

**ATTACHMENT C7**  
**TRU WASTE CONFIRMATION**

Waste Isolation Pilot Plant  
Hazardous Waste Permit  
March 13, 2013

(This page intentionally blank)

**ATTACHMENT C7**  
**TRU WASTE CONFIRMATION**  
**TABLE OF CONTENTS**

Introduction .....	1
C7-1 Permittee Confirmation of TRU Mixed Waste .....	1
C7-1a Confirmation of a Representative Subpopulation of the Waste.....	1
C7-1a(1) Confirmation Training Requirements .....	2
C7-1b Radiography Methods Requirements .....	2
C7-1b(1) Radiography Training .....	3
C7-1b(2) Radiography Oversight.....	3
C7-1c Visual Examination Methods Requirements .....	3
C7-1c(1) Visual Examination Training .....	5
C7-1c(2) Visual Examination Oversight.....	5
C7-1d Quality Assurance Objectives ( <b>QAOs</b> ) for Radiography and Visual Examination .....	5
C7-1d(1) Radiography QAOs .....	5
C7-1d(2) Visual Examination QAOs .....	6
C7-1e Review and Validation of Radiography and Visual Examination Data Used for Waste Examination.....	7
C7-1e(1) Independent Technical Review .....	7
C7-1e(2) DOE Management Representative Review.....	7
C7-2 Noncompliant Waste Identified During Waste Confirmation.....	8

## LIST OF FIGURES

### Figure

### Title

Figure C7-1 Overview of Waste Confirmation



1 from a waste stream in a particular shipment, a minimum of one container from the waste  
2 stream shipped will be selected. If the random selection of containers in a shipment occurs prior  
3 to loading the waste containers into the Shipping Package, the randomly selected containers  
4 may be consolidated into a single Type B package consistent with transportation requirements.  
5 Documentation of the random selection of containers for waste confirmation will be placed in the  
6 WIPP facility operating record.

7 For each container selected for confirmation in accordance with the process above, the  
8 Permittees will examine the respective nonconformance report (**NCR**) documentation to verify  
9 NCRs have been dispositioned for the selected container as required by Permit Attachment C3,  
10 Section C3-13.

#### 11 C7-1a(1) Confirmation Training Requirements

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

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

#### 18 C7-1b Radiography Methods Requirements

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

25 A radiography system (e.g., real time radiography, digital radiography/computed tomography)  
26 normally consists of an X-ray-producing device, an imaging system, an enclosure for radiation  
27 protection, a waste container handling system, a video and audio recording system, and an  
28 operator control and data acquisition station. Although these six components are required, it is  
29 expected there will be some variation within a given component between radiography systems.  
30 The radiography system shall have controls or an equivalent process which allow the operator  
31 to control image quality. On some radiography systems, it should be possible to vary the  
32 voltage, typically between 150 to 400 kilovolts (**kV**), to provide an optimum degree of  
33 penetration through the waste. For example, high-density material should be examined with the  
34 X-ray device set on the maximum voltage. This ensures maximum penetration through the  
35 waste container. Low-density material should be examined at lower voltage settings to improve  
36 contrast and image definition. The imaging system typically utilizes either a fluorescent screen  
37 and a low-light television camera or x-ray detectors to generate the image.

38 To perform radiography, the waste container is scanned while the operator views the television  
39 screen. A video and audio recording is made of the waste container scan and is maintained in  
40 the WIPP facility operating record as a non-permanent record. A radiography data form is also  
41 used to document the Waste Matrix Code, ensure that the waste container contains no  
42 ignitable, corrosive, or reactive waste by documenting the absence of liquid in excess of TSDF-

1 WAC limits or compressed gases, and verify that the physical form of the waste is consistent  
2 with the waste stream description documented on the WSPF. Containers whose contents  
3 prevent full examination of the remaining contents shall be subject to visual examination unless  
4 the Permittees certify that visual examination would provide no additional relevant information  
5 for that container based on the acceptable knowledge information for the waste stream. Such  
6 certification shall be documented in the WIPP facility operating record.

