ATTACHMENT C7

TRU WASTE CONFIRMATION

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Introduction

The Permittees demonstrate compliance with the waste analysis requirements of the Permit by ensuring that the waste characterization processes performed by generator/storage sites (**sites**) produce data compliant with the Waste Analysis Plan (**WAP**) and through the waste screening and verification processes. Verification occurs at three levels: 1) the data generation level, 2) the project level, and 3) the Permittee level. The Permittees also examine a representative subpopulation of waste prior to shipment to confirm that the waste contains no ignitable, corrosive or reactive waste; and that assigned U.S. Environmental Protection Agency ~~(**EPA**)~~ hazardous waste numbers are allowed by the Permit. The waste confirmation activities described herein occur prior to shipment of the waste from the generator/storage site to the Waste Isolation Pilot Plant (**WIPP**) facility~~WIPP~~.

C7-1 Permittee Confirmation of TRU Mixed Waste

Waste confirmation is defined in Permit Part 1, Section 1.5.12 as the activities performed by the Permittees or the co-Permittee the U.S. Department of Energy (**DOE**), pursuant to this Permit Attachment, to satisfy the requirements specified in Section 310 of Pub. L. 108-447. Waste confirmation occurs after waste containers have been certified for shipment to and disposal at the WIPP facility. The general confirmation process for WIPP waste is presented in Figure C7-1.

C7-1a Confirmation of a Representative Subpopulation of the Waste

The Permittees shall confirm that the waste contains no ignitable, corrosive, or reactive waste through radiography (Section C7-1b) or the use of visual examination (**VE**) (Section C7-1c) of a statistically representative subpopulation of the waste. Prior to shipment to the WIPP facility, waste confirmation will be performed on randomly selected containers from each contact-handled~~**CH**~~ and remote-handled~~**RH**~~ transuranic (**TRU**) mixed waste stream shipment. Figure C7-1 presents the overall waste verification and confirmation process.

Waste confirmation encompasses ensuring that the physical characteristics of the TRU mixed waste correspond with its waste stream description and that the waste does not contain liquid in excess of Treatment, Storage, and Disposal Facility-Waste Acceptance Criteria (**TSDF-WAC**) limits or compressed gases. These techniques can detect liquid that exceeds ~~1~~one percent volume of the container and containerized gases, which are prohibited from storage or disposal at the WIPP facility. The prohibition of liquid in excess of TSDF-WAC limits and containerized gases prevents the storage or disposal of ignitable, corrosive, or reactive wastes. Radiography and/or ~~visual examination~~VE will ensure that the physical form of the waste matches its waste stream description (i.e., Homogeneous Solids, Soil/Gravel, or Debris Waste). The results of waste confirmation activities, including radiography and ~~visual examination~~VE records (data sheets, packaging logs, and/or video and audio recordings) will be maintained in the WIPP facility ~~operating record~~Operating Record. Noncompliant waste identified during waste confirmation will be managed as described in Section C7-2.

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

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

C7-1a(1) TRU Waste Confirmation Training Requirements

Transuranic ~~TRU~~ waste confirmation may be completed by performing actual radiography/~~visual examination~~VE on the waste container(s) or by a review of radiography/~~visual examination~~VE media and records. This allows for a tiered approach for the training of the Permittees'~~WIPP~~ TRU waste confirmation personnel.

The Permittees' TRU waste confirmation personnel may be trained to either review radiography/~~visual examination~~VE media and records (Level 1) or to perform actual radiography/~~visual examination~~VE on the waste container(s) (Level 2). Level 2 personnel may also perform waste confirmation by review of media and records.

C7-1b Radiography Methods Requirements

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

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

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

For containers that have been characterized using radiography by the generator/storage sites in accordance with the method in Permit Attachment C1, Section C1-1~~C1-3~~, the Permittees may perform confirmation by review of the generator/storage site's radiography audio/video recordings.

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

C7-1b(1) Radiography Training

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

Radiographer Level 1 personnel performing TRU mixed waste confirmation shall be trained in:

- TRU Waste Confirmation Radiographer Level 1 Qualification.

Radiographer Level 2 personnel performing TRU mixed waste confirmation shall be trained in:

- TRU Waste Confirmation Radiographer Certification Level 2 Qualification.

C7-1b(1)(i) TRU Waste Confirmation Radiographer Certification Level 1 Qualification

Level 1 radiographer operators are instructed in the specific waste-generating practices and typical packaging configurations expected to be found in each Waste Matrix Code at each site shipping waste to the WIPP facility. The on-the-job training (**OJT**) and apprenticeship is conducted by an experienced, qualified radiography operator or trainer prior to the qualification of the training candidate. Radiography operators are qualified once every two years.

