  
7 of the facility's mission shall be correlated to specific waste stream information.
- 8 • Correlations between waste streams, with regard to time of generation, waste generating  
9 processes, and site-specific facilities shall be clearly described. ~~For newly generated~~  
10 ~~wastes,~~ The rate and quantity of waste to be generated shall be defined, if applicable.
- 11 • A reference list shall be provided that identifies documents, databases, Quality Assurance  
12 protocols, and other sources of information that support the ~~acceptable knowledge~~ AK  
13 information.
- 14 • Container inventories for TRU mixed waste shall be delineated into waste streams based  
15 on required AK information.

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

19  
20 B4-3d AK Acceptable Knowledge Sufficiency Determination Request Contents

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

- 25
- 26 • Identification of the scenario for which the approval is sought (Renewal Application  
27 Chapter B, Section B-0b).
- 28 • A complete AK Summary Report that addresses the following technical requirements:  
29
  - 30 – Executive Summary;
  - 31 – Waste Stream Identification Summary, (including a demonstration that the waste  
32 a waste stream (Renewal Application Chapter B, Introduction));
  - 33 – Mandatory Program Information, (including, but not limited to, facility location and  
34 description, mission, defense waste assessment, spent nuclear fuel and high-level  
35 waste assessment, description of waste generating processes, research/development  
36 [as necessary], facility support operations [as applicable], types and quantities of

1 TRU waste generated, correlation of waste streams to buildings/processes, waste  
2 identification and categorization, physical form identifiers);

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

- 13 – Types of supporting information gathered;

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

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

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

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

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

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

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

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

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

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

34

1 B4-3e Requirements for Re-evaluating Acceptable Knowledge Information

2 Acceptable knowledge includes information regarding the physical form of the waste, the base  
3 materials composing the waste, and the process that generates the waste. Waste sampling and  
4 analysis (i.e., radiography or ~~visual examination~~ VE, ~~headspace gas~~ HSG sampling and analysis,  
5 and homogeneous waste sampling and analysis) may be used to augment ~~acceptable knowledge~~  
6 AK information.

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

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

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

- 1 • If discrepancies exist in the acceptable knowledge **AK** information for the revised Waste  
2 Matrix Code, document the segregation of the affected portion of the waste stream, and  
3 define the actions necessary to fully characterize the waste

4 Potential toxicity characteristics **TCs** for base materials that compose TRU mixed heterogeneous  
5 debris (S5000) waste may be determined without destructive sampling and analysis via  
6 acceptable knowledge **AK**. Sites **Certified characterization programs** will assign a Waste Matrix  
7 Code and waste stream to each container of waste using acceptable knowledge **AK**. In lieu of  
8 sampling and analytical or other data to the contrary (including headspace gas **HSG** and totals/  
9 **Toxicity Characteristic Leaching Procedure (TCLP)** analysis of **homogeneous** solids/ or  
10 soils/gravel), sites **certified characterization programs** shall assign the toxicity characteristic **TC**  
11 hazardous waste numbers **HWNs** based on the presence of the constituent identified by  
12 acceptable knowledge **AK**, regardless of the quantity or concentration. Procedures shall describe  
13 how additions to hazardous waste numbers **HWNs** based on material composition are  
14 documented, as necessary (Section B4-3b).

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

34  
35 ~~The EPA **TC** hazardous waste numbers **HWNs** associated with S3000 and S4000 waste streams  
36 will be assigned based on the results of the totals/TCLP analysis of a representative  
37 homogeneous waste sample when waste streams do not have an **a Scenario 1 or Scenario 3**  
38 **AKSD** AK Sufficiency Determination approved by the Permittees. As with headspace gas **HSG**,  
39 if the totals/TCLP results indicate that the concentration of a characteristic **TC** waste or non-toxic  
40 constituent of an F003 waste is below **the** regulatory levels, the hazardous waste number **HWN**  
41 assigned initially by acceptable knowledge **AK** may be changed. Otherwise, if an F-listed waste  
42 constituent is detected, the appropriate hazardous waste number shall be applied.~~

43  
44 ~~If the site determines that the source of the F-listed constituent is a spent solvent used in the  
45 process or is determined to be the result of mixing a listed waste with a solid waste during waste~~

