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CCP-TP-147

Revision 1

CCP
Operation of the Drum Nondestructive Examination Systems at Waste Receiving and Processing (WRAP) Facility

EFFECTIVE DATE: 03/09/2011

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APPROVED FOR USE

RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	01/06/2010	Initial issue.
1	03/09/2011	Revised to clarify procedural steps.

TABLE OF CONTENTS

LIST OF TABLES

1.0 PURPOSE

The purpose of this procedure is to provide instructions for safe operations of the Drum Nondestructive Examination (NDE) systems at the Waste Receiving and Processing (WRAP) Facility. This procedure is used in conjunction with CCP-TP-053, *CCP Standard Real-Time Radiography (RTR) Inspection Procedure*, for performing certified scanning of waste containers.

1.1 Scope

This procedure applies to the operation of the WRAP Drum NDE systems. Maintenance activities are outside the scope of this procedure.

2.0 REQUIREMENTS

2.1 References

Baseline Documents

- WRP1-OP-0904, *Operation and Emergency Procedure for the 450 kV X-Ray Machine*
- WRP1-OP-0908, *Operation of the Drum Nondestructive Examination System*

Referenced Documents

- CCP-QP-002, *CCP Training and Qualification Plan*
- CCP-QP-008, *CCP Records Management*
- CCP-PO-005, *CCP Conduct of Operations*
- CCP-TP-053, *CCP Standard Real-Time Radiography (RTR) Inspection Procedure*

2.2 Training Requirements

2.2.1 Personnel performing this procedure will be trained and qualified in accordance with CCP-QP-002, *CCP Training and Qualification Plan,* prior to performing this procedure.

2.3 Equipment List

- RTR System
- NDE Operational Logbook
- Personal Protective Equipment (PPE)

NOTE

WRAP Facility documents use “NDE” to designate the subject equipment. Central Characterization Project (CCP) documents refer to this class of equipment as “RTR.” For the purposes of this procedure, the terms are equivalent.

2.4 Software

2.4.1 None.

2.5 Precautions and Limitations

2.5.1 **IF** during the course of performing this procedure a change occurs that causes deviation from the normal process, **AND** this condition CAN **NOT** be corrected as directed by this procedure,
THEN the RTR Operators shall IMMEDIATELY STOP WORK, **AND** notify the Vendor Project Manager (VPM) and the RTR Lead Operator (LO) or designee.

2.5.2 The drum x-ray vaults are a restricted access area. The vaults are monitored by in-vault closed-circuit television (CCTV) cameras. The vaults are posted inside with “Radiation Generating Device: High Intensity Radiation When Red Light Is On” signs.

2.5.3 **IF** this procedure CAN **NOT** be implemented as written,
THEN the RTR personnel shall notify appropriate supervisors.

2.5.4 **IF** it is determined that a portion of the work CAN **NOT** be accomplished as described in this procedure, or would result in an undesirable situation,
THEN work shall be STOPPED. Work will **NOT** be resumed until this procedure is modified or replaced by a new document that allows for safe, compliant operations.

2.5.5 Prohibited items discovered within the contents of a waste container during the radiography process must be rejected by RTR Operators. Notification to the Duty Operations Supervisor (DOS) and generation of two Linear Diode Array (LDA) Scans will be performed PRIOR to removal of the waste container from the vault.

2.5.6 Personnel who will be working in a radiation area must have met the Host site requirements prior to entering the area.

2.6 Prerequisite Actions

2.6.1 Conduct a safety walk-down of the work area, **AND** record results in the NDE Operational Logbook at the beginning of each shift.

2.6.2 Verify the RTR Lead Operator and the RTR Operator’s qualifications are current.

2.6.3 Confirm WRAP Facility is in Operation mode.

2.7 Definitions

2.7.1 None.

3.0 RESPONSIBILITIES

3.1 RTR Operator

3.1.1 Operates the RTR system.

3.1.2 Maintains the NDE Operational Logbook.

3.2 RTR Lead Operator (LO)

3.2.1 Ensures the technical quality in all aspects of the RTR examination process.

3.2.2 Ensures RTR Operators are trained and qualified in accordance with CCP-QP-002.

3.2.3 Ensures trainees are under direct supervision of the qualified Subject Matter Expert (SME)/On-the-job training (OJT) Instructor in accordance with CCP-PO-005, *CCP Conduct of Operations.*

3.3 Radiological Control Technician (RCT)

3.3.1 Conducts radiological surveys to verify radiation and contamination levels are maintained in accordance with facility requirements.

