

ATTACHMENT B4

**TRU MIXED WASTE CHARACTERIZATION ANALYSIS USING
ACCEPTABLE KNOWLEDGE**

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ATTACHMENT B4 TRU MIXED WASTE CHARACTERIZATION ANALYSIS USING ACCEPTABLE KNOWLEDGE

1 B4-1 Introduction

2 The Resource Conservation and Recovery Act (RCRA) regulations codified in 40 CFR Parts
3 260 through 265, 268, and 270, and the New Mexico Hazardous Waste Management
4 Regulations in Title 20 New Mexico Administrative Code, Chapter 4, Part 1, (20.4.1 NMAC)
5 Subparts I through VI, Subpart VIII, and Subpart IX, authorize the use of acceptable knowledge
6 (AK) in appropriate circumstances by waste generators, or treatment, storage, or disposal
7 facilities to characterize analyze hazardous waste. Acceptable knowledge is described in *Waste*
8 *Analysis: EPA Guidance Manual for Facilities That Generate, Treat, Store and Dispose of*
9 *Hazardous Waste* (EPA, 1994). Acceptable knowledge, as an alternative to sampling and
10 analysis, can be used to meet all or part of the waste characterization analysis requirements
11 under the RCRA (EPA, 1994).

12 Acceptable knowledge includes a number of techniques used to characterize analyze
13 transuranic (TRU) mixed waste, such as process knowledge, records of analysis acquired prior
14 to RCRA, and other supplemental sampling and analysis data (EPA, 1994). Radiography and/or
15 visual examination, headspace gas sampling and analysis, and homogeneous waste sampling
16 and analysis (specified in Permit Attachment B1) are may be used to acquire supplemental
17 sampling and analysis data to meet the waste analysis requirements in of the Waste Analysis
18 Plan (WAP) specified in Permit Attachment B. Acceptable knowledge is used in TRU mixed
19 waste characterization analysis activities in three five ways:

- 20 ● To delineate TRU mixed waste streams
- 21 ● To assess if TRU mixed waste streams comply with the Treatment, Storage, and
22 Disposal Facility Waste Acceptance Criteria (TSDF-WAC)
- 23 ● To assess if TRU mixed heterogeneous debris wastes streams exhibit a toxicity
24 characteristic (20.4.1.200 NMAC, incorporating 40 CFR §261.24 Subpart C)
- 25 ● To assess if TRU mixed wastes streams are listed (20.4.1.200 NMAC,
26 incorporating 40 CFR §261.34 Subpart D)
- 27 ● To estimate waste material parameter weights

28 ~~Sampling and analysis shall be performed to confirm acceptable knowledge and to update and~~
29 ~~modify initial AK assessments. Sampling and analysis includes radiography, visual examination,~~
30 ~~headspace gas, and homogeneous waste sampling and analysis. TRU mixed waste streams~~
31 ~~shall undergo applicable provisions of the acceptable knowledge process prior to management,~~
32 ~~storage, or disposal by the Permittees at WIPP.~~

1 B4-2 Acceptable Knowledge Documentation

2 The Permittees shall obtain from each Department of Energy (DOE) TRU mixed waste
3 generator/storage site (site) a logical sequence of acceptable knowledge information that
4 progresses from general facility information (TRU Mixed Waste Management Program
5 Information) to more detailed waste-specific information (TRU Mixed Waste Stream
6 Information). Traceability of acceptable knowledge information for a selected ~~ed~~ drum container in
7 the audited Waste Summary Category Group(s) will be examined during the Permittees' audit of
8 a site (Section B4-3f). The consistent presentation of acceptable knowledge documentation
9 among sites in auditable records¹ will allow ~~Waste Isolation Pilot Plant (WIPP)~~ the Permittees
10 personnel to verify the completeness and adequacy of acceptable knowledge for TRU mixed
11 waste ~~characterization~~ analysis during the audit process. The Permittees shall implement the
12 acceptable knowledge process as specified in this Permit to ~~characterize~~ analyze TRU mixed
13 wastes and obtain sufficient waste analysis data to demonstrate compliance with the Hazardous
14 Waste Facility Permit (HWFP). The New Mexico Environment Department (NMED) may
15 independently validate the implementation of and compliance with applicable provisions of the
16 WAP at each generator/storage site by participation in the Permittees' Audit and Surveillance
17 Program (Permit Attachment B6). The Permittees shall provide NMED with current audit
18 schedules and notify NMED in writing no later than thirty (30) calendar days prior to each audit.
19 NMED may choose to accompany the Permittees on any audit of the WAP implementation.

20 The following sections include the information the Permittees will require for each site to
21 ~~characterize~~ analyze TRU mixed waste using acceptable knowledge. Because waste generating
22 processes are site-specific, sites shall, as necessary, supplement the required acceptable
23 knowledge records with additional information (see Section B4-2c, Supplemental Acceptable
24 Knowledge Information). If the required information is not available for a particular waste
25 stream, ~~supplemental information~~ it shall be obtained and the waste stream will not be approved
26 by the Permittees until a complete AK record is compiled, ~~accepted for management, storage, or~~
27 ~~disposal at the WIPP facility as a retrievably stored waste (i.e., the waste will be characterized~~
28 ~~as specified in Permit Attachment B, Section B-3d(1))~~.

29 B4-2a Required TRU Mixed Waste Management Program Information

30 TRU mixed waste management program information shall clearly define waste categorization
31 schemes and terminology, provide a breakdown of the types and quantities of TRU mixed waste
32 that are generated and stored at the site, and describe how waste is tracked and managed at
33 the site, including historical and current operations. Information related to TRU mixed waste
34 certification procedures and the types of documentation (e.g., waste profile forms) used to
35 summarize acceptable knowledge shall also be provided. The following information shall be
36 included as part of the acceptable knowledge written record:

- 37 ● Map of the site with the areas and facilities involved in TRU mixed waste
38 generation, treatment, and storage identified
- 39 ● Facility mission description as related to TRU mixed waste generation and
40 management (e.g., nuclear weapons research may involve metallurgy,

¹ "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 this Permit.