The ~~level~~ Level 1 radiography training program includes the following elements:

Formal Training

- Project Requirements
- State and Federal Regulations
- Basic Principles of Radiography
- Radiography of Waste Forms (including the ability to identify liquid and compressed gases which will be verified by the radiography subject matter expert)
- Waste Stream-Specific Instruction (e.g., specific waste-generating processes, typical packaging configurations, waste material parameters)

On-the-Job Training

- System Operation (equipment and procedures used by Level 1 radiographers)
- Identification of Packaging Configurations
- Identification of Waste Material Parameters/Waste Matrix Codes
- Identification of liquid in excess of the TSDF-WAC limits and compressed gases
- Verification of waste stream description

C7-1b(1)(ii) TRU Waste Confirmation Radiographer Level 2 Qualification

Level 2 radiography operators are instructed in the specific waste-generating practices and typical packaging configurations expected to be found in each Waste Matrix Code at each site shipping waste to the WIPP facility. The OJT and apprenticeship are conducted by an experienced qualified radiography operator prior to the qualification of the training candidate. Radiography operators are requalified once every two years.

The Level 2 radiography training program included the following elements:

Formal Training

- Project Requirements
- State and Federal Regulations
- Basic Principles of Radiography
- Radiographic Image Quality
- Radiographic Scanning Techniques
- Application Techniques

- Radiography of Waste Forms
- Standards, Codes, and Procedures for Radiography
- Waste Stream-Specific Instruction

On-the-Job Training

- System Operation
- Identification of Packaging Configurations
- Identification of Waste Material Parameters/Waste Matrix Codes
- Identification of liquid in excess of the TSDF-WAC limits and compressed gases
- Verification of waste stream description

C7-1b(2) Radiography Oversight

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

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

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

C7-1c Visual Examination Methods Requirements

Visual examination ~~(**VE**)~~ may also be used as a waste confirmation method. Visual examination~~VE~~ shall be conducted by the Permittees in accordance with written SOPs to describe the contents of a waste container. Visual examination shall be conducted to identify and describe ~~all~~ waste items, packaging materials, and waste material parameters. Visual examination~~VE~~ may be used to examine a statistically representative subpopulation of the waste certified for shipment to the WIPP facility to confirm that the waste contains no ignitable, corrosive, or reactive waste. This is achieved by confirming that the waste contains no liquid in excess of TSDF-WAC limits or compressed gases, and that the physical form of the waste matches the waste stream description documented on the WSPF. During packaging, the waste container contents are directly examined by trained personnel. This form of waste confirmation

may be performed by the Permittees at a generator/storage site. The VE may be documented on video and audio media, or by using a second operator to provide additional verification by reviewing the contents of the waste container to ensure correct reporting. When VE is performed using a second operator, each operator performing the VE shall observe for themselves the waste being placed in the waste container or the contents within the examined waste container when waste is not removed. The results of ~~all~~ VE shall be documented on VE data forms, which are used to document (1) the Waste Matrix Code, (2) that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and (3) that the physical form of the waste is consistent with the waste stream description documented on the WSPF.

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

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

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

- The video/audio media shall capture the waste container identification number.

- The personnel loading the waste container shall be identified on the video/audio media or on packaging records traceable to the loading of the waste container.

- The date of loading of the waste container will be recorded on the video/audio media or on packaging records traceable to the loading of the waste container.

~~VE~~Visual examination audio/video media of containers that contain classified shapes shall be considered classified information.

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

- At least two generator site personnel who witnessed the packaging of the waste shall approve the data forms or packaging records attesting to the contents of the waste container.

- The data forms or packaging records shall contain an inventory of waste items in sufficient detail that a trained Permittee VE operator can identify the associated waste material parameters.

- The waste container identification number shall be recorded on the data forms or packaging records.

Visual examination video/audio media of containers which contain classified shapes shall be considered classified information. Visual examination data forms will not contain classified information.

C7-1c(1) Visual Examination Training

Visual Examination Operator/Expert Level 1 personnel performing TRU mixed waste confirmation shall be trained in:

- TRU Waste Confirmation Visual Examination Level 1 Qualification.

Visual Examination Operator/Expert Level 2 performing TRU mixed waste confirmation shall be trained in:

- TRU Waste Confirmation Visual Examination Level 2 Qualification.

