

ATTACHMENT ~~B~~ C7

~~PERMITTEE~~ DOE LEVEL TRU WASTE CONFIRMATION PROCESSES

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**ATTACHMENT-B\_C7**

**PERMITTEE-DOE LEVEL TRU WASTE CONFIRMATION PROCESSES**

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1 **ATTACHMENT B C7**

2 **PERMITTEE DOE LEVEL TRU WASTE CONFIRMATION PROCESSES**

3 Introduction

4 This part of the Waste Analysis Plan (**WAP**) describes the actions that the **Permittees**  
5 **Department of Energy Carlsbad Field Office (DOE)** will take to approve and accept waste for  
6 storage and disposal at the Waste Isolation Pilot Plant (**WIPP**), including waste confirmation  
7 activities.

8 **The Permittees-DOE** demonstrates compliance with the Permit by ensuring that the waste  
9 characterization processes performed by generator/storage sites (**sites**) produce data compliant  
10 with the WAP and through the waste screening and verification processes. Verification occurs at  
11 three levels: 1) the data generation level, 2) the project level, and 3) the **Permittee-DOE** level.  
12 **The Permittees-DOE** also examines a representative subpopulation of waste prior to shipment  
13 to confirm that the waste contains no ignitable, corrosive or reactive waste; and that assigned  
14 Environmental Protection Agency (**EPA**) hazardous waste numbers are allowed by the Permit.  
15 The waste confirmation activities described herein occur prior to shipment of the waste from the  
16 generator/storage site to WIPP.

17 BC7-1 **Permittee-DOE** Confirmation of TRU Mixed Waste

18 Waste confirmation is defined in Module I as the activities performed by **the Permittees-DOE** to  
19 satisfy the requirements specified in Section 310 of Pub. L. 108-447. Waste confirmation occurs  
20 after waste containers have been certified for disposal at WIPP. The general confirmation  
21 process for WIPP waste is presented in Figure **B C7-1**.

22 BC7-1a **Permittees'-DOE's** Confirmation of a Representative Subpopulation of the Waste

23 **The Permittees-DOE** shall confirm that the waste contains no ignitable, corrosive, or reactive  
24 waste through radiography (Section **B C7-1b**) or the use of visual examination (Section **B C7-**  
25 **1c**) of a statistically representative subpopulation of the waste. Prior to shipment to WIPP, waste  
26 confirmation will be performed on randomly selected containers from each CH and RH TRU  
27 mixed waste stream shipment. Figure **B C7-1** presents the overall waste verification and  
28 confirmation process.

29 **The Permittees'-DOE's** waste confirmation encompasses ensuring that the physical  
30 characteristics of the TRU mixed waste correspond with its waste stream description and that  
31 the waste does not contain liquid in excess of TSDF-WAC limits or compressed gases. These  
32 techniques can detect liquid that exceeds 1 percent volume of the container and containerized  
33 gases, which are prohibited from storage or disposal at the WIPP facility. The prohibition of  
34 liquid in excess of TSDF-WAC limits and containerized gases prevents the storage or disposal  
35 of ignitable, corrosive, or reactive wastes. Radiography and/or visual examination will ensure  
36 that the physical form of the waste matches its waste stream description (i.e., Homogeneous  
37 Solids, Soil/Gravel, or Debris Waste). The results of **the Permittees'-DOE's** waste confirmation  
38 activities, including radiography and visual examination records (data sheets, packaging logs,  
39 and/or video and audio recordings) will be maintained in the WIPP facility operating record.

1 Noncompliant waste identified during waste confirmation will be managed as described in  
2 Section B\_C7-2.

3 ~~The Permittees-DOE~~ shall randomly select at least 7 percent of each waste stream shipment for  
4 waste confirmation. This equates to a minimum of one container from each fourteen containers  
5 in each waste stream in each designated shipment. If there are less than fourteen containers  
6 from a waste stream in a particular shipment, a minimum of one container from the waste  
7 stream shipped will be selected. If the random selection of containers in a shipment occurs prior  
8 to loading the waste containers into the Shipping Package, the randomly selected containers  
9 may be consolidated into a single Type B package consistent with transportation requirements.  
10 Documentation of the random selection of containers for waste confirmation will be placed in the  
11 WIPP facility operating record.

12 For each container selected for confirmation in accordance with the process above, ~~the~~  
13 ~~Permittees-DOE~~ will examine the respective nonconformance report (**NCR**) documentation to  
14 verify NCRs have been dispositioned for the selected container as required by Permit  
15 Attachment B\_C3, Section B\_C3-13.