1 ~~packaging, or applicable toxicity characteristic or non-toxic F003 wastes are present in excess of~~  
2 ~~regulatory levels, then the site will either: 1) assign the applicable listed hazardous waste number~~  
3 ~~to the entire waste stream, or 2) segregate the drums containing detectable concentrations of the~~  
4 ~~solvent into a separate waste stream and assign applicable hazardous waste numbers. Each site~~  
5 ~~shall document, justify, and consistently delineate waste streams and assign hazardous waste~~  
6 ~~numbers based on site-specific permit requirements and other state-enforced agreements.~~  
7

8 To determine the mean concentration of solvent VOCs, all ~~headspace gas~~ HSG data or  
9 homogeneous waste data for a waste stream or waste stream lot (i.e., the portion of the waste  
10 stream that is characterized as a unit) will be used, including data qualified with a 'J' flag (i.e.,  
11 less than the program required quantitation limit ~~PRQL~~ but greater than the method detection  
12 limit ~~f~~ (MDL) or qualified with a 'U' flag (i.e., undetected). For data qualified with a 'U' flag,  
13 sites certified characterization programs shall use one-half the MDL in calculating the mean  
14 concentration. Because listed wastes are not defined based on concentration, sites certified  
15 characterization programs may not remove ~~hazardous waste numbers~~ HWNs assigned using  
16 ~~acceptable knowledge~~ AK if hazardous constituents are not detected in the ~~headspace gas~~ HSG,  
17 ~~or homogeneous~~ solids/ or soils/gravel analysis.  
18

19 The TRU mixed ~~waste~~ headspace gas HSGs and homogeneous mixed waste matrices may  
20 contain one or two constituents (e.g., carbon tetrachloride ~~and 1,1,1-trichloroethane~~) at  
21 concentrations that are orders of magnitude higher than the other target analytes. In these cases,  
22 samples shall be diluted to remain within the instrument calibration range for the elevated  
23 constituents. Sample dilution results in elevated MDLs for the constituents with elevated  
24 concentrations. Only the concentrations of detected constituents will be used to calculate the  
25 mean for the purpose of assigning F-listed ~~hazardous waste numbers~~ HWNs. Because the  
26 presence or absence of F-listed solvents can not be assigned based on the artificially high MDLs  
27 that are caused by sample dilution, data flagged as 'U' and showing an elevated MDL will not be  
28 used in calculating the mean concentration.  
29

#### 30 B4-3f Acceptable Knowledge Data Quality Requirements

31 The data quality assurance objectives for sampling and analysis techniques are provided in  
32 Renewal Application Appendix B3, Quality Assurance Objectives and Data Validation  
33 Techniques for Waste Characterization Sampling and Analytical Methods. Analytical results  
34 will be used to augment the characterization of wastes based on ~~acceptable knowledge~~ AK. To  
35 ensure that the ~~acceptable knowledge~~ AK process is consistently applied, the Permittees shall  
36 require sites certified characterization programs to comply with the quality assurance objectives  
37 ~~data quality requirements~~ for ~~acceptable knowledge~~ AK documentation in Renewal Application  
38 Appendix B3, Section B3-9.  
39

40 Each site certified characterization program shall address quality control by tracking its  
41 performance with regard to the use of ~~acceptable knowledge~~ AK by: 1) assessing the frequency  
42 of inconsistencies among information, and 2) documenting the results of waste discrepancies  
43 identified by the ~~generator/storage site~~ certified characterization program during waste  
44 characterization or the Permittees during waste confirmation using radiography, review of  
45 radiography audio/video recordings, ~~visual examination~~ VE, or review of ~~visual examination~~ VE

1 records. In addition, the ~~acceptable knowledge~~ AK process and waste stream documentation  
2 shall be evaluated through internal assessments by ~~generator/storage site~~ the certified  
3 characterization program quality assurance organization(s).  
4

