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July 13, 2000

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Subject: Review of Revised Hanford Operation of the Drum Nondestructive Examination System Procedure (WRP1-OP-0908, Revision F-3)

Dear Mr. Zappe:

The Carlsbad Area Office (CAO) has completed a review of the subject procedure and found the changes to be acceptable. The review indicates that the changes do not impact compliance with the requirements Waste Analysis Plan.

Please contact the CAO Quality Assurance Manager, Sam Vega, at (505) 234-7423 should you have any questions concerning the procedure review.

Sincerely,

Gary L Smith
for Dr. Inés R. Triay
Manager

Enclosure

CAO:QA:SAV:NM 00-0836 UFC 2300.00

000721

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CHANGE SUMMARY & SIGNATURE SHEET	PACR Number: 00-063
Procedure Number, Rev/Mod Number WRP1-OP-0908, F-3	Procedure Title OPERATION OF THE DRUM NONDESTRUCTIVE EXAMINATION SYSTEM
Desired Completion Date: 07/22/2000	Effective Date of Change 07/06/2000

Affected Page/Step	Summary Of Change
4/Section 1.0 6/6.0 NOTE	Deleted: "document the waste matrix code group" from 2nd paragraph. Revised 3rd bullet to read: Refer to Attachment 1, "Definitions" for an explanation of the various terms/limits used throughout this procedure. (i.e., layers of confinement, layers of packaging, etc.)
6/CAUTION	Deleted CAUTION statement.
8/6.4 Caution	Deleted CAUTION statement.
10/Warning	Deleted Warning statement.
10/6.4.23	Moved notification of Sample Treatment Director to new step 6.7.3.
10/6.4.23 (Note)	Deleted Note that followed step 6.4.23.
11/Section 6.7	Changed title of Section 6.7 to: "Data Recording & Notifications - Non-WIPP Waste"
11/NOTE & 6.7.3	Added new NOTE & step 6.7.3: NOTE • Provide DOS with any available pertinent information. This information may include the discovery of liquids, the estimated volume of liquids, or any additional information about known hazardous materials present in the container that would aid in the proper management of the material. • DOS will notify Facility Manager, FQAO, ECO/STD and initiate NCR's as appropriate. 6.7.3 **NOTIFY** the DOS via the Control Room Operator if ANY of the following conditions exist: • The drum appears to have questionable structural integrity, • The drum appears to contain any flammable/hazardous materials which do NOT match the Contents Inventory Sheet, • The drum appears to NOT comply with the waste acceptance criteria as determined by Generator Waste Acceptance Services.
12/Section 6.8	Changed title of Section 6.8 to: "Data Recording & Notifications - WIPP Waste"
All Applicable Pages	Changed "waste matrix parameter category" to "waste matrix code group" where applicable.
13/NOTE	Modified 1st bullet of NOTE to read: For WIPP TRU waste, radiography is used to confirm the waste stream and to determine the waste material parameter weights.
14/6.8.2.e & 6.8.2.f	Added: "WMC" to steps 6.8.2.e and 6.8.2.f.
15/NOTE & 6.8.3	Added new NOTE & step 6.8.3 as follows: Added same NOTE as the one added before step 6.7.3 (see above) 6.8.3. **NOTIFY** the DOS via the Control Room Operator if ANY of the following conditions exist: • The drum cannot be completely examined, • The drum appears to contain a 90-ml liner which is NOT vented (see Attachment 1 - Definitions), • The drum appears to have questionable structural integrity. • The drum appears to contain any flammable/hazardous materials which do NOT match waste stream description, • The drum appears to contain any prohibited items, • The drum appears to NOT comply with the waste stream description.
All Applicable Pages	Changed: "WMP-400" to "WMH-400" where applicable.
28 & 29/Attachment 1	Added: Definition for Waste Matrix Code (WMC), and added, " 90-mil liners are considered packaging for waste material parameter purposes whether they are vented, unvented, with or without a lid.

Effective Date: 07/06/2000

APPROVAL DESIGNATOR **Q**

PROCEDURE USE LEVEL **REFERENCE**

TABLE OF CONTENTS

REVISION STATUS 4

1.0 PURPOSE AND SCOPE 5

2.0 REFERENCES 5

3.0 PRECAUTIONS AND LIMITATIONS 6

4.0 SPECIAL TOOLS, EQUIPMENT, AND MATERIALS 6

5.0 PREREQUISITES 6

6.0 INSTRUCTIONS 7
- 6.1 Preliminary Activities 7
- 6.2 RTR Resolution Measurement 7
- 6.3 LDA Acceptability Tests 8
- 6.4 Waste Drum Examination 9
- 6.5 Perform Independent Observation - WIPP Waste 11
- 6.6 Perform Independent Replicate Examination - WIPP Waste 11
- 6.7 Data Recording And Notifications - Non-WIPP Waste 12
- 6.8 Data Recording And Notifications - WIPP Waste 13
- 6.9 Shutdown Activities 17
- 6.10 Optical Disks 17
- 6.11 Video Tapes 19

7.0 RECORDS 20

FIGURE 1. RADIOGRAPHY DATA SHEET 21

FIGURE 2. EXAMPLE NON-WIPP WASTE VERIFICATION CHECKLIST 23

FIGURE 3. VOLUME UTILIZATION PERCENTAGE 24

TABLE 1. WASTE MATERIAL PARAMETERS AND DESCRIPTIONS 25

TABLE 2. ESTIMATED WEIGHTS OF WASTE MATERIALS 26

TABLE 3. CONVERSION FACTORS AND EQUATIONS 26

TABLE 4. REFERENCE POINTS FOR 100% RTR COVERAGE OF WASTE DRUMS 27

TABLE 5. PROHIBITED ITEMS 27

ATTACHMENT 1 - DEFINITIONS 28

REVISION STATUS

Change Level	Date	Change Document	Pages	Description
F-3	07/06/2000	PACR 00-063	See Change Summary Sheet for affected pages and description	

1.0 PURPOSE AND SCOPE

This procedure provides instructions for the operation of the Drum Nondestructive Examination (NDE) systems. This scope includes:

- NDE for characterization of Transuranic (TRU) waste containers destined for shipment to the Waste Isolation Pilot Plant (WIPP) and,

- NDE of other waste containers for verification waste acceptance, and other non-WIPP related activities. Some TRU containers that are not being characterized for WIPP may go through NDE.