C7-1c(1)(i) TRU Waste Confirmation Visual Examination Level 1 Qualification

Level 1 ~~visual examination~~VE personnel are instructed in the specific waste-generating processes, typical packaging configurations, and waste material parameters expected to be found in each Waste Matrix Code in the waste stream being confirmed using ~~visual examination~~VE. The OJT and apprenticeship are conducted by an operator experienced and qualified in ~~visual examination~~VE or a qualified trainer prior to qualification of the candidate. The training is waste stream specific to include the various waste configurations being confirmed. For example, the particular physical forms and packaging configurations at each site will vary and operators shall be trained on types of waste that are generated, stored, and/or characterized at that particular site. Visual examination personnel are requalified once every two years.

The Level 1 ~~visual examination~~VE training program included the following elements:

Formal Training

- Project Requirements

- State and Federal Regulations

- Batch Data Report Forms

- Waste Stream-Specific Instruction (e.g., waste-generating processes, typical packaging configurations, waste material parameters)

On-the-Job Training

- System Operation (equipment and procedures used by Level 1 ~~visual examination~~VE personnel)
- Identification of Packaging Configurations
- Identification of Waste Material Parameters/Waste Matrix Codes
- Identification of liquid in excess of the limits in the TSDF-WAC and compressed gases
- Verification of waste stream description

C7-1c(1)(ii) TRU Waste Confirmation Visual Examination Level 2 Qualification

Level 2 ~~visual examination~~VE personnel are instructed in the specific waste-generating processes, typical packaging configurations, and waste material parameters expected to be found in each Waste Matrix Code in the waste stream being confirmed using ~~visual examination~~VE. The OJT and apprenticeship are conducted by an operator experienced and qualified in ~~visual examination~~VE or a qualified trainer prior to qualification of the candidate. The training is waste stream specific to include the various waste configurations being confirmed. For example, the particular physical forms and packaging configurations at each site will vary so operators shall be trained on types of waste that are generated, stored, and/or characterized at that particular site. Visual examination personnel are requalified once every two years.

The Level 2 ~~visual examination~~VE training program includes the following elements:

Formal Training

- Project Requirements
- State and Federal Regulations
- Batch Data Report Forms
- Application Techniques
- Waste Stream-Specific Instruction (e.g., specific waste-generating processes, typical packaging configurations, waste material parameters)

On-the-Job Training

- Identification of Packaging Configurations
- Identification of Waste Material Parameters/Waste Matrix Codes

- Identification of liquid in excess of the TSDF-WAC limits and compressed gases
- Verification of waste stream description

C7-1c(2) Visual Examination Oversight

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

C7-1d Quality Assurance Objectives ~~(**QAOs**)~~ for Radiography and Visual Examination

The Quality Assurance Objectives (**QAOs**)~~QAOs~~ the Permittees must meet for radiography and ~~visual examination~~VE are detailed in this section. If the QAOs described below are not met, then corrective action as specified in Permit Attachment C3, Section C3-7 shall be taken.

C7-1d(1) Radiography Quality Assurance Objectives~~QAOs~~

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

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

Precision

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

Accuracy

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

Representativeness

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

Completeness

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

Comparability

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

C7-1d(2) Visual Examination Quality Assurance Objectives~~QAOs~~

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

Precision

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

Accuracy

Accuracy is maintained by requiring operators to pass a comprehensive examination and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification. Visual examination~~VE~~ operators shall be requalified once every two years.

Representativeness

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

Completeness

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

Comparability

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

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

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

C7-1e(1) Independent Technical Review

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

- Data generation and reduction were conducted in a technically correct manner in accordance with the methods used (procedure with revision). Data were reported in the proper units and correct number of significant figures.

- The data have been reviewed for transcription errors.

- Radiography video and audio media recordings have been reviewed (independent observation) on a waste container basis at a minimum of once per shipment or once per day of operation, whichever is less frequent. The radiography video/audio recording will be reviewed against the data reported on the ~~Permittees 's~~Permittees' radiography form to ensure that the data are correct and complete. If review of radiography scans recorded by the generator/storage site was used to perform confirmation, two observations must be performed for each shipment or two observations per day, whichever is less frequent.

C7-1e(2) DOE Management Representative Review

The radiography and/or ~~visual examination~~VE data forms and independent technical review checklist (confirmation data package) for each shipment shall receive a DOE management review. This review will be performed before the affected waste shipment is disposed of at the WIPP facility. The review shall be performed by a designated representative of DOE management. The review will be performed in accordance with approved DOE SOPs and will be documented on a review checklist. The reviewer(s) must approve the confirmation data package as evidenced by signature, and as a consequence, ensure the following:

- The data are technically reasonable based on the technique used.

- The data have received independent technical review.