1 radiochemistry, and nuclear physics operations that result in specific waste
2 streams)

- 3 ● Description of the operations that generate TRU mixed waste at the site (e.g.,
4 plutonium recovery, weapons design, or weapons fabrication)
- 5 ● Waste identification or categorization schemes used at the facility (e.g., item
6 description codes, content codes)
- 7 ● Types and quantities of TRU mixed waste generated, including historical
8 generation through future projections
- 9 ● Correlation of waste streams generated from the same building and process, as
10 appropriate (e.g., sludge, combustibles, metals, and glass)
- 11 ● Waste certification procedures for retrievably stored and newly generated wastes
12 to be sent to the WIPP facility

13 B4-2b Required TRU Mixed Waste Stream Information

14 The Permittees may use acceptable knowledge to delineate site-specific waste streams. For
15 each TRU mixed waste stream, the Permittees shall require sites to compile all process
16 information and data that support the acceptable knowledge used to characterize analyze that
17 waste stream. The type and quantity of supporting documentation will vary by waste stream,
18 depending on the process generating the waste and site-specific requirements imposed by the
19 Permittees. At a minimum, the waste process information shall include the following written
20 information:

- 21 ● Area(s) and/or building(s) from which the waste stream was or is generated
22
- 23 ● Waste stream volume and time period of generation (e.g., 100 standard waste
24 boxes of retrievable stored waste generated from June 1977 through December
25 1977)
- 26 ● Waste generating process described for each building (e.g., batch waste stream
27 generated during decommissioning operations of glove boxes), including
28 processes associated with U134 waste generation, if applicable.
- 29 ● Process flow diagrams (e.g., a diagram illustrating glove boxes from a specific
30 building to a size reduction facility to a container storage area). In the case of
31 research/development, analytical laboratory waste, or other similar processes
32 where process flow diagrams cannot be created, a description of the waste
33 generating processes, rather than a formal process flow diagram, may be
34 included if this modification is justified and the justification is placed in the
35 auditable record
- 36 ● Material inputs or other information that identifies the chemical content of the
37 waste stream and the physical waste form (e.g., glove box materials and
38 chemicals handled during glove box operations; data obtained through visual
39 examination of newly generated waste that later undergoes radiography;

1 information demonstrating neutralization of U134 [hydrofluoric acid] and waste
2 compatibility, etc.)

3 The acceptable knowledge written record shall include a summary that identifies all sources of
4 waste characterization analysis information used to delineate the waste stream. The basis and
5 rationale for delineating each waste stream, based on the parameters of interest, shall be
6 clearly summarized and traceable to referenced documents. Assumptions made in delineating
7 each waste stream also shall be identified and justified. If discrepancies exist between required
8 information, then sites shall apply all hazardous waste codes numbers indicated by the
9 information to the subject waste stream unless the sites choose to justify an alternative
10 assignment and document the justification in the auditable record. The Permittees shall obtain
11 from each site, at a minimum, procedures that comply with the following acceptable knowledge
12 requirements.

- 13 ● Procedures for identifying and assigning the physical waste form of the waste
- 14 ● Procedures for delineating waste streams and assigning Waste Matrix Codes
- 15 ● Procedures for resolving inconsistencies in acceptable knowledge documentation
- 16 ● Procedures for ~~confirming~~ supplementing acceptable knowledge information
17 through headspace gas sampling and analysis, visual examination and/or
18 radiography, and homogeneous waste sampling and analysis
- 19 ● Procedures describing management controls used to ensure prohibited items
20 (specified in the WAP, Permit Attachment B TSDf-WAC) are documented and
21 managed
- 22 ~~● Procedures to ensure radiography and visual examination include a list of~~
23 ~~prohibited items that the operator shall verify are not present in each container of~~
24 ~~waste (e.g., liquids exceeding TSDf-WAC limits, corrosives, ignitables, reactives,~~
25 ~~and incompatible wastes)~~
- 26 ● Procedures to document how changes to Waste Matrix Codes, waste stream
27 assignment, and associated Environmental Protection Agency (EPA) hazardous
28 waste numbers based on material composition are documented for any waste
- 29 ~~● Procedures for newly generated waste shall describe how acceptable knowledge~~
30 ~~is confirmed using either the visual examination technique or radiography (or VE~~
31 ~~in lieu of radiography). Procedures shall also describe the criteria for selecting~~
32 ~~either radiography or VE to ensure there is documentation and adequate~~
33 ~~justification of the process selected~~
- 34 ● Procedures for assigning EPA hazardous waste numbers to TRU mixed waste
35 streams
- 36 ● Procedures for estimating waste material parameter weights

1 B4-2c Supplemental Acceptable Knowledge Information

2 The generator/storage sites shall ~~shall~~ may obtain supplemental acceptable knowledge information.
3 The amount and type of supplemental information is site-specific and cannot be mandated, but
4 sites shall collect information as appropriate to support required information. Adequacy of
5 supplemental information shall be assessed by the Permittees during audits (Section B47-
6 3f1a(1)). Sites will use this information to compile the acceptable knowledge written record.
7 Supplemental acceptable knowledge documentation that may be used (if available) in addition
8 to the required information specified above include, but are not limited to, the following
9 information:

- 10 ● Process design documents (e.g., Title II Design)
- 11 ● Standard operating procedures that may include a list of raw materials or
12 reagents, a description of the process or experiment generating the waste, and a
13 description of wastes generated and how the wastes are managed at the point of
14 generation
- 15 ● Preliminary and final safety analysis reports and technical safety requirements
- 16 ● Waste packaging logs
- 17 ● Test plans or research project reports that describe reagents and other raw
18 materials used in experiments
- 19 ● Site databases (e.g., chemical inventory database for Superfund Amendments
20 and Reauthorization Act Title III requirements)
- 21 ● Information from site personnel (e.g., documented interviews)
- 22 ● Standard industry documents (e.g., vendor information)
- 23 ● Analytical data relevant to the waste stream, including results from fingerprint
24 analyses, spot checks, or routine verification sampling. This may also include
25 new information ~~acquired apart from the confirmatory process~~ which
26 supplements required information (e.g., visual examination not performed in
27 compliance with the WAP)
- 28 ● Material Safety Data Sheets, product labels, or other product package
29 information
- 30 ● Sampling and analysis data from comparable or surrogate waste streams (e.g.,
31 equivalent nonradioactive materials)
- 32 ● Laboratory notebooks that detail the research processes and raw materials used
33 in an experiment