For TRU wastes the purpose of RTR is to verify the physical form matches the waste stream description, estimate waste material parameters, confirm Acceptable Knowledge and identify prohibited items.

Transuranic (TRU) waste drums destined for WIPP must comply with the Waste Acceptance Criteria for the Waste Isolation Pilot Plant (DOE/WIPP-069), and with the requirements contained in "TRUPACT-II Authorized Methods for Payload Control (TRAMPAC). This procedure implements the requirements of the Hanford Site Transuranic Waste Certification Plan, HNF-2600, and the Hanford Site Transuranic Waste Characterization Quality Assurance Project Plan, HNF-2599 for the certification of WIPP waste. These requirements are further implemented through the following administrative procedures:

WMH-400, section 1.2.1, "TRU Training and Qualification Plan"
WMH-400, section 1.2.2, "Qualification and Certification of NDE, NDA, and Visual Examination and Inspection and Test Personnel"
WMH-400, section 1.3.2, "TRU Non-Conforming Item Reporting and Control"
WMH-400, section 1.5.1, "TRU Records Management"
WMH-400, section 7.1.3, "TRU Waste Repackaging, Visual Examination, and Sampling"
WMH-400, section 7.1.7, "TRU Sampling and Container Management Activities"
WMP-350, section 2.3, "Data Management for NDE/NDA Results"

Radiography has been developed to aid in the examination and identification of containerized waste. There is no equivalent associated method found in EPA Sampling and Analysis guidance documents.

Waste containers not destined for WIPP must comply with HNF-EP-0063, Hanford Site Solid Waste Acceptance Criteria.

2.0 REFERENCES

The following are required to perform the procedure:

- WRP1-OP-0503, "Move Drums Throughout the WRAP Facility" *(For WIPP certification drums only)*

2.0 REFERENCES (Cont.)

- WRP1-OP-0904, "Operating and Emergency Procedure for the Philips 450-kV X-Ray Machine"
- WMP-350, WRAP Administrative Manual, Section 2.3, "Data Management for NDE/NDA Results" *(For WIPP certification drums only)*

3.0 PRECAUTIONS AND LIMITATIONS

This is NOT a "step sensitive" procedure.

The following restriction applies:

X-ray equipment should be operated in accordance with established As Low As Reasonably Achievable (ALARA) principles and practices.

4.0 SPECIAL TOOLS, EQUIPMENT, AND MATERIALS

None

5.0 PREREQUISITES

Training specifically required for WIPP waste container examination is described in: WMH-400, *Waste Isolation Pilot Plant (WIPP) Procedures*, Section 1.2.1, "TRU Training and Qualification Plan", and Section 1.2.2, "Qualification and Certification of Inspection and Test Personnel".

All personnel performing this procedure shall be qualified and trained in accordance with applicable WMP and site requirements; COGEMA-SVCP-PRC-014, "Qualification and Certification of Nondestructive Examination Personnel", and on-the-job training.

The X-Ray machine shall be started in accordance with WRP1-OP-0904.

For WIPP waste, Section 6.5, "Perform Independent Observation - WIPP Waste" and Section 6.6, "Perform Independent Replicate Examination - WIPP Waste" are performed by a qualified radiographer other than the individual who performed the first exam. At least one replicate and one independent observation must be performed per batch or per day, whichever is less frequent. The replicate and independent observation must NOT be performed on the same drum.

For WIPP waste, waste containers are to be characterized by radiography in testing batches. A testing batch can be up to 20 containers. The DOS will assign a testing batch number to a group of drums to be examined.

6.0 INSTRUCTIONS

NOTE

- Procedure steps which require assistance from other organizations in order to be completed, should be identified by one of the following indicators:

  (S) - Indicates step requires management support.

- When drum movement is accomplished in MANUAL mode, the PCS messages will not occur.

- Refer to Attachment 1, "Definitions" for an explanation of the various terms/limits used throughout this procedure. (i.e., layers of confinement, layers of packaging, etc.)

6.1 Preliminary Activities

6.1.1 **START UP** NDE console and X-Ray system in accordance with WRP1-OP-0904, "Operating and Emergency Procedure for the Philips 450-kV X-Ray Machine".

6.2 RTR Resolution Measurement

NOTE

- RTR resolution measurement is performed at the beginning of each work shift in each vault to be used. When examining waste containers for WIPP, the RTR resolution measurement is performed at the beginning of each work shift and at the start of each testing batch. A work shift is ended when shutdown activities are performed. A work shift can be up to 24 hours.

- RTR resolution is acceptable when the IQI is 2.0 lp/mm or better when viewed on the RTR television monitor. The RTR resolution measurement will be performed with the RTR's zoom lens at its maximum enlargement with the image intensifier set to the "CENTER" position and at normal image intensifier magnification.

6.2.1 **VERIFY** by Closed-Circuit Television (CCTV) that the X-ray vault is clear of personnel and the Image Quality Indicator (IQI) drum is in the NDE vault.

6.2.2 **CLOSE** door to vault.

6.2.3 **SET** X-ray machine to small focal spot, approximately 35 kV, and maximum mA with camera iris open, and at maximum zoom.

6.2.4 **ENERGIZE** X-ray machine to produce radiation.

6.2.5 **PERFORM** RTR resolution measurement to determine acceptability.

(S) a. IF the RTR resolution measurement is not within acceptable limits, THEN **STOP** and **NOTIFY** the DOS.

b. IF examining WIPP waste,

1. **GENERATE** the following on the RTR screen:

- testing batch number
- vault name
- time/date

2. **DISPLAY** the IQI.