7 For containers that have been characterized using radiography by the generator/storage sites in  
8 accordance with the method in Attachment C1, Section C1-3, the Permittees may perform  
9 confirmation by review of the generator/storage site's radiography audio/video recordings.

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

### 13 C7-1b(1) Radiography Training

14 The radiography system involves qualitative and semiquantitative evaluations of visual displays.  
15 Operator training and experience are the most important considerations for ensuring quality  
16 controls in regard to the operation of the radiography system and for interpretation and  
17 disposition of radiography results. Only trained personnel shall be allowed to operate  
18 radiography equipment.

19 The Permittee radiography operators performing waste confirmation shall be trained in  
20 accordance with the requirements of Permit Attachment F1.

### 21 C7-1b(2) Radiography Oversight

22 The Permittees shall be responsible for monitoring the quality of the radiography data and  
23 calling for corrective action, when necessary.

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

28 Independent replicate scans and replicate observations of the video output of the radiography  
29 process shall be performed under uniform conditions and procedures. Independent replicate  
30 scans shall be performed on one waste container per day or once per shipment, whichever is  
31 less frequent. Independent observations of one scan (not the replicate scan) shall also be made  
32 once per day or once per shipment, whichever is less frequent, by a qualified radiography  
33 operator other than the individual who performed the first examination. When confirmation is  
34 performed by review of audio/video recorded scans produced by the generator/storage site as  
35 specified in Permit Attachment C1, Section C1-1, independent observations shall be performed  
36 on two waste containers per shipment or two containers per day, whichever is less frequent.

### 37 C7-1c Visual Examination Methods Requirements

38 Visual examination (**VE**) may also be used as a waste confirmation method. VE shall be  
39 conducted by the Permittees in accordance with written SOPs to describe the contents of a

1 waste container. Visual examination shall be conducted to identify and describe all waste items,  
2 packaging materials, and waste material parameters. VE may be used to examine a statistically  
3 representative subpopulation of the waste certified for shipment to WIPP to confirm that the  
4 waste contains no ignitable, corrosive, or reactive waste. This is achieved by confirming that the  
5 waste contains no liquid in excess of TSDf-WAC limits or compressed gases, and that the  
6 physical form of the waste matches the waste stream description documented on the WSPF.  
7 During packaging, the waste container contents are directly examined by trained personnel.  
8 This form of waste confirmation may be performed by the Permittees at a generator/storage  
9 site. The VE may be documented on video and audio media, or by using a second operator to  
10 provide additional verification by reviewing the contents of the waste container to ensure correct  
11 reporting. When VE is performed using a second operator, each operator performing the VE  
12 shall observe for themselves the waste being placed in the waste container or the contents  
13 within the examined waste container when waste is not removed. The results of all VE shall be  
14 documented on VE data forms, which are used to document (1) the Waste Matrix Code, (2) that  
15 the waste container contains no ignitable, corrosive, or reactive waste by documenting the  
16 absence of liquids in excess of TSDf-WAC limits or compressed gases, and (3) that the  
17 physical form of the waste is consistent with the waste stream description documented on the  
18 WSPF.

19 In order to keep radiation doses as low as reasonably achievable at generator/storage sites, the  
20 Permittees may use their own trained VE operators to perform VE for waste confirmation by  
21 reviewing generator/storage site VE data, which includes VE data forms, waste packaging  
22 records, and may also include audio/video media. The Permittees shall document their review of  
23 generator/storage site VE data on confirmation data forms.