34 For waste containers that belong to LANL sealed sources waste streams, these containers have
35 a NMED approved AK Sufficiency Determination and do not require headspace gas sampling

1 and analysis prior to shipment to WIPP and meet the criteria of Permit Attachment B, Section B-
2 3a(1)(iii); if the following information is required as part of the AK documentation:

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

32 All specific, relevant supplemental acceptable knowledge documentation assembled and used
33 in the acceptable knowledge process, whether it supports or contradicts any required
34 acceptable knowledge documentation, shall be identified and an explanation provided for its use
35 (e.g., identification of a toxicity characteristic). Supplemental documentation may be used to
36 further document the rationale for the hazardous characterization waste analysis results. The
37 collection and use of supplemental information shall be assessed by the Permittees site audits
38 to ensure that hazardous waste characterization analysis is supported, as necessary, by
39 supplemental information. Similar to required information, if discrepancies exist between
40 supplemental information and the required information, then sites shall apply all hazardous
41 waste codes numbers indicated by the supplemental information to the subject waste stream
42 unless the sites choose to justify an alternative assignment and document the justification in the
43 auditable record.

1 B4-3 Acceptable Knowledge Training, Procedures and Other Requirements

2 The Permittees shall require consistency among sites in using acceptable knowledge
3 information to characterize analyze TRU mixed waste by the use of the following ~~three phase~~
4 ~~process~~: 1) compiling the required and supplemental acceptable knowledge documentation in
5 an auditable record, 2) ~~confirming and updating acceptable knowledge information using~~
6 ~~radiography and/or visual examination, headspace gas sampling and analysis, and~~
7 ~~homogeneous waste sampling and analysis, and 3) auditing acceptable knowledge records~~ and
8 3) WSPF approval and waste examination. This section specifies qualification and training
9 requirements, describes each phase of the process, specifies the procedures that the
10 Permittees shall require all sites to develop to implement the requirements for using acceptable
11 knowledge, and specifies data quality requirements for acceptable knowledge.

12 B4-3a Qualifications and Training Requirements

13 Site personnel responsible for compiling acceptable knowledge, assessing acceptable
14 knowledge, and resolving discrepancies associated with acceptable knowledge shall be
15 qualified and trained in the following areas at a minimum:

- 16 ● WIPP WAP in Permit Attachment B and the ~~Treatment, Storage and Disposal~~
17 ~~Facility Waste Acceptance Criteria (TSDf-WAC)~~ specified in this permit
- 18 ● State and Federal RCRA regulations associated with solid and hazardous waste
19 characterization analysis
- 20 ● Discrepancy resolution and reporting processes
- 21 ● Site-specific procedures associated with waste characterization analysis using
22 acceptable knowledge

23 B4-3b Acceptable Knowledge Assembly, ~~and~~ Compilation, and Confirmation Procedures and
24 Required Administrative Controls

25 The Permittees shall obtain from sites acceptable knowledge procedures which require
26 consistent application of the acceptable knowledge process and requirements. Site-specific
27 acceptable knowledge procedures shall address the following:

- 28 ● Sites shall prepare and implement a written procedure outlining the specific
29 methodology used to assemble acceptable knowledge records, including the
30 origin of the documentation, how it will be used, and any limitations associated
31 with the information (e.g., identify the purpose and scope of a study that included
32 limited sampling and analysis data).
- 33 ● Sites shall develop and implement a written procedure to compile the required
34 acceptable knowledge record.
- 35 ● Sites shall develop and implement a written procedure that ensures
36 unacceptable wastes (e.g., reactive, ignitable, corrosive) are identified and
37 segregated from TRU mixed waste populations sent to WIPP.

- 1 ● Sites shall prepare and implement a written procedure to evaluate acceptable
2 knowledge and resolve discrepancies. If different sources of information indicate
3 different hazardous wastes are present, then sites shall include all sources of
4 information in its records and conservatively assign all potential hazardous waste
5 codes numbers unless the sites choose to justify an alternative assignment and
6 document the justification in the auditable record. The assignment of hazardous
7 waste codes numbers shall be tracked in the auditable record to all required
8 documentation.
- 9 ● Sites shall prepare and implement a written procedure to identify hazardous
10 wastes and assign the appropriate hazardous waste codes numbers to each
11 waste stream. The following are minimum baseline requirements/standards that
12 site-specific procedures shall include to ensure comparable and consistent
13 characterization analysis of hazardous waste:
- 14 - Compile all of the required information in an auditable record.
- 15 - Review the compiled information and delineate TRU mixed waste
16 streams. Delineation of waste streams must comply with the following
17 definition: a waste stream is defined as waste material generated from a
18 single process or from an activity that is similar in material, physical form,
19 and hazardous constituents.
- 20 - Review the compiled information to determine if the waste stream is
21 compliant with the TSDf-WAC.
- 22 - Review the required information to determine if the waste is listed under
23 20.4.1.200 NMAC (incorporating 40 CFR §261), Subpart D. Assign all
24 listed hazardous waste codes numbers unless the sites choose to justify
25 an alternative assignment and document the justification in the auditable
26 record.
- 27 - Review the required information to determine if the waste exhibits a
28 hazardous characteristic or may contain hazardous constituents included
29 in the toxicity characteristics specified in 20.4.1.200 NMAC (incorporating
30 40 CFR §261), Subpart C. If a toxicity characteristic contaminant is
31 identified and is not included as a listed waste, assign the toxicity
32 characteristic code number unless data are available that demonstrate
33 that the concentration of the constituent in the waste is less than the
34 toxicity characteristic regulatory level. When data are not available, the
35 toxicity characteristic hazardous waste code number for the identified
36 hazardous constituent shall be applied to the mixed waste stream.
- 37 - Review the compiled information to provide an estimate of material
38 parameter weights for each container to be stored or disposed of at
39 WIPP.