3. **VERBALLY RECORD** the following on the videotape:

- testing batch number
- vault name
- RTR resolution measurement.

6.2.6 **TERMINATE** X-ray generation.

6.2.7 **RECORD** RTR resolution measurement in the RGD Operational/Daily Log.

6.3 LDA Acceptability Tests

6.3.1 **CHANGE** system's main control console from RTR mode to LDA mode of operation by selecting "EXTERNAL CONTROL" mode on LDA menu.

6.3.2 **EXECUTE** LDA "OFFSET" option by selecting "O" on LDA keyboard.

6.3.3 **ENERGIZE** X-ray machine to produce radiation.

6.3.4 **ANALYZE** LDA signal on the oscilloscope for LDA detection and resolution measurement.

NOTE

- LDA acceptablily tests are performed at the beginning of each work shift in each vault to be used.
- LDA resolution is acceptable when the element drop out indicated on the oscilloscope is less than 8 consecutive individual elements and less than 100 elements per detector.
- LDA detection is acceptable when the X-ray voltage setting is less than 210 kV when there is nothing in the radiation beam, the X-ray current is set to 4 milliamps and the LDA signal on the oscilloscope shows a minimum of 0.5 volts.

(S) a. IF the LDA detection or resolution measurement is NOT within acceptable limits, THEN, **STOP** and **NOTIFY** the DOS.

6.3.5 **TERMINATE** X-ray generation.

6.3.6 **RECORD** LDA acceptability on the RGD Operational/Daily Log.

6.3.7 **ESCAPE** from LDA "EXTERNAL CONTROL" mode.

6.3.8 **DEPRESS** "EXAM COMPLETE" button to remove the IQI drum from the vault.

6.4 Waste Drum Examination

6.4.1 **VERIFY** X-ray vault's interior is clear of personnel and drum is inside using CCTV.

6.4.2 **CLOSE** door to vault.

6.4.3 **SELECT** Data Management System (DMS) icon from the Real Time Applications Platform (RTAP) screen.

6.4.4 **LOG ON** DMS using your user name and password.

6.4.5 **REVIEW** DMS records for drum, as desired.

a. FROM MANUAL MODE,
SELECT drum PIN# from "LIST OF VALUES",
OR from AUTOMATIC MODE,
SELECT DMSS0201-NDE screen and indicate which drum vault (A or B) is in operation.

6.4.6 **ENERGIZE** X-ray machine to produce radiation.

6.4.7 **CENTER** the drum and **ZERO** the counter. (See Attachment 1 for definition of "Center")

6.4.8 **SELECT** from LDA menu "EXTERNAL CONTROL" mode.

6.4.9 IF necessary,
THEN, **EXECUTE** LDA "OFFSET" option by selecting "0" on LDA keyboard with X-ray machine OFF.

6.4.10 **ADJUST** controls to desired levels to scan drum without saturating LDA detectors (as indicated on LDA oscilloscope).

NOTE

The gain of the LDA detectors is normally set with nothing in the radiation beam. However, it may be desirable under certain circumstances (dense drums) to set the gain with the upper portion of the drum in the radiation beam.

6.4.11 IF necessary,
THEN, **EXECUTE** LDA "GAIN" option by selecting "G" on LDA keyboard.

6.4.12 **SCAN** drum by pressing "LDA SCAN" button on main control panel.

6.4.13 **TERMINATE** X-ray generation.

NOTE

The system will automatically rotate the drum 90 degrees if the "LDA SCAN" button is depressed twice.

6.4.14 **DISPLAY** LDA image on monitor,
AND **STORE** LDA image on optical disk.

a. FOR Verification waste containers and WIPP waste containers requiring NDE, **CONTINUE** with Step 6.4.15.

1. **COMPLETE** RTR examination and 2 LDA scans.
2. **GO TO** Step 6.4.22.

b. FOR WIPP waste containers which have completed VE and all other waste containers, REPEAT Steps 6.4.8 - 6.4.14 rotating drum 90 degrees.

1. **COMPLETE** two LDA scans.
2. **GO TO** Step 6.4.22.

6.4.15 **PLACE** main control console into RTR mode.

6.4.16 **GENERATE** drum number, vault name, and time/date using RTR image processor.

6.4.17 **ENERGIZE** X-ray machine.

6.4.18 **CENTER** the drum and **ZERO** the counter.

NOTE

Low density materials should be examined at lower voltage settings to improve contrast and image definition.

6.4.19 **PERFORM** examination using Table 4 reference points for 100% RTR coverage of waste drums.

- **JOG** the drum as necessary to check for liquids.
- **VARY** the X-ray machine voltage to optimize penetration through the waste.

6.4.20 **RECORD** waste descriptions on video tape as described in the section 6.7, "Data Recording - Non-WIPP", or section 6.8 "Data Recording - WIPP."

6.4.21 **REPEAT** Steps 6.4.8 through 6.4.14 rotating the drum 90 degrees.

6.4.22 **RECORD** results of examination as described in Section 6.7 or 6.8.

6.4.23 **INDICATE** to PCS that examination is complete by depressing the "EXAM COMPLETE" button on control console.

6.5 Perform Independent Observation - WIPP Waste

(S) 6.5.1 **PERFORM** an independent observation of a drum as directed by DOS. Review the Radiography Data Sheet, video tape and optical disk records previously created.

a. **RECORD** results of independent observation in Comments section of original Radiography Data Sheet. (FIGURE 1)

b. **SIGN** and **DATE** Radiography Data Sheet.