24 If the generator/storage site documented VE using audio/video media in accordance with Permit  
25 Attachment C1, Section C1-2, the Permittees must use the audio/video media to perform  
26 confirmation. If the Permittees perform waste confirmation by review of audio/video media, the  
27 audio/video record of the VE must be sufficiently complete for the Permittees to confirm the  
28 Waste Matrix Code and waste stream description, and verify the waste contains no liquid in  
29 excess of TSDf-WAC limits or compressed gases. Generator/storage site VE video/audio  
30 media subject to review by the Permittees shall meet the following minimum requirements:

- 31 • The video/audio media shall record the waste packaging event for the container such  
32 that all waste items placed into the container are recorded in sufficient detail and shall  
33 contain an inventory of waste items in sufficient detail that a trained Permittee VE  
34 operator can identify the associated waste material parameter.
- 35 • The video/audio media shall capture the waste container identification number.
- 36 • The personnel loading the waste container shall be identified on the video/audio media  
37 or on packaging records traceable to the loading of the waste container.
- 38 • The date of loading of the waste container will be recorded on the video/audio media  
39 or on packaging records traceable to the loading of the waste container.

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

1 If the generator/storage site did not document VE using audio/video media, the Permittees may  
2 use their own trained VE operators to perform VE for waste confirmation by reviewing VE data  
3 forms or packaging records prepared by the generator/storage site. To be acceptable, the  
4 generator/storage site VE data forms or packaging records must be signed by two  
5 generator/storage site personnel who witnessed the packaging of the waste and must provide  
6 sufficient information for the Permittees to determine that the waste container contents match  
7 the waste stream description on the WSPF and the waste contains no liquids in excess of  
8 TSDf-WAC limits or compressed gases. Generator/storage site VE forms or packaging records  
9 subject to review by the Permittees shall meet the following minimum requirements:

- 10 • At least two generator site personnel shall approve the data forms or packaging  
11 records attesting to the contents of the waste container.
- 12 • The data forms or packaging records shall contain an inventory of waste items in  
13 sufficient detail that a trained Permittee VE operator can identify the associated waste  
14 material parameters.
- 15 • The waste container identification number shall be recorded on the data forms or  
16 packaging records.

17 Visual examination video media of containers which contain classified shapes shall be  
18 considered classified information. Visual examination data forms will not contain classified  
19 information.

#### 20 C7-1c(1) Visual Examination Training

21 The Permittees 's VE operators performing waste confirmation shall be trained in accordance  
22 with the requirements of Permit Attachment F1.

#### 23 C7-1c(2) Visual Examination Oversight

24 The Permittees shall designate at least one VE expert. The VE expert shall be familiar with the  
25 processes that were used to generate the waste streams being confirmed using VE. The VE  
26 expert shall be responsible for the overall direction and implementation of the Permittees 's VE  
27 program. The Permittees shall specify the selection, qualification, and training requirements of  
28 the visual examination expert in an SOP.

#### 29 C7-1d Quality Assurance Objectives (QAOs) for Radiography and Visual Examination

30 The QAOs the Permittees must meet for radiography and visual examination are detailed in this  
31 section. If the QAOs described below are not met, then corrective action as specified in Permit  
32 Attachment C3, Section C3-7 shall be taken.

#### 33 C7-1d(1) Radiography QAOs

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

36 Data to meet these objectives must be obtained from a video and audio recorded scan provided  
37 by trained radiography operators. Results must also be recorded on a radiography data form.

1 The precision, accuracy, representativeness, completeness, and comparability objectives for  
2 radiography data are presented below.

3 Precision

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

8 Accuracy

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

12 Representativeness

13 Representativeness is ensured by performing radiography on a random sample of waste  
14 containers from each waste stream in each shipment.

15 Completeness

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

18 Comparability

19 The comparability of radiography data from different operators shall be enhanced by using  
20 standardized radiography procedures and operator qualifications.

21 C7-1d(2) Visual Examination QAOs

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

24 Precision

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

28 Accuracy

29 Accuracy is maintained by requiring operators to pass a comprehensive examination and  
30 demonstrate satisfactory performance in the presence of the VE expert during their initial  
31 qualification. VE operators shall be requalified as specified in Permit Attachment F2.