40 For newly generated wastes, procedures shall be developed and implemented to
41 characterize analyze hazardous waste using acceptable knowledge prior to
42 packaging the waste.

1 ~~● Sites shall develop and implement a written procedure for the confirmation of~~
2 ~~acceptable knowledge in accordance with Section B4-3(d).~~

3 ~~● Sites shall prepare and implement a written procedure that provides a cross~~
4 ~~reference to the applicable waste summary category group (i.e., S3000, S4000,~~
5 ~~and S5000) to verify all of the required confirmation data has been evaluated and~~
6 ~~the proper hazardous waste codes have been assigned.~~

7 ● Sites shall ensure that results of other audits of the TRU mixed waste
8 characterization analysis programs at the site are available in the records.

9 Furthermore, the Permittees shall require the sites to implement procedure(s) which specify the
10 administrative controls used by the site to ensure that prohibited items are documented and
11 managed in accordance with site-specific certification plans. The following minimum elements
12 shall be addressed in site-specific documentation associated with administrative controls:

13 ● Identify the organization(s) responsible for compliance with administrative
14 controls.

15 ● Identify the oversight procedures and frequency of actions to verify compliance
16 with administrative controls.

17 ● Develop on-the-job training specific to administrative control procedures.

18 ● Ensure that personnel may stop work if noncompliance with administrative
19 controls is identified.

20 ● Develop a nonconformance process that complies with the requirements in
21 Section B3 of the WAP to document and establish corrective actions.

22 ● As part of the corrective action process, assess the potential time frame of the
23 noncompliance, the potentially affected waste population(s), and the
24 reassessment and recertification of those wastes.

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

27 Figure B4-1 provides an overview of the process for assembling acceptable knowledge
28 documentation into an auditable record. The first step is to assemble all of the required
29 acceptable knowledge information and any supplemental information regarding the materials
30 and processes that generate a specific waste stream. The Permittees shall require the sites to
31 implement procedures which comply with the following criteria to establish acceptable
32 knowledge records:

33 ● Acceptable knowledge information shall be compiled in an auditable record,
34 including a road map for all applicable information.

35 ● The overview of the facility and TRU mixed waste management operations in the
36 context of the facility's mission shall be correlated to specific waste stream
37 information.

- Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities shall be clearly described. For newly generated wastes, the rate and quantity of waste to be generated shall be defined.
- A reference list shall be provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support the acceptable knowledge information.

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

B4-3d Requirements for Confirmation of Re-evaluating Acceptable Knowledge Information

~~Acceptable knowledge includes information regarding the physical form of the waste, the base materials composing the waste, and the process that generates the waste. Waste characterization (i.e., radiography or visual examination, headspace gas sampling and analysis, and homogeneous waste sampling and analysis) will be used to confirm acceptable knowledge information. Figure B4-2 illustrates the process the Permittees shall require sites to use to confirm acceptable knowledge.~~

The Waste Stream Profile Form (WSPF) and Waste Analysis Information Summary (including the acceptable knowledge summary) will be reviewed for each waste stream prior to Permittee approval of the WSPF. The Permittees review will assure that the submitted AK information was collected under procedures that assure implementation of the WAP, provides data sufficient to meet the DQOs in Section B-4a(1) and allow the Permittees to demonstrate compliance with the waste analysis requirements of the HWFP. A detailed discussion of the Permittees' waste stream review and approval process is provided in Permit Attachment B7.

~~Acceptable knowledge characterization results shall be confirmed for both retrievably stored and newly generated waste. All retrievably stored waste shall be characterized using radiography or visual examination to confirm the Waste Matrix Code and waste stream and certify compliance with the WAP (Permit Attachment B). If a site must repackage its retrievably stored waste, either the visual examination technique prior to or during waste packaging or radiography (or VE in lieu of radiography) after waste packaging shall be used to confirm acceptable knowledge information.~~

For newly generated wastes, sites that elect to confirm AK during packaging of newly generated waste shall have written procedures to document the confirmation of acceptable knowledge information with the visual examination technique prior to or during waste packaging. The following minimum requirements shall be addressed in site-specific procedures:

- scope (i.e., waste streams) and purpose;
- responsible organization(s);
- administrative process controls;

- 1 —●— material inputs to process;
- 2 —●— process controls and range of operation that affect final hazardous waste
- 3 characterization;
- 4 ●— rate and quantity of the hazardous waste generated;
- 5 —●— list of applicable operating procedures relevant to the hazardous waste
- 6 characterization;
- 7 —●— process knowledge verification sampling (i.e., headspace-gas sampling and/or
- 8 homogeneous waste annual sampling); and
- 9 —●— reporting and records management.

10 The Permittees shall require sites to establish procedures for reevaluating acceptable
11 knowledge if the results of waste examination radiography or visual examination results indicate
12 that the waste shipped (or to be shipped) does not match the approved waste stream. the
13 assignment of a different Waste Matrix Code [e.g., Plastic/Rubber (S5310) versus Paper/Cloth
14 (S5330)]. Site procedures shall describe how the waste is reassigned, acceptable knowledge
15 reevaluated, and appropriate hazardous waste codes numbers assigned. If the reevaluation
16 requires that the a waste must be assigned to a different Waste Matrix Code be changed for the
17 waste stream or the waste does not match the approved waste stream based on radiography or
18 visual examination, the following minimum steps shall be taken to reevaluate acceptable
19 knowledge:

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

1 Potential toxicity characteristics for base materials that compose TRU mixed heterogeneous
2 debris (S5000) waste may be determined without destructive sampling and analysis via
3 acceptable knowledge. Sites will assign a Waste Matrix Code and waste stream to each
4 container of waste using acceptable knowledge. In lieu of confirmatory sampling and analytical
5 or other data to the contrary (including headspace gas and total/TCLP analysis of solids/soils),
6 sites shall assign the toxicity characteristic hazardous waste codes numbers based on the
7 presence of the constituent identified by acceptable knowledge, regardless of the quantity or
8 concentration. Radiography or visual examination shall be used to confirm the Waste Matrix
9 Code and waste stream identified using acceptable knowledge. If the waste stream designation
10 is so detailed that the specific components cannot be differentiated by radiography (e.g., a
11 waste stream based on a specific type of plastic), this waste stream confirmation need not be
12 performed and this omission shall be explained in the auditable record. Procedures shall
13 describe how discrepancies in the Waste Matrix Code are recorded and additions to hazardous
14 waste codes numbers based on material composition are documented, as necessary (Section
15 B4-3b).