#### 16 BC7-1a(1) Confirmation Training Requirements

17 Waste confirmation may be completed by performing actual radiography/visual examination on  
18 the waste container(s) or by a review of radiography/visual examination media and records.

19 Waste confirmation personnel may be trained to either review of radiography/visual examination  
20 media and records (Level 1) or to perform actual radiography/visual examination on the waste  
21 container(s) (Level 2). Level 2 personnel may also perform waste confirmation by review of  
22 media and records.

23 The ~~Permittees-DOE~~ management representative must be trained to the requirements of Level  
24 2.

#### 25 BC7-1b Radiography Methods Requirements

26 Radiography has been developed by ~~the Permittees-DOE~~ specifically to aid in the examination  
27 and identification of containerized waste. ~~The Permittees-DOE~~ shall describe all activities  
28 required to achieve the radiography objectives in standard operating procedures (**SOPs**). These  
29 SOPs shall include instructions specific to the radiography system(s) used by ~~the Permittees~~  
30 ~~DOE~~ at an off-site facility (e.g., the generator/storage site). For example, to detect liquid, some  
31 systems require the container to be rotated back and forth while other systems require the  
32 container to be tilted.

33 A radiography system (e.g., real time radiography, digital radiography/computed tomography)  
34 normally consists of an X-ray-producing device, an imaging system, an enclosure for radiation  
35 protection, a waste container handling system, a video and audio recording system, and an  
36 operator control and data acquisition station. Although these six components are required, it is  
37 expected there will be some variation within a given component between radiography systems.  
38 The radiography system shall have controls or an equivalent process which allow the operator  
39 to control image quality. On some radiography systems, it should be possible to vary the  
40 voltage, typically between 150 to 400 kilovolts (**kV**), to provide an optimum degree of  
41 penetration through the waste. For example, high-density material should be examined with the

1 X-ray device set on the maximum voltage. This ensures maximum penetration through the  
2 waste container. Low-density material should be examined at lower voltage settings to improve  
3 contrast and image definition. The imaging system typically utilizes either a fluorescent screen  
4 and a low-light television camera or x-ray detectors to generate the image.

5 To perform radiography, the waste container is scanned while the operator views the television  
6 screen. A video and audio recording is made of the waste container scan and is maintained in  
7 the WIPP facility operating record as a non-permanent record. A radiography data form is also  
8 used to document the Waste Matrix Code, ensure that the waste container contains no  
9 ignitable, corrosive, or reactive waste by documenting the absence of liquid in excess of TSDF-  
10 WAC limits or compressed gases, and verify that the physical form of the waste is consistent  
11 with the waste stream description documented on the WSPF. Containers whose contents  
12 prevent full examination of the remaining contents shall be subject to visual examination unless  
13 ~~the Permittees certify~~ DOE certifies that visual examination would provide no additional relevant  
14 information for that container based on the acceptable knowledge information for the waste  
15 stream. Such certification shall be documented in the WIPP facility operating record.

16 For containers that have been characterized using radiography by the generator/storage sites in  
17 accordance with the method in Attachment B C1, Section B C1-3, ~~the Permittees~~ DOE may  
18 perform confirmation by review of the generator/storage site's radiography audio/video  
19 recordings.

20 For containers which contain classified shapes and undergo radiography, the radiography will  
21 occur at a facility with appropriate security provisions and the video and audio recording will be  
22 considered classified. The radiography data forms will not contain classified information.

### 23 BC7-1b(1) Radiography Training

24 The radiography system involves qualitative and semiquantitative evaluations of visual displays.  
25 Operator training and experience are the most important considerations for ensuring quality  
26 controls in regard to the operation of the radiography system and for interpretation and  
27 disposition of radiography results. Only trained personnel shall be allowed to operate  
28 radiography equipment.

29 ~~The Permittee~~ DOE radiography operators performing waste confirmation shall be trained in  
30 accordance with the requirements of Permit Attachment H F1.

### 31 BC7-1b(2) Radiography Oversight

32 ~~The Permittees~~ DOE shall be responsible for monitoring the quality of the radiography data and  
33 calling for corrective action, when necessary.

34 A training drum with internal containers of various sizes shall be scanned biennially by each  
35 Level 2 operator. The video and audio media shall then be reviewed by a radiography subject  
36 matter expert to ensure that operators' interpretations remain consistent and accurate. Imaging  
37 system characteristics shall be verified on a routine basis.