6.6 Perform Independent Replicate Examination - WIPP Waste

(S) 6.6.1 **PERFORM** an independent replicate examination of a drum as directed by DOS. DO NOT review previously created records.
REPEAT section 6.4 Waste Drum Examination.

a. **RECORD** the results of the replicate exam on a separate Radiography Data Sheet. (FIGURE 1)

6.7 Data Recording And Notifications - Non-WIPP Waste

6.7.1 From **DMSS0201 - NDE** screen, **PERFORM** the following:

a. **SELECT** "Vault A" or "Vault B".

b. **ENSURE** the following data fields are complete:

- Outer PIN
- Gross Wt.
- Date/Time
- Operator
- Vault
- Disk: File A, File B, Number
- Video: Number, Start
- Comments: (e.g., "LDA scan only" when appropriate)
- Volume Utilization % (when appropriate)

6.7.2 IF examining Verification waste,

a. **RECORD** information on Verification Checklist. (Figure 2)

b. **RECORD** a visual inventory of waste container contents on the videotape.

NOTE

- Provide DOS with any available pertinent information. This information may include the discovery of liquids, the estimated volume of liquids, or any additional information about known hazardous materials present in the container that would aid in the proper management of the material.
- DOS will notify Facility Manager, FQAO, ECO/STD and initiate NCR's as appropriate.

6.7.3 **NOTIFY** the DOS via the Control Room Operator if ANY of the following conditions exist:

- The drum appears to have questionable structural integrity,
- The drum appears to contain any flammable/hazardous materials which do NOT match the Contents Inventory Sheet,
- The drum appears to NOT comply with the waste acceptance criteria as determined by Generator Waste Acceptance Services.

6.8 Data Recording And Notifications - WIPP Waste

NOTE

Radiography and/or visual examination are used to examine every waste container.

6.8.1 Waste drums which have completed visual examination.

a. **ESTIMATE** volume utilization (VUP) of the waste.

1. **RECORD** this VUP on the following:

- DMS NDE Record
- WCMT.

b. From **DMSS0201 - NDE** screen, **PERFORM** the following:

1. **SELECT** "Vault A" or "Vault B".

2. **ENSURE** the following data fields are complete:

- Outer PIN
- Gross Wt.
- Date/Time
- Operator
- Vault
- Disk: File A, File B, Number
- Comments: (e.g., "LDA scan only")
- Volume Utilization %

NOTE

- For WIPP TRU waste, radiography is used to confirm the waste stream and to determine the waste material parameter weights.
- The presence of an identified horsetail/tape wrap at the top of a drum indicates a layer of confinement, and is considered a layer of packaging.
- A complete radiography examination is defined as using RTR to review the entire contents of the waste container from top to bottom at the increments defined in Table 4. At each of the 9 increments defined in Table 4, the scan is rotated 360 degrees to provide complete coverage of the drum. During each rotation the container is jogged by starting and stopping the turntable/dolly to look for wave motion, a sign that liquids are present. Voltage may be varied to optimize penetration through the waste.
- Radiography information is used to confirm acceptable knowledge (AK). For example, AK documents an empty lead pig is present in the drum. RTR confirms the lead pig is in the drum but can not penetrate the interior of the pig. Since AK identified the lead pig is empty, this is considered a complete examination. In another example, AK does not document lead in the drum. RTR identifies a lead shielded inner container and can not penetrate the interior of the container. This is considered an incomplete examination because AK was not confirmed and the interior of the shielded container can not be determined. Some areas of a drum may be too dense to RTR. These drums may be considered completely examined if the AK can be confirmed (e.g., a motor housing identified by AK is confirmed in the drum even if RTR can not see the interior of the housing).
- Containers of high density waste (e.g., leaded rubber, cemented sludges) can only be examined at their edges. In addition to this limitation, waste containers that are configured with a lead liner cannot be examined using radiography. Sites that are unable to radiographically examine a waste container due to the presence of a lead liner must visually examine the contents of these waste containers to confirm the waste stream and determine the waste material parameter weights.

6.8.2 For waste drums requiring radiography examination:

a. **OBTAIN** Testing Batch Data Report Cover Sheet (WMP-350, Section 2.3) and WIPP AK package from the DOS or designee.

b. **VERIFY** that the testing batch number, vault name, and RTR resolution measurement are visually and verbally recorded on the videotape at the start of each testing batch and each work shift.

c. **RECORD**, both verbally and visually on the video tape, each container ID and inventory of contents, including any identified prohibited items (TABLE 5), a description of identifiable waste items, residual materials, packaging materials, and/or waste material parameters.

d. **RECORD** the following from RGD Operational/Daily Log onto the Radiography Data Sheet (RDS) (Figure 1).:

- RTR resolution acceptability.
- LDA detection and resolution acceptability

e. **RECORD** the waste stream, WMC (Waste Matrix Code), WMCG, and TRUCON code from the AK package onto the RDS.

f. **VERIFY** the following, based on the RTR and LDA images:

1. The waste in the container is in agreement with the waste stream, WMC, WMCG, and TRUCON code.

(i) IF any discrepancy exists,
THEN, **CHECK** "NO",
AND **ENTER** this discrepancy in the COMMENTS block on the Radiography Data Sheet and the WCMT.

g. **DETERMINE** the following:

1. IF a 90-ml liner is present,
THEN, **SPECIFY** whether or not it is punctured or vented in the Comments section.

2. IF the head space gas volume (HGV)
(see Attachment 1) is less than 5 percent,
THEN, **ESTIMATE** the available HGV by reviewing the LDA scans
AND **RECORD** the HGV in comments/results block in NDE Data section of the WCMT.

h. **ESTIMATE** the volume utilization percentage (VUP) of the waste in the drum. (See Figure 3).

1. **RECORD** this VUP on the FOLLOWING:

- DMS NDE Record
- WCMT
- RDS

i. **IDENTIFY** any prohibited items (Table 5).

1. **DESCRIBE** the items including amounts/volumes and locations on the "Prohibited Items" section of Figure 1 and the COMMENTS/CONTENTS section of the Radiography Data Sheet.

2. **NOTE** on the NDE section of the WCMT that there is a prohibited item.