16 ~~With the exception of qualifying LANL sealed sources waste containers, headspace gas~~
17 ~~sampling and analysis shall be conducted on all TRU mixed waste or randomly selected~~
18 ~~containers from waste streams that meet the conditions for reduced headspace gas sampling~~
19 ~~listed in Permit Attachment B, Section B-3a(1), to be sent to the WIPP facility. The LANL sealed~~
20 ~~sources waste containers that meet specified conditions must be assigned VOC concentration~~
21 ~~values in accordance with Section B-3a(1)(iii). Headspace gas data will be used to confirm the~~
22 ~~presence or absence of volatile organic compounds (VOCs) identified using acceptable~~
23 ~~knowledge.~~

24 The Permittees shall require sites to use acceptable knowledge to identify spent solvents
25 associated with each TRU mixed waste stream or waste stream lot. Headspace-gas data will
26 then be used to confirm resolve the assignment EPA F-listed hazardous waste numbers to
27 debris waste streams when waste streams do not have an AK Sufficiency Determination
28 approved by NMED or for which the Permittees do not request approval of an AK Sufficiency
29 Determination. acceptable knowledge concerning the presence or absence of F-listed solvents
30 and concentration of applicable toxicity characteristic solvents. In this case, S sites shall confirm
31 the assignment of F-listed hazardous waste codes numbers (20.4.1.200 NMAC, incorporating
32 40 CFR §261.31) by evaluating the average concentrations of each VOC detected in container
33 headspace gas for each waste stream or waste stream lot using the upper 90 percent
34 confidence limit (UCL_{90}). The UCL_{90} for the mean concentration shall be compared to the
35 program required quantitation limit (**PRQL**) for the constituent. If the UCL_{90} for the mean
36 concentration exceeds the PRQL, sites shall reevaluate their acceptable knowledge information
37 and determine the potential source of the constituent. Sites shall provide documentation to
38 support any determination that F-listed organic constituents are associated with packaging
39 materials, radiolysis, or other uses not consistent with solvent use. If the source of the detected
40 F-listed solvents can not be identified, the appropriate spent solvent hazardous waste codes
41 numbers will be conservatively applied to the waste stream. In the case of applicable toxicity
42 characteristic VOCs and non-toxic F003 constituents, generator/storage sites may assess
43 whether the head space gas concentration would render the waste non-hazardous for those
44 characteristics and change the initial acceptable knowledge determination accordingly.

45 EPA H hazardous waste numbers associated with S3000 and S4000 waste streams will be
46 verified assigned based on the results of the total/TCLP analysis of a representative

1 homogeneous waste sample when waste streams do not have an AK Sufficiency Determination
2 approved by NMED or for which the Permittees do not request an AK Sufficiency Determination.

3 If discrepancies between the results obtained from homogeneous waste sampling and analysis
4 and headspace-gas sampling and analysis exist (i.e., a VOC is detected in the solidified waste
5 but not in the headspace), the most conservative results will be used to verify acceptable
6 knowledge and assign hazardous waste codes, as applicable. As with headspace gas, if the
7 total/TCLP results indicate that the concentration of a characteristic waste or non-toxic
8 constituent of an F003 waste is below regulatory levels, the hazardous waste codes numbers
9 assigned initially by acceptable knowledge may be changed as part of the confirmatory process.
10 Otherwise, if an F-listed waste constituent is detected, the appropriate hazardous waste code
11 number shall be applied.

12 If the confirmatory process site determines that the source of the F-listed constituent is a spent
13 solvent used in the process or is determined to be the result of mixing a listed waste with a solid
14 waste during waste packaging, or applicable toxicity characteristic or non-toxic F003 wastes are
15 present in excess of regulatory levels, then the site will either: 1) assign the applicable listed
16 hazardous waste code number to the entire waste stream, or 2) segregate the drums containing
17 detectable concentrations of the solvent into a separate waste stream and assign applicable
18 hazardous waste codes numbers. Each site shall document, justify, and consistently delineate
19 waste streams and assign hazardous waste codes numbers based on site-specific permit
20 requirements and other state-enforced agreements.

21 To determine the mean concentration of solvent VOCs, all headspace-gas data and or
22 homogeneous waste data for a waste stream or waste stream lot (i.e., the portion of the waste
23 stream that is characterized analyzed as a unit) will be used, including data qualified with a 'J'
24 flag (i.e., less than the PRQL but greater than the method detection limit [MDL]) or qualified with
25 a 'U' flag (i.e., undetected). For data qualified with a 'U' flag, sites shall use one-half the MDL in
26 calculating the mean concentration. Because listed wastes are not defined based on
27 concentration, sites may not remove hazardous waste codes numbers assigned using
28 acceptable knowledge if hazardous constituents are not detected in the headspace gas or
29 solids/soil analysis.

30 TRU mixed headspace gases and homogeneous waste matrices may contain one or two
31 constituents (e.g., carbon tetrachloride and 1,1,1-trichloroethane) at concentrations that are
32 orders of magnitude higher than the other target analytes. In these cases, samples shall be
33 diluted to remain within the instrument calibration range for the elevated constituents. Sample
34 dilution results in elevated MDLs for the constituents with elevated concentrations. Only the
35 concentrations of detected constituents will be used to calculate the mean for the purpose of
36 assigning F-listed hazardous waste codes numbers. Because the presence or absence of F-
37 listed solvents cannot be confirmed assigned based on the artificially high MDLs that are
38 caused by sample dilution, data flagged as 'U' and showing an elevated MDL will not be used in
39 calculating the mean concentration.