1 Representativeness

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

4 Completeness

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

6 Comparability

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

9 C7-1e Review and Validation of Radiography and Visual Examination Data Used for Waste  
10 Examination

11 This section describes the requirements for review and validation of radiography and VE data by  
12 the Permittees.

13 C7-1e(1) Independent Technical Review

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

- 20 • Data generation and reduction were conducted in a technically correct manner in  
21 accordance with the methods used (procedure with revision). Data were reported in  
22 the proper units and correct number of significant figures.
- 23 • The data have been reviewed for transcription errors.
- 24 • Radiography video and audio media recordings have been reviewed (independent  
25 observation) on a waste container basis at a minimum of once per shipment or once  
26 per day of operation, whichever is less frequent. The radiography video/audio  
27 recording will be reviewed against the data reported on the Permittees 's radiography  
28 form to ensure that the data are correct and complete. If review of radiography scans  
29 recorded by the generator/storage site was used to perform confirmation, two  
30 observations must be performed for each shipment or two observations per day,  
31 whichever is less frequent.

32 C7-1e(2) DOE Management Representative Review

33 The radiography and/or visual examination data forms and independent technical review  
34 checklist (confirmation data package) for each shipment shall receive a DOE management  
35 review. This review will be performed before the affected waste shipment is disposed of at the  
36 WIPP. The review shall be performed by a designated representative of DOE management. The

1 review will be performed in accordance with approved DOE SOPs and will be documented on a  
2 review checklist. The reviewer(s) must approve the confirmation data package as evidenced by  
3 signature, and as a consequence, ensure the following:

- 4 • The data are technically reasonable based on the technique used.
- 5 • The data have received independent technical review.
- 6 • The data indicate that the waste examined contained no ignitable, corrosive, or  
7 reactive waste and that the physical form of the waste was consistent with the waste  
8 stream description in the WSPF.
- 9 • QC checks have been performed (e.g., replicate scans, image quality checks).
- 10 • The data meet the established QAOs

11 Upon completion of the DOE management representative review, the waste confirmation data  
12 for the shipment shall be submitted to the WIPP facility operating record as non-permanent  
13 records. Waste confirmation data includes radiography and VE data forms, video/audio media,  
14 and review checklists.

#### 15 C7-2 Noncompliant Waste Identified During Waste Confirmation

16 If the Permittees identify noncompliant waste during waste confirmation at a generator/storage  
17 site (i.e., the waste does not match the waste stream description documented in the WSPF or  
18 there is liquid in excess of TSDF-WAC limits or compressed gases) the waste will not be  
19 shipped. DOE will suspend further shipments of the affected waste stream and issue a CAR to  
20 the generator/storage site. Shipments of affected waste streams shall not resume until the CAR  
21 has been closed. NMED will be notified within 24 hours of any suspension of waste stream  
22 shipments due to the identification of noncompliant waste during waste confirmation.

23 As part of the corrective action plan in response to the CAR, the generator/storage site will  
24 evaluate whether the waste characterization information documented in the Characterization  
25 Information Summary and/or WSPF for the waste stream must be updated because the results  
26 of waste confirmation for the waste stream indicated that the TRU mixed waste being examined  
27 did not match the waste stream description. The generator/storage site will thoroughly evaluate  
28 the potential impacts on waste that has been shipped to WIPP. DOE will evaluate the potential  
29 that prohibited items were shipped to WIPP and what remedial actions should occur, if any. The  
30 results of these evaluations will be provided to NMED before shipments of affected waste  
31 streams resume. If the Characterization Information Summary or WSPF requires revision,  
32 shipments of the affected waste stream shall not resume until the revised waste stream waste  
33 characterization information has been reviewed and approved by DOE.