38 Independent replicate scans and replicate observations of the video output of the radiography  
39 process shall be performed under uniform conditions and procedures. Independent replicate  
40 scans shall be performed on one waste container per day or once per shipment, whichever is

1 less frequent. Independent observations of one scan (not the replicate scan) shall also be made  
2 once per day or once per shipment, whichever is less frequent, by a qualified radiography  
3 operator other than the individual who performed the first examination. When confirmation is  
4 performed by review of audio/video recorded scans produced by the generator/storage site as  
5 specified in Permit Attachment B\_C1, Section B\_C1-3, independent observations shall be  
6 performed on two waste containers per shipment or two containers per day, whichever is less  
7 frequent.

8 BC7-1c Visual Examination Methods Requirements

9 Visual examination (VE) may also be used as a waste confirmation method by ~~the Permittees~~  
10 DOE. VE shall be conducted by ~~the Permittees~~ DOE in accordance with written SOPs to  
11 describe the contents of a waste container. Visual examination shall be conducted to identify  
12 and describe all waste items, packaging materials, and waste material parameters. VE may be  
13 used by ~~the Permittees~~ DOE to examine a statistically representative subpopulation of the  
14 waste certified for shipment to WIPP to confirm that the waste contains no ignitable, corrosive,  
15 or reactive waste. This is achieved by confirming that the waste contains no liquid in excess of  
16 TSDf-WAC limits or compressed gases, and that the physical form of the waste matches the  
17 waste stream description documented on the WSPF. During packaging, the waste container  
18 contents are directly examined by trained personnel. This form of waste confirmation may be  
19 performed by ~~the Permittees~~ DOE at a generator/storage site. The VE may be documented on  
20 video and audio media, or by using a second operator to provide additional verification by  
21 reviewing the contents of the waste container to ensure correct reporting. When VE is  
22 performed using a second operator, each operator performing the VE shall observe for  
23 themselves the waste being placed in the waste container or the contents within the examined  
24 waste container when waste is not removed. The results of all VE shall be documented on VE  
25 data forms, which are used to document the Waste Matrix Code, ensure that the waste  
26 container contains no ignitable, corrosive, or reactive waste by documenting the absence of  
27 liquids in excess of TSDf-WAC limits or compressed gases, and verify that the physical form of  
28 the waste is consistent with the waste stream description documented on the WSPF.

29 In order to keep radiation doses as low as reasonably achievable at generator/storage sites, ~~the~~  
30 ~~Permittees~~ DOE may use their own trained VE operators to perform VE for waste confirmation  
31 by reviewing generator/storage site VE data, which includes audio/video media, VE data forms,  
32 and waste packaging records. DOE shall document their review of generator/storage site VE  
33 data on DOE's confirmation data forms.

34 If the generator/storage site documented VE using audio/video media, DOE must use the  
35 audio/video media to perform confirmation prepared by the generator/storage site during their  
36 VE of the waste. If ~~the Permittees~~ DOE performs waste confirmation by review of audio/video  
37 media, the audio/video record of the VE must be sufficiently complete for the Permittees DOE to  
38 confirm the Waste Matrix Code and waste stream description, and verify the waste contains no  
39 liquid in excess of TSDf-WAC limits or compressed gases. Generator/storage site VE  
40 video/audio media subject to review by ~~the Permittees~~ DOE shall meet the following minimum  
41 requirements:

- 42 • The video/audio media shall record the waste packaging event for the container such  
43 that all waste items placed into the container are recorded in sufficient detail and shall  
44 contain an inventory of waste items in sufficient detail that a trained ~~Permittee~~ DOE VE  
45 operator can identify the associated waste material parameter.

- 1 • The video/audio media shall capture the waste container identification number.
- 2 • The personnel loading the waste container shall be identified on the video/audio media
- 3 or on packaging records traceable to the loading of the waste container.
- 4 • The date of loading of the waste container will be recorded on the video/audio media
- 5 or on packaging records traceable to the loading of the waste container.