- The data indicate that the waste examined contained no ignitable, corrosive, or reactive waste and that the physical form of the waste was consistent with the waste stream description in the WSPF.

- Quality control~~QC~~ checks have been performed (e.g., replicate scans, image quality checks).

- The data meet the established QAOs

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

C7-1e(3) DOE Management Representative Training

The DOE Management Representative performing TRU mixed waste confirmation data package review and approval shall be trained in:

- Required Reading:

- The DOE's Quality Assurance Program Document
- Permit Attachments C through C7
- Required Reading identified in DOE's management procedure, *Approval of Contractor-Generator Confirmation Data Packages*

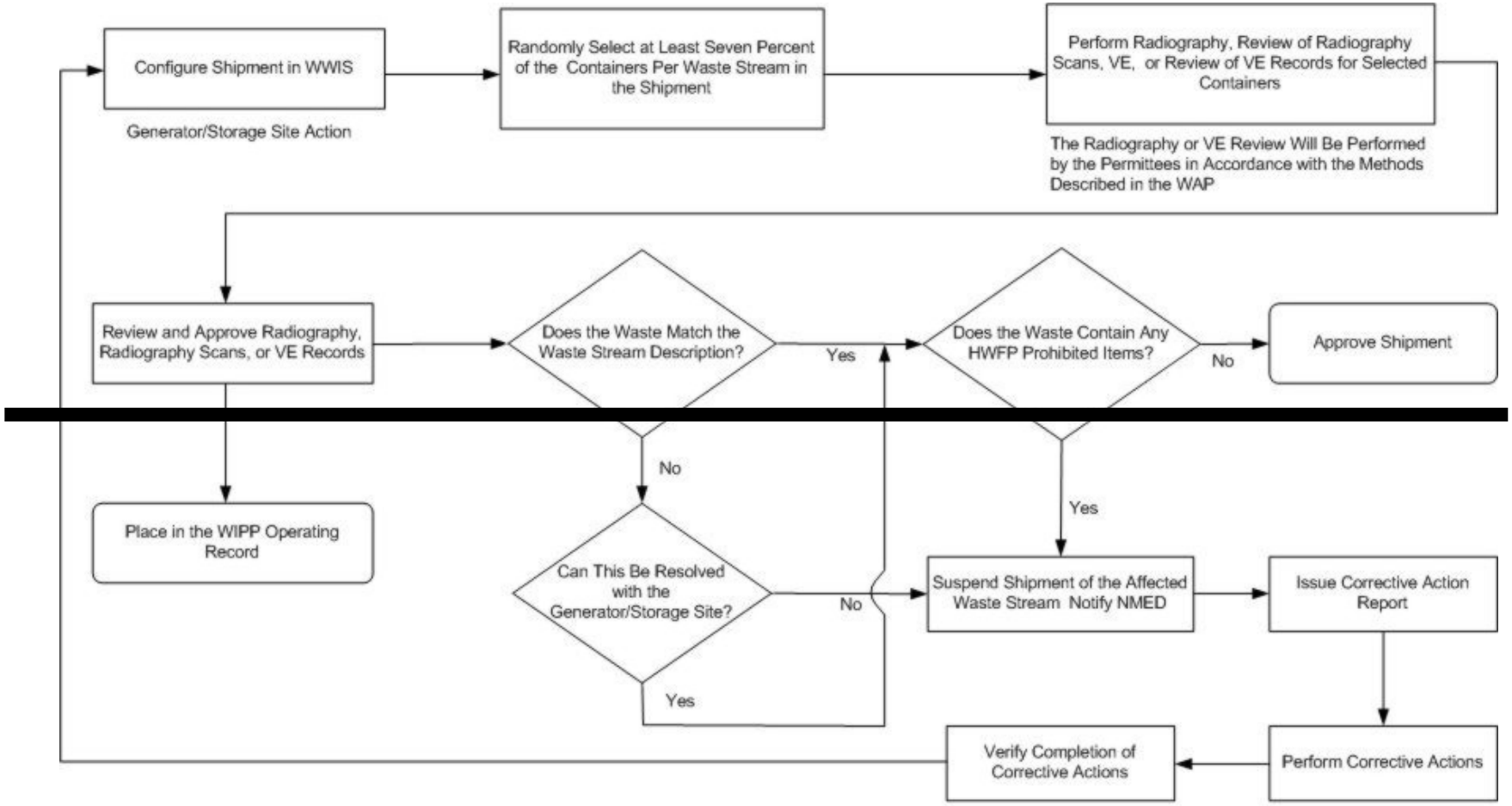
C7-2 Noncompliant Waste Identified During Waste Confirmation

If the Permittees identify noncompliant waste during waste confirmation at a generator/storage site (i.e., the waste does not match the waste stream description documented in the WSPF or there is liquid in excess of TSDF-WAC limits or compressed gases) the waste will not be shipped, and the Management and Operating Contractor and the DOE Carlsbad Field Office will be notified. The DOE will suspend further shipments of the affected waste stream and issue a Corrective Action Report (**CAR**) to the generator/storage site. Shipments of affected waste streams shall not resume until the CAR has been closed. The New Mexico Environment Department (**NMED**) will be notified within 24 hours of any suspension of waste stream shipments due to the identification of noncompliant waste during waste confirmation.