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

6 The Permittees will conduct an initial audit of each site characterization program prior to  
7 certifying the site characterization program for shipment of TRU mixed waste to the WIPP  
8 facility. This initial audit will establish an approved baseline that will be reassessed annually by  
9 the Permittees. These audits will verify compliance with the requirements specified in the ~~WAP~~  
10 (Renewal Application Chapter B). The audits will be used to verify compliance with the  
11 compilation, application, and interpretation requirements of ~~acceptable knowledge~~ AK  
12 information specified in the Permit resulting from the Renewal Application at by all sites  
13 certified characterization programs, and to evaluate the completeness and defensibility of site-  
14 specific ~~acceptable knowledge~~ AK documentation related to hazardous waste characterization.  
15 Renewal Application Appendix B6 gives a description of the overall audit program and a  
16 required checklist. Figure B4-2 includes the primary steps associated with the audit process of  
17 ~~acceptable knowledge~~ AK.  
18

19 The Site-specific audit plans will be prepared by the Permittees and provided to NMED, and  
20 will identify the scope of the audit, requirements to be assessed, participating personnel,  
21 activities to be audited, organizations to be notified, applicable documents, and schedule. Audits  
22 will be performed in accordance with written procedures and site-specific checklists that will be  
23 developed by the Permittees ~~prior to the audit~~ and provided to NMED prior to the audit. The  
24 site-specific audit checklists will include items associated with the compilation and evaluation of  
25 the required ~~acceptable knowledge~~ AK information as specified in the checklist required by  
26 Renewal Application Appendix B6.  
27

28 Audit checklists shall include Table B6-3 in Renewal Application Appendix B6, and will include  
29 but not be limited to the following elements for review during the audit:  
30

- 31 • Documentation of the process used to compile, evaluate, and record ~~acceptable~~  
32 ~~knowledge~~ AK is available and implemented;
- 33 • Personnel qualifications and training are documented;
- 34 • All of the required ~~acceptable knowledge~~ AK documentation specified in Section B4-2  
35 has been compiled in an auditable record;
- 36 • All of the required procedures specified in Section B4-3 have been developed and  
37 implemented, including but not limited to:
  - 38 – A procedure exists for assigning ~~hazardous waste numbers~~ HWNs to waste streams in  
39 accordance with Section B4-3;

1           – A procedure exists for resolving discrepancies in ~~acceptable knowledge~~ AK  
2           documentation in accordance with Section B4-3; and

- 3           • Results of other audits of the TRU mixed waste characterization programs at the site are  
4           available in site certified characterization program records.

5 Members of the audit team will be knowledgeable regarding the required ~~acceptable knowledge~~  
6 AK information, RCRA regulations and EPA guidance regarding the use of ~~acceptable~~  
7 ~~knowledge~~ AK for waste characterization, RCRA hazardous waste characterization, and the  
8 WAP requirements in (Renewal Application Chapter B). Audit team members will be  
9 independent of all ~~TRU mixed waste management operations at the site~~ certified characterization  
10 program being audited.

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

21  
22 Auditors will review the ~~acceptable knowledge~~ AK documentation for selected waste streams for  
23 logic, completeness, and defensibility. The criteria that will be used by auditors to evaluate the  
24 logic and defensibility of the ~~acceptable knowledge~~ AK documentation include completeness  
25 and traceability of the information, consistency of application of information, clarity of  
26 presentation, degree of compliance with this Renewal Application Appendix with regard to  
27 ~~acceptable knowledge~~ AK data, nonconformance procedures, and oversight procedures.  
28 Auditors will evaluate compliance with written site certified characterization program procedures  
29 for developing the ~~acceptable knowledge~~ AK record. A completeness review will evaluate the  
30 availability of all required TRU mixed waste management program information and TRU mixed  
31 waste stream information (Section B4-2). Records will be reviewed for correlation to specific  
32 waste streams and the basis for characterizing hazardous waste. Auditors will verify that sites  
33 certified characterization programs include all required information and ~~conservatively include~~  
34 ~~all potential~~ the applicable ~~hazardous waste numbers~~ HWNs indicated by the ~~acceptable~~  
35 ~~knowledge~~ AK records. All deficiencies in the ~~acceptable knowledge~~ AK documentation will be  
36 included in the audit report.