6 VE audio/video media of containers that contain classified shapes shall be considered classified  
7 information.

8 ~~If the generator/storage site did not document VE using audio/video media, The Permittees~~  
9 ~~DOE may also~~ use their own trained VE operators to perform VE for waste confirmation by  
10 reviewing VE data forms or packaging ~~logs records~~ prepared by the generator/storage site  
11 ~~during their packaging of the waste.~~ To be acceptable, the generator/storage site VE data forms  
12 or packaging records must be signed by two generator/storage site personnel who witnessed  
13 the packaging of the waste and must provide sufficient information for ~~the Permittees DOE~~ to  
14 determine that the waste container contents match the waste stream description on the WSPF  
15 and the waste contains no liquids in excess of TSDf-WAC limits or compressed gases. ~~The~~  
16 ~~Permittees will document their review of generator/storage site VE data on Permittee VE data~~  
17 ~~forms.~~ Generator/storage site VE forms or packaging records subject to review by ~~the~~  
18 Permittees DOE shall meet the following minimum requirements:

- 19 • At least two generator site personnel shall approve the data forms or packaging
- 20 records attesting to the contents of the waste container.
- 21 • The data forms or packaging records shall contain an inventory of waste items in
- 22 sufficient detail that a trained Permittee DOE VE operator can identify the associated
- 23 waste material parameters.
- 24 • The waste container identification number shall be recorded on the data forms or
- 25 packaging records.

26 Visual examination video media of containers which contain classified shapes shall be  
27 considered classified information. Visual examination data forms will not contain classified  
28 information.

29 BC7-1c(1) Visual Examination Training

30 ~~The Permittees' DOE's~~ VE operators performing waste confirmation shall be trained in  
31 accordance with the requirements of Permit Attachment ~~H F~~ 1.

32 BC7-1c(2) Visual Examination Oversight

33 ~~The Permittees DOE~~ shall designate at least one VE expert. The VE expert shall be familiar with  
34 the processes that were used to generate the waste streams being confirmed using VE. The VE  
35 expert shall be responsible for the overall direction and implementation of ~~the Permittees' DOE's~~  
36 VE program. ~~The Permittees DOE~~ shall specify the selection, qualification, and training  
37 requirements of the visual examination expert in an SOP.

1 | BC7-1d Quality Assurance Objectives (QAOs) for Radiography and Visual Examination

2 | The QAOs ~~the Permittees DOE~~ must meet for radiography and visual examination are detailed  
3 | in this section. If the QAOs described below are not met, then corrective action as specified in  
4 | Permit Attachment BC3, Section BC3-13 shall be taken.

5 | BC7-1d(1) Radiography QAOs

6 | The QAOs for radiography are detailed in this section. If the QAOs described below are not met,  
7 | then corrective action shall be taken.

8 | Data to meet these objectives must be obtained from a video and audio recorded scan provided  
9 | by trained radiography operators. Results must also be recorded on a radiography data form.  
10 | The precision, accuracy, representativeness, completeness, and comparability objectives for  
11 | radiography data are presented below.

12 | Precision

13 | Precision is maintained by reconciling any discrepancies between two radiography operators  
14 | with regard to the waste stream waste confirmation, identification of liquid in excess of TSDF-  
15 | WAC limits, and identification of compressed gases through independent replicate scans and  
16 | independent observations.

17 | Accuracy

18 | Accuracy is obtained by using a target to tune the image for maximum sharpness and by  
19 | requiring operators to successfully identify 100 percent of the required items in a training  
20 | container during their initial qualification and subsequent requalification.

21 | Representativeness

22 | Representativeness is ensured by performing radiography on a random sample of waste  
23 | containers from each waste stream in each shipment.

24 | Completeness

25 | A video and audio media recording of the radiography examination and a validated radiography  
26 | data form will be obtained for 100 percent of the waste containers subject to radiography.

27 | Comparability

28 | The comparability of radiography data from different operators shall be enhanced by using  
29 | standardized radiography procedures and operator qualifications.

30 | BC7-1d(2) Visual Examination QAOs

31 | Results must be recorded on a VE data form. The precision, accuracy, representativeness,  
32 | completeness, and comparability objectives for VE data are presented below.

1 Precision

2 Precision is maintained by reconciling any discrepancies between the operator and the  
3 independent technical reviewer with regard to the waste stream waste confirmation,  
4 identification of liquid in excess of TSDf-WAC limits, and identification of compressed gases.

5 Accuracy

6 Accuracy is maintained by requiring operators to pass a comprehensive examination and  
7 demonstrate satisfactory performance in the presence of the VE expert during their initial  
8 qualification and subsequent requalification.

9 Representativeness

10 Representativeness is ensured by performing VE on a random sample of waste containers  
11 within each waste stream in each shipment.