NOTE

Asbestos is not considered a prohibited item, but is currently prohibited from disposal at the WIPP site by the State of New Mexico.

j. **IDENTIFY** any asbestos
AND **RECORD** estimated weight in the Comments section of the Radiography Data Sheet.

k. **RECORD** "Gross Weight of Drum" from the TRU WASTE CONTAINER DESCRIPTION DATA SHEET. (Refer to WRP1-OP-0503, "Move Drums Throughout the WRAP Facility)

l. **ESTIMATE**, based on the RTR and LDA images, weights for the waste material parameters. (TABLES 1 - 3)

1. **ENSURE** the sum of the estimated weights equals the gross weight.

m. **RECORD** a brief and concise physical description of the drum contents in COMMENTS block to include waste items, residual materials and packaging materials.

n. **COMPLETE** remaining blocks on Radiography Data Sheet,
AND **SIGN** and **DATE**.

o. From **DMSS0201-NDE** screen, **PERFORM** the following:

1. **SELECT** "Vault A" or "Vault B".

2. **ENSURE** the following data fields are complete:

- Outer PIN
- Gross Wt.
- Date/Time
- Operator
- Vault
- Batch
- Disk: File A, File B, Number
- Video: Number, Start
- Comments: (Identify prohibited items)
- Volume Utilization %

NOTE

- Provide DOS with any available pertinent information when making notifications. This information may include the discovery of liquids, the estimated volume of liquids, or any additional information about known hazardous materials present in the container that would aid in the proper management of the material. The DOS must operate WRAP within the bounds of the Facility Authorization Basis and Permits.
- DOS will notify Facility Manager, FQAO, ECO/STD and initiate NCR's as appropriate.

6.8.3 **NOTIFY** the DOS via the Control Room Operator if ANY of the following conditions exist:

- The drum cannot be completely examined,
- The drum appears to contain a 90-ml liner which is NOT vented (see Attachment 1 - Definitions),
- The drum appears to have questionable structural integrity,
- The drum appears to contain any flammable/hazardous materials which do NOT match waste stream description,
- The drum appears to contain any prohibited items,
- The drum appears to NOT comply with the waste stream description.

6.9 Shutdown Activities

6.9.1 **SHUT DOWN** X-ray machine and NDE console, per WRP1-OP-0904, "Operating and Emergency Procedure for the Philips 450-kV X-Ray Machine".

6.9.2 **LOG OFF** DMS and PCS.

6.9.3 **DE-ENERGIZE** PCS terminal.

6.9.4 **DISPOSE** of NDE records as directed in Section 7.0.

6.9.5 **RETURN** keys to DOS or key cabinet.

6.10 Optical Disks

NOTE

- Optical disks are used to store the x-ray images created by the LDA system. Two images are saved for each drum showing a 0 and a 90 degree aspect.
- The WIPP optical disks will be numbered separately from the non-WIPP optical disks.
- Before an optical disk is placed into service, it must be formatted and scanned for bad sectors.

6.10.1 Formatting

a. **EXIT** to DOS. **PERFORM** the following steps for side A AND **REPEAT** for side B.

1. At the "C:\>" prompt,
   ENTER "CD_EZSCSI"

2. At the "C:\EZSCSI>" prompt,
   ENTER "AFDISK"

3. HA-Target 3 MAXOTIXT4-1300 (ENTER)

4. This disk unformatted (ESC)

5. Select Format Option: "OS/2 floppy format" (ENTER)

6. At the "**CREATE** Floppy Format" prompt,
   ENTER "Yes"

7. At the "EXIT AF Disk" prompt,
   ENTER "Yes"

8. **REBOOT** the system to **SAVE** changes.

6.10.2 Scanning for Bad Sectors

a. **EXIT** to DOS. **PERFORM** the following steps for side A AND **REPEAT** for side B.

b. C:\>SCANDISK_D: (ENTER)

c. Surface Scan "Yes" (ENTER)

6.10.3 Viewing Directory

a. **VIEW** files on the optical disk by **EXITING** to DOS and **TYPING** the following:

- dir_d: (ENTER)
- dir_d:/P (ENTER)

6.10.4 Labeling WIPP Disks

a. **NUMBER** the disks as follows: TRU-D-01, TRU-D-02, TRU-D-03, etc.

NOTE

The file names are "T_ _ 0" and "T_ _ 90" for the 0 and 90 degree images respectively. The files for the first pair of images on the disk are T010 and T0190, the second pair are T020 and T0290, the third pair are T030 and T0390, etc. For each new disk, the file names are repeated starting with T010 and T0190.

6.10.5 Labeling One Trip Drum and Verification Disks

a. **NUMBER** the disks 1, 2, 3, ... 99, 100, etc.

NOTE

- The disks contain both One Trip Drum and Verification images.
- The file names for One Trip Drums are "O_ _ 0" and "O_ _ 90" for the 0 and 90 degree images respectively. The files for the first pair of One Trip Drum images on the disk are O010 and O0190, the second are O020 and O0290, the third are O030 and O0390, etc. For each new disk, the file names are repeated starting with O010 and O0190.
- The file names for Verification are "V_ _ 0" and "V_ _ 90" for the 0 and 90 degree images respectively. The files for the first pair of images on the disk are V010 and V0190, the second are V020 and V0290, the third drum are V030 and V0390, etc. For each new disk, the file names are repeated starting with V010 and V0190.

6.11 Video Tapes

NOTE

- The WIPP waste video tapes will be numbered separately from the non-WIPP video tapes.

6.11.1 WIPP video tapes

a. **ENSURE** that the tapes to be used are SVHS.

b. **ENSURE** that the tape machine is set to record in SVHS and in SP speed.

c. **NUMBER** the tapes as follows: TRU01 and continue sequentially. (i.e. TRU01, TRU02, TRU03... TRU99, TRU100, etc.)

6.11.2 Verification video tapes (may or may not be SVHS)

a. **NUMBER** the tapes as follows: W (for WRAP), followed by a letter to indicate waste drums or boxes (D for drums, B for boxes) followed by three digits. The first tapes shall be WD001, WD002, WB003, etc.