40 B4-3e Acceptable Knowledge Data Quality Requirements

41 The data quality objectives for sampling and analysis techniques are provided in Permit
42 Attachment B3. Analytical results will be used to confirm the supplement characterization
43 analysis of wastes based on acceptable knowledge. To ensure that the acceptable knowledge
44 process is consistently applied, the Permittees shall require sites to comply with the following
45 data quality requirements for acceptable knowledge in Permit Attachment B3, documentation:

1 ● Precision - Precision is the agreement among a set of replicate measurements
2 without assumption of the knowledge of a true value. The qualitative
3 determinations, such as compiling and assessing acceptable knowledge
4 documentation, do not lend themselves to statistical evaluations of precision.
5 Therefore, precision requirements are not established for acceptable knowledge.

6 ● Accuracy - Accuracy is the degree of agreement between an observed sample
7 result and the true value. The percentage of waste containers which require
8 reassignment to a new Waste Matrix Code and/or designation of different
9 hazardous waste codes based on the reevaluation of acceptable knowledge or
10 on obtaining sampling and analysis data will be reported as a measure of
11 acceptable knowledge accuracy.

12 ● Completeness - Completeness is an assessment of the number of waste streams
13 or number of samples collected to the number of samples determined to be
14 useable through the data validation process. The acceptable knowledge record
15 shall contain 100 percent of the information specified in Section B4-2. The
16 useability of the acceptable knowledge information will be assessed for
17 completeness during audits.

18 ● Comparability - Data are considered comparable when one set of data can be
19 compared to another set of data. Comparability is ensured through sites meeting
20 the training requirements and complying with the minimum standards outlined for
21 procedures that are used to implement the acceptable knowledge process. All
22 sites shall assign hazardous waste codes in accordance with Section B4.3b and
23 provide this information regarding its waste to other sites who store or generate a
24 similar waste stream.

25 ● Representativeness - Representativeness expresses the degree to which sample
26 data accurately and precisely represent characteristics of a population.
27 Representativeness is a qualitative parameter that will be satisfied by ensuring
28 that the process of obtaining, evaluating, and documenting acceptable
29 knowledge information is performed in accordance with the minimum standards
30 established in Section B4-3b. Sites also shall assess and document the
31 limitations of the acceptable knowledge information used to assign hazardous
32 waste codes (e.g., purpose and scope of information, date of publication, type
33 and extent to which waste parameters are addressed and limitations of
34 information in identifying hazardous wastes).

35 Each site shall address quality control by tracking its performance with regard to the use of
36 acceptable knowledge by: 1) assessing the frequency of inconsistencies among information,
37 and 2) documenting the results of acceptable knowledge confirmation through waste
38 discrepancies identified by the Permittees during waste examination using radiography, or
39 visual examination, or review of VE records, headspace gas analyses, and homogeneous
40 waste analyses. In addition, the acceptable knowledge process and waste stream
41 documentation shall be evaluated through internal assessments by generator/storage site
42 quality assurance organizations and assessments by auditors or observers external to the
43 organization (i.e., DOE/Carlsbad Field Office (CBFO), NMED, EPA).

1 B4-3f Audits of Acceptable Knowledge

2 The Permittees will conduct an initial audit of each site prior to certifying the site for shipment of
3 TRU mixed waste to the WIPP facility. This initial audit will establish an approved baseline that
4 will be reassessed annually by the Permittees. These audits will verify compliance with the
5 requirements specified in the WAP (Permit Attachment B). The audits will be used to verify
6 compliance with the compilation, application, and interpretation requirements of acceptable
7 knowledge information specified in this Permit at all sites, and to evaluate the completeness and
8 defensibility of site-specific acceptable knowledge documentation related to hazardous waste
9 characterization analysis. Permit Attachment B6 gives a description of the overall audit program
10 and a required checklist. Figure B4-32 includes the primary steps associated with the audit
11 process of acceptable knowledge.

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

20 Audit checklists shall include Table B6-3 in Permit Attachment B6, and will include but not be
21 limited to the following elements for review during the audit:

- 22 ● Documentation of the process used to compile, evaluate, and record acceptable
23 knowledge is available and implemented;
- 24 ● Personnel qualifications and training are documented;
- 25 ● All of the required acceptable knowledge documentation specified in Section B4-
26 2 has been compiled in an auditable record;
- 27
28 ● All of the required procedures specified in B4-3 have been developed and
29 implemented, including but not limited to:
 - 30 - A procedure exists for assigning hazardous waste codes numbers to
31 waste streams in accordance with Section B4-3;
 - 32 - A procedure exists for resolving discrepancies in acceptable knowledge
33 documentation in accordance with Section B4-3;
 - 34 ~~- A procedure exists for confirming acceptable knowledge information
35 through: a) radiography or visual examination, b) headspace gas sampling
36 and analysis, and c) homogeneous waste sampling and analysis in
37 accordance with Section B4-3; and~~
- 38 ● Results of other audits of the TRU mixed waste characterization analysis
39 programs at the site are available in site records.

1 Members of the audit team will be knowledgeable regarding the required acceptable knowledge
2 information, RCRA regulations and EPA guidance regarding the use of acceptable knowledge
3 for waste ~~characterization~~ analysis, RCRA hazardous waste characterization analysis, and the
4 WAP requirements (Permit Attachment B). Audit team members will be independent of all TRU
5 mixed waste management operations at the site being audited.

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

15 Auditors will review the acceptable knowledge documentation for selected waste streams for
16 logic, completeness, and defensibility. The criteria that will be used by auditors to evaluate the
17 logic and defensibility of the acceptable knowledge documentation include completeness and
18 traceability of the information, consistency of application of information, clarity of presentation,
19 degree of compliance with this Permit Attachment with regard to acceptable knowledge
20 ~~confirmation data~~, nonconformance procedures, and oversight procedures. Auditors will
21 evaluate compliance with written site procedures for developing the acceptable knowledge
22 record. A completeness review will evaluate the availability of all required TRU mixed waste
23 management program information and TRU mixed waste stream information (Section B4-2).
24 Records will be reviewed for correlation to specific waste streams and the basis for
25 ~~characterizing~~ analyzing hazardous waste. Auditors will verify that sites include all required
26 information and conservatively include all potential hazardous waste codes numbers indicated
27 by the acceptable knowledge records. All deficiencies in the acceptable knowledge
28 documentation will be included in the audit report.