37  
38 Auditors will verify and document that sites certified characterization programs use  
39 administrative controls and follow written procedures to characterize hazardous waste for newly-  
40 ~~generated and retrievably stored wastes~~. Procedures to document changes in ~~acceptable~~  
41 ~~knowledge~~ AK documentation and changes to ~~hazardous waste number~~ HWN assignments to  
42 specific waste streams also will be evaluated for compliance with the WAP.  
43

1 After the audit is complete, the Permittees will provide the site certified characterization program  
2 with preliminary results at a close-out meeting. The Permittees will prepare a final audit report  
3 that includes all observations and findings identified during the audit. Sites Certified  
4 characterization programs shall respond to all audit findings and identify corrective actions.  
5 Audit results will be included in the final audit report in (Renewal Application Appendix B6). If  
6 ~~acceptable knowledge~~ AK procedures do not exist, the required information is not available, or  
7 corrective actions (i.e., ~~CARs~~ Corrective Action Reports) are identified associated with  
8 ~~acceptable knowledge~~ AK compilation, and/or hazardous waste characterization, the Permittees  
9 will not manage, store, or dispose TRU mixed waste for the subject waste summary category.  
10 Management, storage, or disposal of the subject waste summary category at WIPP will not  
11 resume until the Permittees find that all corrective actions have been implemented and the site  
12 certified characterization program complies with all applicable requirements of the WAP.  
13

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

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References

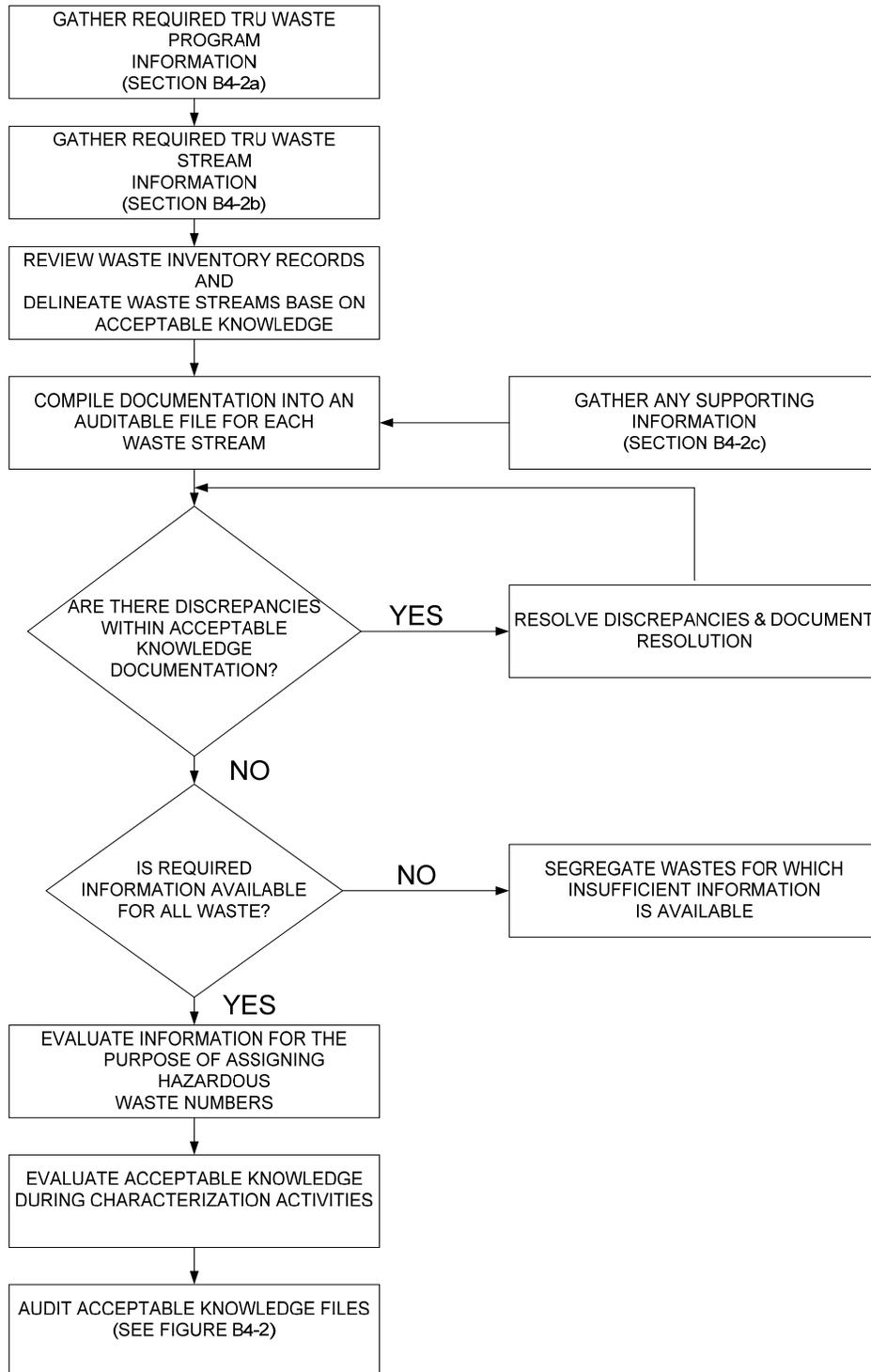
U.S. Environmental Protection Agency (EPA), April 1994, *Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual*, OSWER 9938.4-03, Office of Solid Waste and Emergency Response, Washington, D.C.