3.4 Vendor Project Manager (VPM)

3.4.1 Monitors the List of Qualified Individuals (LOQI) daily to confirm that only qualified personnel perform waste characterization.

4.0 PROCEDURE

NOTE
The DOS shall control the x-ray machine and console keys.

4.1 RTR System Startup

4.1.1 Obtain NDE Console and x-ray keys from DOS, **AND** sign key log.

NOTE
DO NOT operate x-ray vault unless a current copy of "6-month Radiation Generating Device (RGD) Interlock Checklist" and a survey report are provided by host site. Any notification to DOS may be made through the dispatch operator.

4.1.2 Verify that a current copy of "6-month Radiation Generating Device (RGD) Interlock Checklist" and a survey report are in the x-ray Unit A/B/BOX Logbook, provided by host site facility.

4.1.3 **IF** inspection/surveys are not current or are not in the x-ray Unit A/B/BOX Logbook,
THEN NOTIFY the DOS.

4.1.4 Energize NDE Console by inserting the Console key into the Control Panel key switch on the left side of the NDE control room console, **AND** turn the switch to the ON position.

4.1.5 Ensure power light is on.

4.1.6 Ensure RTR computer main power (momentary) switch is on.

4.1.7 Select "Nexus 200" icon on RTR computer monitor desktop, if needed.

4.1.8 Enter system Password, **AND** Select "OK," if needed.

4.1.9 Verify NO personnel are in the x-ray vault.

4.1.10 Activate main switch on control panel by inserting the x-ray key into the x-ray key switch, **AND** turn the key to the right to the vertical position “~”.

NOTE
Lift Table Reset button on the NDE Console should remain in the up position.

NOTE
The vertical key position is a "standby" position that allows tube cooling and removal of the key. The white main lamp will illuminate, and the kilovolt (kV), milliamp (mA), and time indicator lights will indicate "0000."

4.1.11 Set main switch to high voltage position by turning x-ray key switch to the right to the horizontal position.

4.1.12 Select appropriate warm-up program from Table 1, Warm-Up Program.

Table 1. Warm-Up Program

Period of Non-Operation Warm-Up Program	Number
1 - 3 Days	101
3 - 14 Days	102
More than 14 days or new tubes	103

4.1.13 Enter Warm-up Program Number using key pad.

4.1.14 Record Warm-up Number in NDE Operational Logbook and provide to DOS for Radiation Generating Device (RGD) Operational/Daily Log.

4.1.15 **IF** RTR Operator encounters any safety related operational or interlock problems,
THEN the RTR Unit shall NOT be operated, **AND** the DOS and VPM shall be notified immediately.

4.1.16 Close x-ray tube shutters and image intensifier (II) shutters to protect II from receiving unnecessary radiation.

4.1.17 Verify RTR monitor displays Nexus 200 LIVE DISPLAY window.

NOTE

When the x-ray machine is energized there is a 20-second delay before the production of x-rays. This delay is called the pre-warning time. During the pre-warning time the following signals are activated:

- Flashing yellow lights inside and on the roof of the respective vault
- An audible alarm inside the vault will sound
- The blue pre-warning lamp on the x-ray control panel (MGC-30) will illuminate.

Upon completion of the pre-warning time:

- X-ray production will begin
- Blue pre-warning lamp and flashing yellow lights will extinguish
- Audible alarm will silence
- Flashing Red warning lamp on the x-ray console will illuminate
- Flashing Red lights inside and on the roof of the vault will illuminate
- Exterior “X-RAY ON” light will illuminate.

4.1.18 Energize high voltage by pressing the black ON button to begin the warm-up cycle.

4.1.19 Record status of the 20-second pre-warning audible alarm, visual indicators, and x-ray ON warning signals in the NDE Operational Logbook.

4.1.20 Verify the kV and the mA displays start indicating voltage and current as the warm-up cycle progresses.

NOTE

- Upon completion of warm-up cycle, the high voltage is switched off automatically and keypad indicator will show "000."
- The x-ray system is now ready for normal manual operation.