12 Completeness

13 A validated VE data form will be obtained for 100 percent of the waste containers subject to VE.

14 Comparability

15 The comparability of VE data from different operators shall be enhanced by using standardized  
16 VE procedures and operator qualifications.

17 BC7-1e Review and Validation of Radiography and Visual Examination Data Used for Waste  
18 Examination

19 This section describes the requirements for review and validation of radiography and VE data by  
20 ~~the Permittees DOE~~.

21 BC7-1e(1) Independent Technical Review

22 The radiography and/or VE confirmation data for each shipment shall receive an independent  
23 technical review. This review will be performed before the affected waste shipment is shipped to  
24 the WIPP facility. The review shall be performed by an individual other than the data generator  
25 who is qualified to have performed the work. The review will be performed in accordance with  
26 approved ~~Permittee DOE~~ SOPs and will be documented on a review checklist. The reviewer(s)  
27 must approve the data as evidenced by signature, and as a consequence, ensure the following:

- 28 • Data generation and reduction were conducted in a technically correct manner in  
29 accordance with the methods used (procedure with revision). Data were reported in  
30 the proper units and correct number of significant figures.
- 31 • The data have been reviewed for transcription errors.
- 32 • Radiography video and audio media recordings have been reviewed (independent  
33 observation) on a waste container basis at a minimum of once per shipment or once  
34 per day of operation, whichever is less frequent. The radiography video/audio

1 | recording will be reviewed against the data reported on ~~the Permittees'~~ DOE's  
2 | radiography form to ensure that the data are correct and complete. If review of  
3 | radiography scans recorded by the generator/storage site was used to perform  
4 | confirmation, two observations must be performed for each shipment or two  
5 | observations per day, whichever is less frequent.

6 | BC7-1e(2) Permittee-DOE Management Review

7 | The radiography and/or visual examination data for each shipment shall receive a Permittee  
8 | DOE management review. This review will be performed before the affected waste shipment is  
9 | disposed of at the WIPP. The review shall be performed by a designated member of Permittee  
10 | DOE management. The review will be performed in accordance with approved Permittee-DOE  
11 | SOPs and will be documented on a review checklist. The reviewer(s) must approve the data as  
12 | evidenced by signature, and as a consequence, ensure the following:

- 13 | • The data are technically reasonable based on the technique used.
- 14 | • The data have received independent technical review.
- 15 | • The data indicate that the waste examined contained no ignitable, corrosive, or  
16 | reactive waste and that the physical form of the waste was consistent with the waste  
17 | stream description in the WSPF.
- 18 | • QC checks have been performed (e.g., replicate scans, image quality checks).
- 19 | • The data meet the established QAOs

20 | Upon completion of the Permittee-DOE management review, the waste confirmation data for the  
21 | shipment shall be submitted to the WIPP facility operating record as non-permanent records.  
22 | Waste confirmation data includes radiography and VE data forms, video/audio media, and  
23 | review checklists.

24 | BC7-2 Noncompliant Waste Identified During Waste Confirmation

25 | If ~~the Permittees identify~~ DOE identifies noncompliant waste during waste confirmation at a  
26 | generator/storage site (i.e., the waste does not match the waste stream description documented  
27 | in the WSPF or there is liquid in excess of TSDF-WAC limits or compressed gases) the waste  
28 | will not be shipped. ~~The Permittees-DOE~~ will suspend further shipments of the affected waste  
29 | stream and issue a CAR to the generator/storage site. Shipments of affected waste streams  
30 | shall not resume until the CAR has been closed. NMED will be notified within 24 hours of any  
31 | suspension of waste stream shipments due to the identification of noncompliant waste during  
32 | waste confirmation.

33 | As part of the corrective action plan in response to the CAR, the generator/storage site will  
34 | evaluate whether the waste characterization information documented in the Characterization  
35 | Information Summary and/or WSPF for the waste stream must be updated because the results  
36 | of waste confirmation for the waste stream indicated that the TRU mixed waste being examined  
37 | did not match the waste stream description. The generator/storage site will thoroughly evaluate  
38 | the potential impacts on waste that has been shipped to WIPP. ~~The Permittees-DOE~~ will  
39 | evaluate the potential that prohibited items were shipped to WIPP and what remedial actions

1 should occur, if any. The results of these evaluations will be provided to NMED before  
2 shipments of affected waste streams resume. If the Characterization Information Summary  
3 and/or WSPF requires revision, shipments of the affected waste stream shall not resume until  
4 the revised waste stream waste characterization information has been reviewed and approved  
5 by ~~the Permittees~~ DOE.