29 Auditors will verify and document that sites use administrative controls and follow written
30 procedures to ~~characterize~~ analyze hazardous waste for newly-generated and retrievably stored
31 wastes. ~~Auditors will review procedures used by the sites to confirm acceptable knowledge
32 information using radiography or visual examination, headspace gas sampling and analysis, and
33 homogeneous waste sampling and analysis.~~ Procedures to document changes in acceptable
34 knowledge documentation and changes to hazardous waste ~~code~~ number assignments to
35 specific waste streams also will be evaluated for compliance with the WAP (Permit Attachment
36 B).

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

1 will not resume until the Permittees find that all corrective actions have been implemented and
2 the site complies with all applicable requirements of the WAP.

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

15 ~~B4-4 Additional Final Confirmation of Acceptable Knowledge at the WIPP Facility~~

16 ~~The Permittees shall require confirmation of acceptable knowledge characterization~~
17 ~~designations at the site, as stated in Section B4-3(b). In addition and prior to notifying a site that~~
18 ~~a waste stream can be managed, stored, or disposed at the WIPP facility, the Permittees will~~
19 ~~review the Waste Stream Profile Forms, the WIPP Waste Information System (WWIS), and~~
20 ~~associated Characterization Information Summary to ensure that radiography or visual~~
21 ~~examination, headspace gas sampling and analysis data, and homogeneous waste sampling~~
22 ~~and analysis data confirm hazardous waste characterization made using acceptable knowledge.~~
23 ~~The Permittees shall require all sites to provide all of the required data associated with waste~~
24 ~~stream characterization, including summary acceptable knowledge information, radiography or~~
25 ~~visual examination, headspace gas sampling and analysis, and homogeneous waste sampling~~
26 ~~and analysis results. In addition, sites will designate the assigned hazardous waste codes for~~
27 ~~the waste stream on the waste profile form. The WWIS and associated Characterization~~
28 ~~Information Summary will be evaluated as illustrated in Figure B4-2 and compared to the~~
29 ~~hazardous waste codes specified on the waste stream profile form. The Permittees will review~~
30 ~~information provided by the sites to ensure that additions to hazardous waste codes are~~
31 ~~identified and justified based on data and that hazardous waste codes are included in the Part A~~
32 ~~of the WIPP permit application. As part of the reconciliation of data quality objectives (DQOs)~~
33 ~~(Permit Attachment B3, Section B3-11), sites are required to track and report changes to~~
34 ~~hazardous waste characterizations. If data consistently indicates that discrepancies with~~
35 ~~acceptable knowledge information were identified at the site level (and were subsequently~~
36 ~~reconciled), the Permittees will require sites to reassess the materials and processes that~~
37 ~~generate the waste, and resubmit waste stream profile information and implement their~~
38 ~~corrective action system. If the Permittees' review of a waste stream profile form and associated~~
39 ~~waste characterization data reveal nonconformance with acceptable knowledge requirements~~
40 ~~as described in Permit Attachment B3 (i.e. project level nonconformance), the Permittees shall~~
41 ~~not manage, store, or dispose of the waste stream until corrective action is taken as specified in~~
42 ~~Permit Attachment B3. Repeated nonconformances by a site in implementing and documenting~~
43 ~~WAP requirements (Permit Attachment B) will result in the termination of management, storage,~~
44 ~~or disposal of the site's waste, waste stream(s), or summary category group(s), as applicable.~~
45 ~~Management, storage, or disposal of the subject waste summary category at WIPP will not~~
46 ~~resume until the Permittees find that all corrective actions have been implemented and the site~~
47 ~~complies with all applicable requirements of the WAP.~~

1 ~~Any drum with unresolved discrepancies associated with hazardous waste characterization will~~
2 ~~not be managed, stored, or disposed at the WIPP facility until the discrepancies are resolved.~~
3 ~~The Permittees shall require the sites to reassess the materials and processes that generate~~
4 ~~the waste, and headspace-gas sampling and analysis, radiography or visual examination, and~~
5 ~~homogeneous waste sampling and analysis results. All shipments of the subject waste stream~~
6 ~~will cease until the corrective action(s), as necessary, have been implemented and the~~
7 ~~discrepancy resolved. The Permittees will notify NMED when the certification status of a waste~~
8 ~~stream at a site is revoked. Waste characterization and certification authority will not be~~
9 ~~reinstated until the site demonstrates all corrective actions have been implemented and the~~
10 ~~program is reassessed by the Permittees.~~