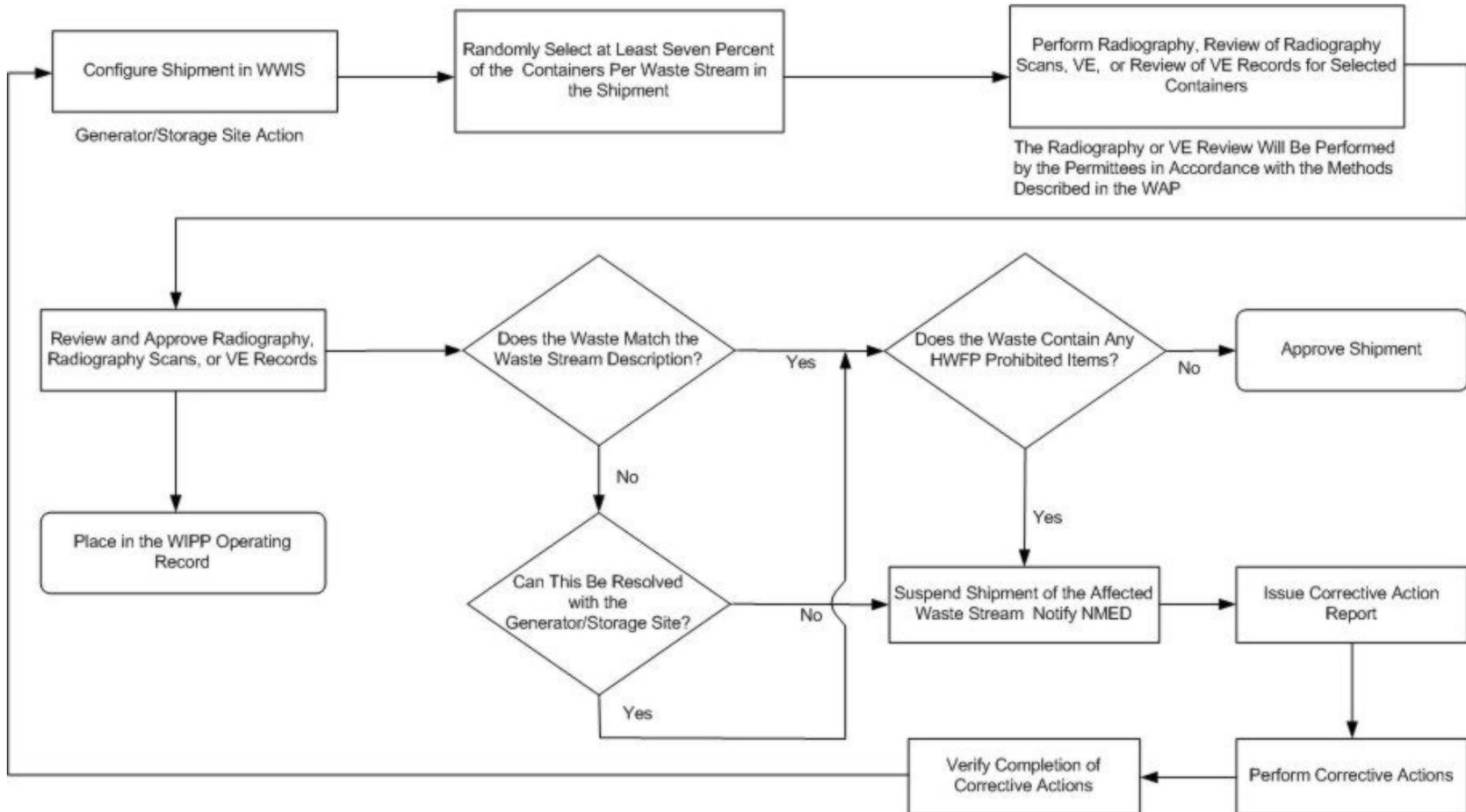
34 If a generator/storage site certifies noncompliant waste more than once during a running 90-day  
35 period, DOE will suspend acceptance of that site's waste until DOE finds that all corrective  
36 actions have been implemented and the site complies with all applicable requirements of the  
37 WAP.

1

## FIGURES

2

(This page intentionally blank)



**Figure C7-1  
 Overview of Waste Confirmation**