7.0 RECORDS

7.1 The following records are maintained for waste that is not processed for disposal at WIPP:

- Non-WIPP Waste Verification Checklists
- Non-WIPP Waste video tapes
- Non-WIPP Optical Disks

7.2 The following record contains both WIPP and non-WIPP operational data. However, it is not maintained as a TRU Project quality record.

- Radiation Generating Device (RGD) Daily Logs

7.3 The following records will become QA records for the TRU Waste Certification Project as shown in WMH-400, Section 1.5.1. These will be considered in-process records until completed:

- Radiography Data Sheet will be provided to the facility records management specialist and included in the NDE Testing Batch Data Report as shown in WMP-350, Section 2.3, "Data Management for NDE/NDA Results".

- The original and one copy of the WIPP video tapes will be provided to the facility records management specialist when completed. These tapes will be provided to the TRU Project records custodian, and will be maintained as non-permanent QA records, per WMH-400, Section 1.5.1.

- The WCMT will be retained in the AK packages which accompany the waste container until processing is complete as shown in WMH-400, Section 7.1.7.

- The original and one copy of the WIPP optical disks will be provided to the facility records management specialist when completed. These disks will be provided to the TRU Project records custodian, and will be maintained as non-permanent QA records, per WMH-400, Section 1.5.1.

FIGURE 1. RADIOGRAPHY DATA SHEET (Page 1 of 2)

Testing Batch No:	Waste Container ID:	Independent Replicate Scan: Yes:_____ No:_____
Vault: A:_____ B:_____	RTR Resolution Acceptable: Yes:_____ No:_____	Tape Number:_____ Tape Start Time:_____
LDA Detection and Resolution Acceptable: Yes:_____ No:_____		Optical Disk:_____ Disk Files:_____

Waste Stream: _____	WMCG: _____	WMC: _____	TRUCON Code: _____	Does Container Match Waste Stream?: Yes:_____ No:_____
90-mil Liner Present: Yes:_____ No:_____	Horsetail Present: Yes:_____ No:_____		Estimate Volume Utilization %: _____	

Prohibited Items (If Detected)	Waste Material Parameters	Gross Weight of Drum: _____ kg Total Est. Weight (kg)
	1. Steel (packaging materials)	
	2 Plastics (packaging materials)	
	3. Iron-based Metals/Alloys	
	4. Other Inorganic Materials	
	5. Aluminum-based Metals/Alloys	
	6. Other Metals	
	7. Cellulosics	
	8. Soils	
	9. Organic Matrix	
	10. Inorganic Matrix	
	11. Rubber	
	12. Plastics (waste materials)	

FIGURE 1. RADIOGRAPHY DATA SHEET

(Page 2 of 2)

Testing Batch:	Waste Container ID:

Layers of Confinement:

HGV: Comment required on the WCMT? ☐ Yes ☐ No

Comments/Contents:

NDE Technician's Signature: Date:

Independent Observer's Signature: Date:
(If Applicable)

FIGURE 2. EXAMPLE NON-WIPP WASTE VERIFICATION CHECKLIST

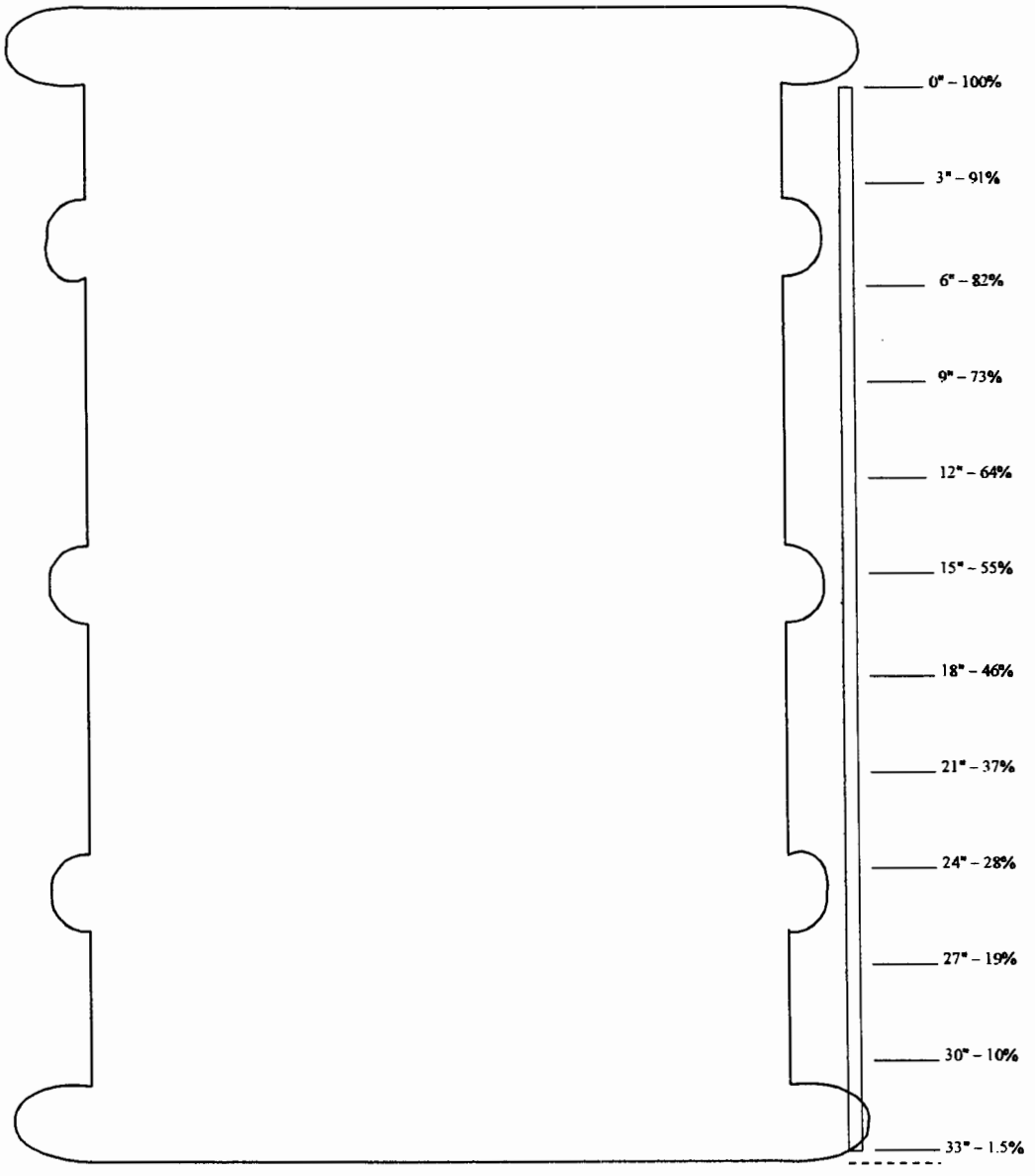
VERIFICATION CHECKLIST		
Container PIN/CIN:		Container Weight:
RTR Operator:		Date:
Optical Disk No.:	File Name:	Tape Number:

NDE EVALUATION			
QUESTION	YES	NO	COMMENTS
1. Is a 90 mil liner present?			Horsetailed? Yes ☐ No ☐
2. Level where waste begins?	N/A		_____ Inches
3. Any Liquid Observed?			Amount?
3A. Containerized?			Container?
4. Any Dense Objects? (i.e. lead, batteries, etc.)			
5. Any Pressurized Containers?			
6. Any sharp, non-padded items?			
7. Any HEPAS present? (mask filters, metal/wood frame)			
8. Absorbent at drum bottom? (CONWEB™ pads, Kitty litter)			

Comments:_____

Is there general agreement between RTR and CIS?	Yes _____	No _____	Signed:_____

FIGURE 3. VOLUME UTILIZATION PERCENTAGE



Volume utilization percentage based on highest point of waste in drum.

Drum liners (i.e. 90-ml, 10-ml, etc.) are NOT considered waste.

TABLE 1. WASTE MATERIAL PARAMETERS AND DESCRIPTIONS

Number	Waste Material Parameter	Description
1	Steel (packaging materials)	208-liter (55-gal.) drums
2	Plastics (packaging materials)	90-mil polyethylene drum liner and plastic bags
3	Iron-based Metals/Alloys	Iron and steel alloys in the waste; does not include the waste container materials
4	Other Inorganic Materials	Nonmetallic inorganic waste including concrete, glass, firebrick, ceramics, sand, and inorganic sorbents
5	Aluminum-based Metals/Alloys	Aluminum or aluminum-based alloys in the waste materials
6	Other Metals	All other metals found in the waste materials
7	Cellulosics	Materials generally derived from high polymer plant carbohydrates; (e.g., paper, cardboard, wood, cloth)
8	Soils	Generally consists of naturally occurring soils which have been contaminated with inorganic waste materials
9	Organic Matrix	Cemented organic resins, solidified organic liquids, and sludges
10	Inorganic Matrix	Any homogeneous materials consisting of sludge, or aqueous-based liquids which are solidified with cement, calcium silicate, or other solidification agents; (e.g., waste water treatment sludge, cemented aqueous liquids, and inorganic particulates)
11	Rubber	Natural or man-made elastic Latex materials; (e.g., surgeons' gloves, leaded rubber gloves)
12	Plastics (waste materials)	Generally man-made materials, often derived from petroleum feedstock; (e.g., polyethylene, polyvinyl chloride)

Source: *Transuranic Waste Baseline Inventory Report* (DOE 1995e)

Note: Vitrified and cement waste is also determined and reported in the most current version of the *Transuranic Waste Baseline Inventory Report*. Initial waste streams for WRAP do not contain these waste materials.

TABLE 2. ESTIMATED WEIGHTS OF WASTE MATERIALS

85-Gallon Drum	35 kg
55-Gallon Drum	29 kg
Nominal 10-ml Liner	.4 kg
1-lead impregnated glove	.75 kg
1-"O" Ring for lead impregnated glove	.05 kg
1-plastic port bag	.54 kg
1-Glovebox Port Plastic Ring	.1 kg
1-slip lid can	.10 kg
1-hypolon glove	.40 kg
90-ml Liner	7.3 kg
1-inch Kitty Litter at Drum Bottom	2.4 kg
2-lb coffee can of cleanup IV	1.2 kg
1-pair coveralls	.96 kg
1-rubber bag cord	.02 kg
1-ounce Glass Bottle	17 g
8-ounce Plastic Bottle	30 g
1-Gallon Glass Bottle	1.3 kg
1-Gallon Plastic Bottle	.43 kg

TABLE 3. CONVERSION FACTORS AND EQUATIONS

Weight of Clean Up IV = weight of kitty litter x 1.38

$$\text{Volume (in}^3\text{)} = \frac{\pi D^2}{4} \text{ X Height}$$

V x .554 = fluid oz. (where V is measured in inches3)

128 fluid oz = 1-gal

4-liters = 1.06-gal

1-liter = 0.27-gal

1-lb = 0.45 kg

Images on LDA monitor can be measured and converted to actual size by multiplying by 2.3 (scale conversion factor).

TABLE 4. REFERENCE POINTS FOR 100% RTR COVERAGE OF WASTE DRUMS

View	Y-Axis
0 - 2.5"	00.00
2.5 - 7.0"	4.50
7.0 - 11.5"	9.00
11.5 - 16.0"	13.50
16.0 - 20.5"	18.00
20.5 - 25.0"	22.50
25.0 - 29.5"	27.00
29.5 - 34.0"	31.50
Bottom	Across Bottom

Y-axis tolerance = ± 0.10

TABLE 5. PROHIBITED ITEMS

Pressurized containers (e.g., aerosol cans)
Compressed gasses
Sealed Containers (> 4 liters)
Corrosives
Ignitables
Pyrophorics
Explosives
Reactive Waste
PCB concentrations equal to or greater than 50 ppm
Non-TRU hazardous wastes
Residual Liquids If:
- > 2 liters in 55-gal drum (>1% Volume of any payload container)
- > 1 inch in the bottom of any internal container (in its normal operating orientation)

Reference: WMH-400, Section 7.1.3

ATTACHMENT 1 - DEFINITIONS

AK Package = Acceptable Knowledge Package - documentation including WCMT which accompanies each waste container through processing.