1

**FIGURES**

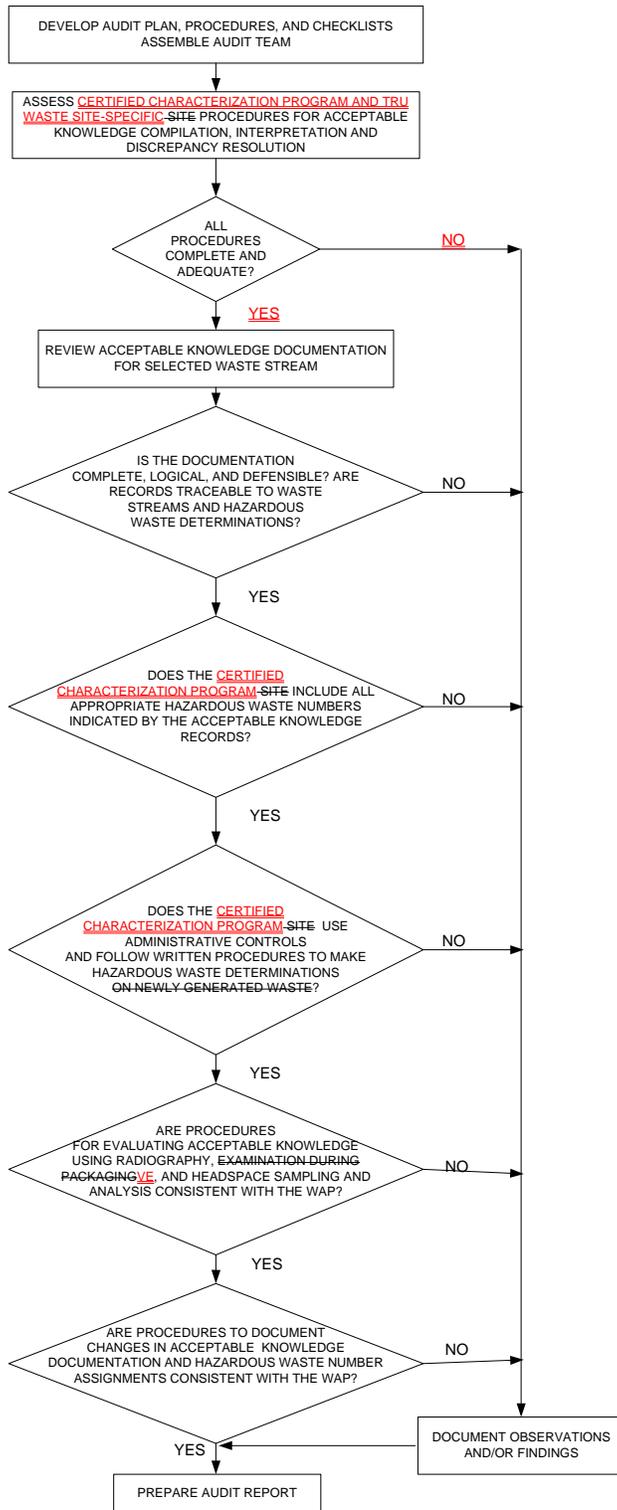
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Figure B4-1  
 Compilation of Acceptable Knowledge Documentation



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Figure B4-2  
 Acceptable Knowledge Auditing