1

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1

FIGURES

1

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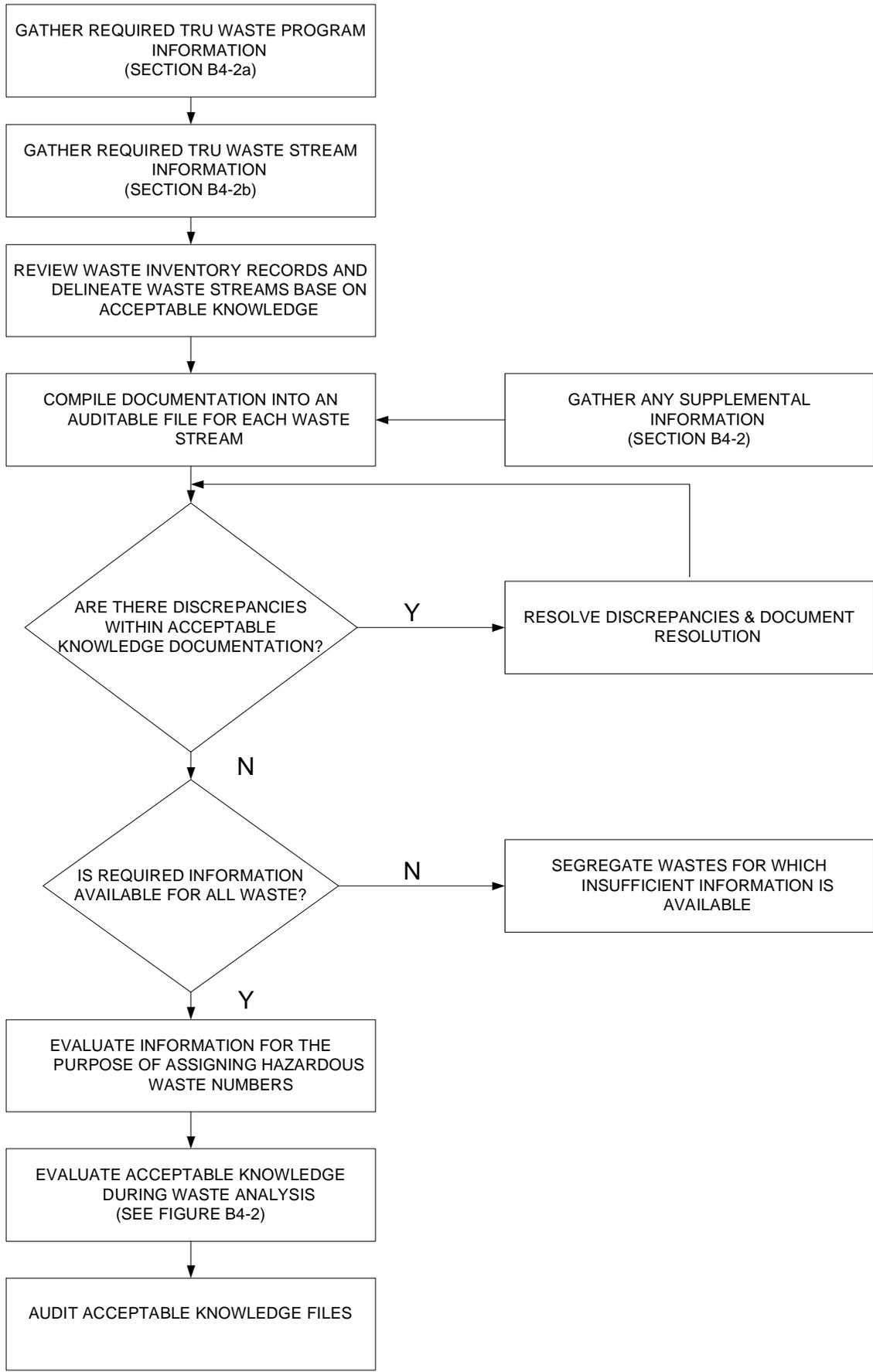


Figure B4-1
Compilation of Acceptable Knowledge Documentation

Figure B4-2
Confirmation of Acceptable Knowledge

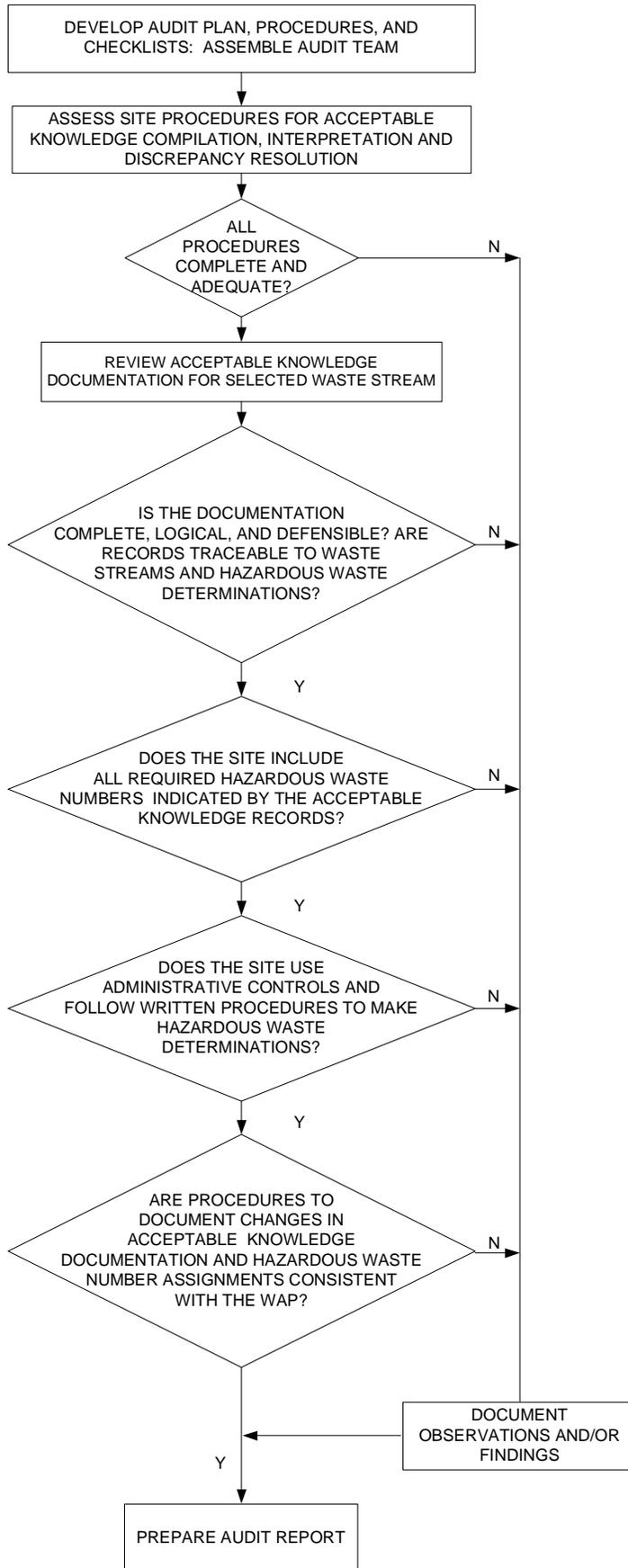


Figure B4-2
Acceptable Knowledge Auditing