Center - positioning the 55-gal drum in the vault such that the drum bolt is as close as possible to the Image Intensifier, and that the top of drum lid is centered in the image displayed on the RTR monitor.

Debris - is defined as waste that contains at least 50% by volume debris materials that are greater than the 60 mm particle size, and may include inorganic debris, metal debris, concrete, glass, ceramic/brick, rock, asbestos, graphite, organic debris, plastic/rubber, leaded gloves, lead items, paper/cloth, wood, electronic equipment, and soil/gravel. An individual container may contain any percentage of the above constituents as long as it meets the definition of debris.
DOS - Duty Operations Supervisor

Headspace Gas Volume (HGV) - the space between the drum and the outside layer of confinement (typically the drum liner).

Independent Observation - must be performed on one examination per testing batch, or once per day, whichever is less frequent. Independent Observation is to be performed by a qualified radiographer other than the individual who performed the first examination. The replicate and independent observation must not be performed on the same drum.

Independent Replicate Examination - performed on one waste container per testing batch, or once per day, whichever is less frequent. Management will determine which drum is to be reexamined. Replicate examination is to be performed by a qualified radiographer other than the individual who performed the first examination. The replicate and independent observation must not be performed on the same drum.

IQI - Image Quality Indicator; a converging lines-paired gauge used to quantify X-ray system resolution.

Layers of Confinement - defined, per the Safety Analysis Report (SAR) for the TRUPACT-II Shipping Package, as any plastic bag containing waste which is closed with one of the following closure methods:

1. Twist and tape closure
2. Fold and tape closure
3. Heat-seal closure or twist and tape closure with a minimum of one filter vent.

Layers of Packaging - are the steel drum and the layers of plastic packaging materials, 90-mil polyethylene drum liner and plastic drum liner bags. (Reference: TABLE 1)

LDA - Linear Diode Array; an x-ray imaging chain which uses a solid-state scintillator to convert X-rays to light photons, which are converted to digital signals and displayed on a high-resolution computer monitor, resulting in a still-life x-ray image.

NDA - Non-Destructive Assay

NDE - Non-Destructive Examination

ATTACHMENT 1 - DEFINITIONS (CONT.)

RH 225I - is a TRUCON code where the layers of confinement are a maximum of 6 plastic bag layers, one of which may or may not be a liner bag. A liner bag is not required.

RTR - Real-Time Radiography; an x-ray imaging chain which uses an image intensifier to convert the X-rays to visible light, which is viewed by a television camera and displayed on a television monitor, resulting in a moving x-ray image.

Sealed Container - **ANY** sealed container less than or equal to 4 L is acceptable without regard to rolled seams, tape or any other closure mechanism. Any roll seamed can (e.g., soup can) is **NOT** acceptable if greater than 4 L in size. Any press fit lid can (e.g., standard 1-gal paint can) is acceptable, regardless of size, **IF** the lid seam is not taped. If the lid is taped, the can cannot exceed 4 L in size. Any slip lid can (i.e., lid slips over outside of the can like a humidor or can of snuff) is acceptable, regardless of size, if the seam is not taped. If the lid seam is taped, the can cannot exceed 4 L in size. Any metal, plastic or glass bottles/containers with a screwed cap or lid greater than 4 L is **NOT** acceptable. A section of pipe with the ends completely taped that exceeds an internal volume of 4 L is **NOT** considered a sealed container.

Testing Batch - For WIPP waste, waste containers are to be characterized by radiography in testing batches. A testing batch can be up to 20 containers. The DOS will assign a testing batch number to a group of drums to be examined.

TRUPACT-II Content Codes (TRUCON) - a content code that is uniform and catalogs site-specific transportation parameters information (e.g., generating processes and packaging procedures) for CH-TRU waste generated by DOE sites.

TRUCON Code = for waste stream NPFPD the TRUCON code is RH225I.

Volume Utilization Percentage (VUP) - Volume Utilization Percentage is based on highest point of waste in drum. Drum liners (i.e., 90-mil, 10-mil, etc.) are NOT considered waste. (See Figure 3)

Waste Matrix Code Groups (WMCG)- Waste streams are grouped by Waste Matrix Code Groups related to the physical and chemical properties of the waste. There are eleven (11) waste matrix code groups defined in the QAPjP. (e.g., WMCG for the NPFPD waste stream is heterogeneous debris)

Waste Stream = Non-mixed Plutonium Finishing Plant Debris (NPFPD) is the first waste stream to be examined by WRAP.

WCMT - Waste Container Management Traveler

WIPP - Waste Isolation Pilot Project

WMC - Waste Matrix Code (e.g., WMC for Waste Stream NPFPD is S5490)

Work Shift - A work shift is ended when shutdown activities are performed. A work shift can be up to 24 hours.

WRAP - Waste Receiving and Processing Facility

ATTACHMENT 1 - DEFINITIONS (CONT.)

90-Mil liner venting - Typically 90-mil liners have a nominal 1-inch diameter hole in the lid of the liner. If NDE verifies that this hole is capped or plugged with a plastic insert, then the 90-mil liner is considered NOT vented. If AK indicates the 90-mil liner is vented and/or NDE verifies that the hole in the inner lid is not capped or plugged, then the 90-mil liner is considered to be vented. Any hole in the liner or liner lid greater than 0.3-inch diameter is considered to be vented. 90-mil liners are considered packaging for waste material parameter purposes whether they are vented, unvented, with or without a lid.