6 If a generator/storage site certifies noncompliant waste more than once during a running 90-day  
7 period, ~~the Permittees~~ DOE will suspend acceptance of that site's waste until ~~the Permittees~~  
8 DOE finds that all corrective actions have been implemented and the site complies with all  
9 applicable requirements of the WAP.

1

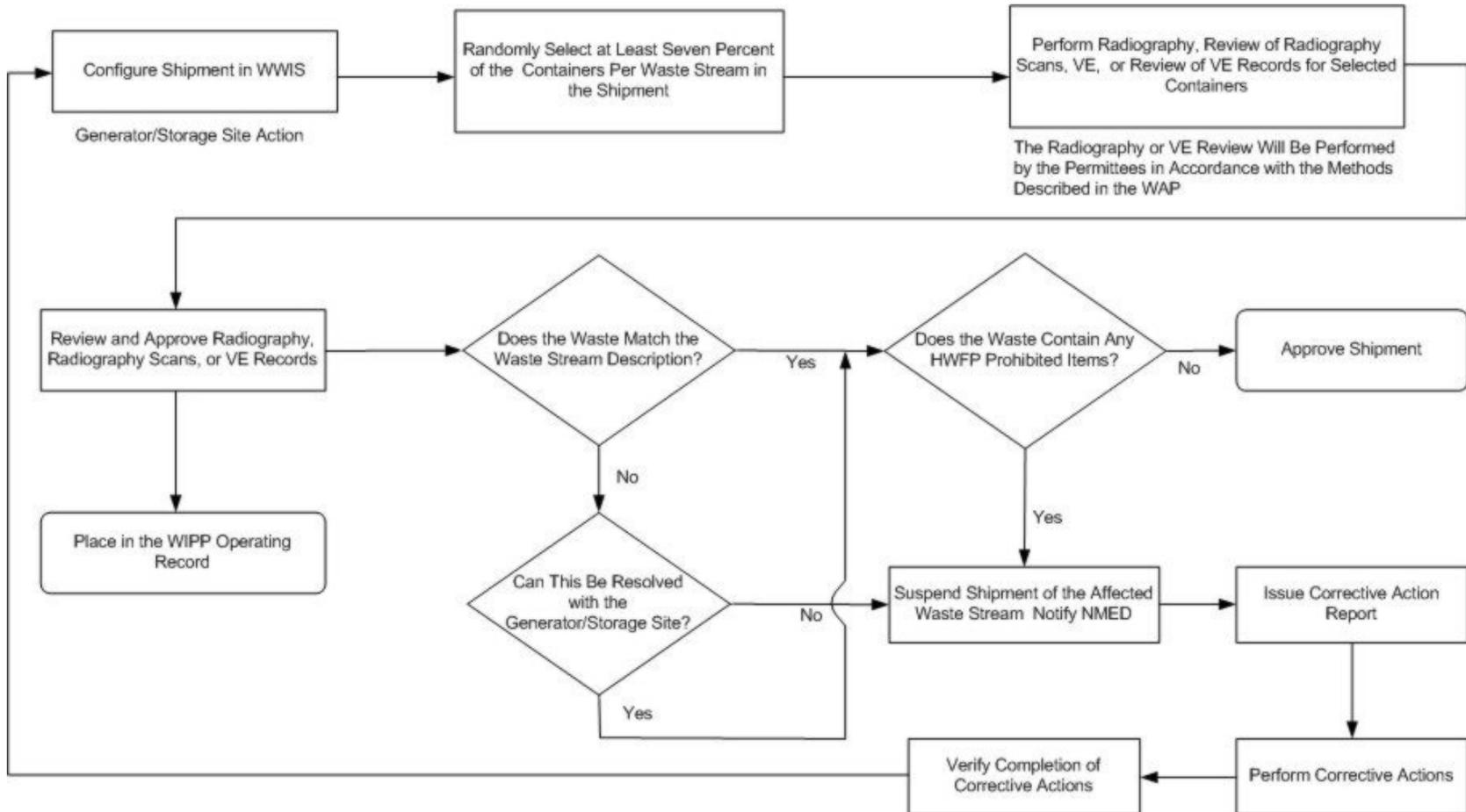
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## FIGURES

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**Figure B\_C7-1**  
**Overview of Waste Confirmation**