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

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

FIGURES



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

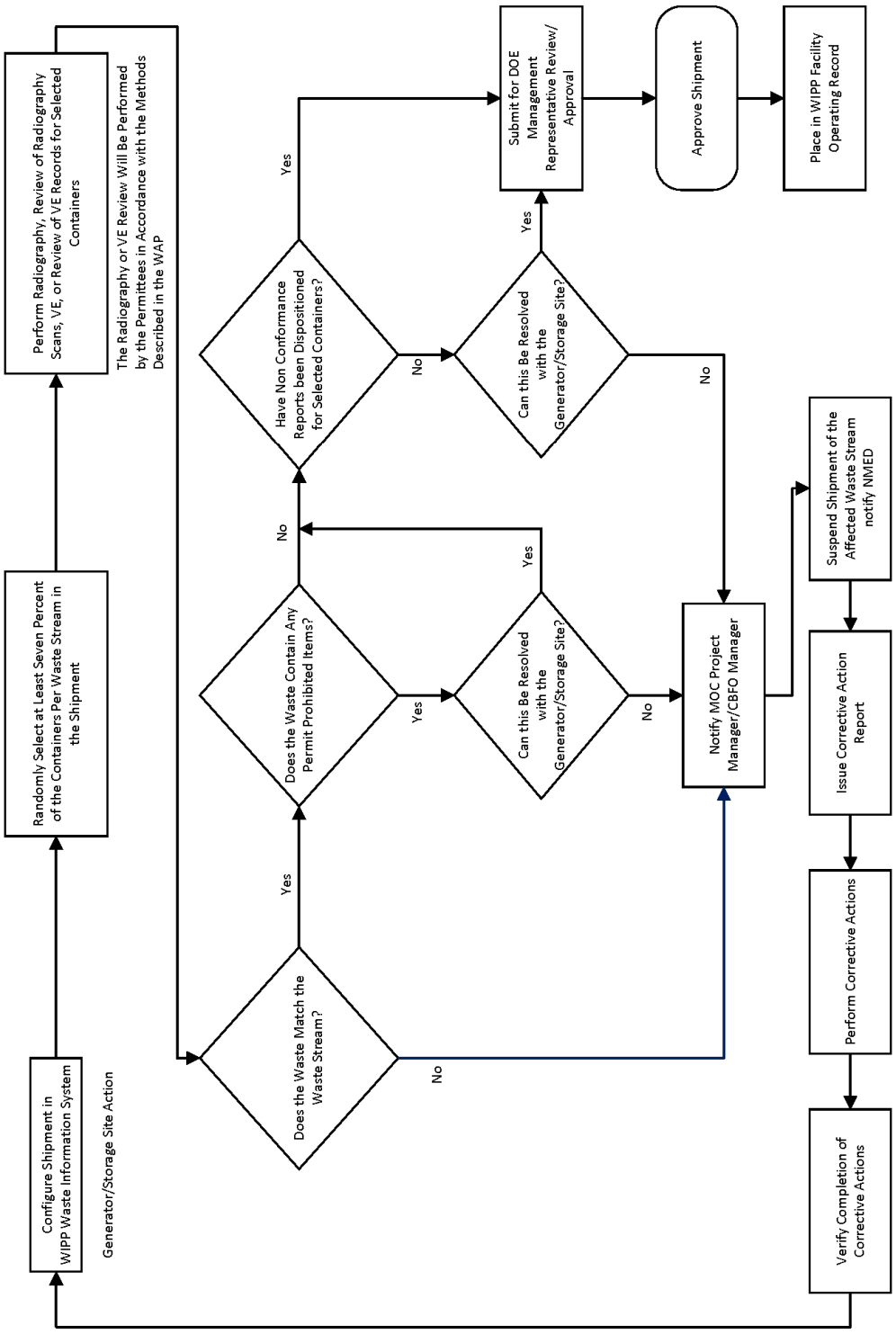


Figure C7-1
Overview of Waste Confirmation