4.1.21 Record the completion of the warm-up cycle in the NDE Operational Logbook.

4.1.22 Open the x-ray tube shutters and II shutters.

NOTE

An Image Quality Indicator container is provided by host site and must be run each day prior to RTR characterization.

4.1.23 Re-energize RTR unit and perform Image Test per CCP-TP-053.

4.2 RTR Operation

4.2.1 Loading Containers

[A] Open the x-ray vault door using the EXAMINATION COMPLETE button on the NDE Control Panel.

[B] Verify x-ray vault is not occupied using the CCTV.

[C] Request host site personnel to load container into the x-ray vault via dispatch.

[D] Verify x-ray vault door is closed using visual on the CCTV.

4.2.2 Container Scanning

[A] Record operations start time in NDE Operational Logbook.

[B] Ensure x-ray vault is not occupied using appropriate CCTV.

[C] Ensure x-ray vault door is in closed position and all safety interlocks are satisfied by observing green interlock light on x-ray control console.

[D] Press the black ON button to start the x-ray system.

[E] Select desired kV, mA, time (normally set to infinity), and focal spot size prior to energizing x-ray machine's high voltage.

NOTE

The RTR Operator may vary the kV and mA settings to obtain optimal results between 50kV and 450kV. The maximum of 450kV and 15mA SHALL NOT be exceeded.

[F] Move the container in the desired direction using the turntable joystick on the NDE Console to make a detailed inspection.

[G] Perform the RTR examination in accordance with CCP-TP-053.

[H] Push the red OFF button on the Console once the desired x-ray inspection is complete.

4.2.3 Unloading Container

[A] Open the x-ray vault using the EXAMINATION COMPLETE button on the NDE Control Panel while maintaining visual on the CCTV.

[B] Request host site personnel to unload container drum from the vault.

[C] **IF** additional container(s) are to be examined, **THEN** return to step 4.2.1 [A], **ELSE** request Host Site Personnel load image quality indicator container.

4.3 LDA Image Acquisition, as required by host site

NOTE

CCP RTR personnel will notify DOS when the following items or conditions are identified:

- Liquid
- Pyrophorics
- Non-mixed hazardous waste
- Incompatibles
- Compressed gasses, explosives
- Unauthorized polychlorinated biphenyls (PCBs)
- Ignitables
- Corrosives
- Reactives
- Certified Waste Stream Profile Form not available
- Visual examination (VE) or RTR of a statistically representative subpopulation not available
- Unvented 90 mil liner
- Gasket placement or integrity concern
- Structural integrity concern
- Does not meet waste stream description
- Impenetrable object

Once the notification requirement has been accomplished, an LDA scan will be generated and made available to the DOS.

4.3.1 Go to LDA mode by selecting "To LDA" button.

4.3.2 **IF** calibration has been performed during current shift, **THEN** energize RTR unit and go to step 4.3.6.

4.3.3 Select "Calibrate" button from menu.

NOTE

- The optimal gain and mA settings are determined during the initial acquisition of LDA image, and must be reset after power loss.
- The gain of the LDA detectors is normally set with nothing in the radiation beam. The optimum gain is normally achieved by setting the x-ray tube at 160 kV and adjusting the mA.
- These settings may be varied depending on the waste drum to obtain usable LDA images.
- All waste drums require two LDA scans at 90 degrees apart. Other views may be used for interpretation.

4.3.4 Adjust NDE console control to desired levels to scan drum without saturating LDA detectors (as indicated on LDA oscilloscope).

4.3.5 Select OFFSET.

[A] **WHEN** OFFSET is complete,
THEN Turn on x-ray system.

[B] Once x-ray system is energized, select GAIN.

[C] **WHEN** GAIN is complete,
THEN close the window.

4.3.6 Scan drum by pressing "LDA SCAN" button on NDE Control Panel.

4.3.7 Select "Annotate" button on the LDA screen, **AND** ENTER drum number, date, and volume utilization percent (VUP) and rotation degree (Example: RHZ-231-A1234 01/01/2004 100% 0 or 90).

4.3.8 Select OK.

4.3.9 Save LDA image to hard drive as follows:

[A] Select "File" and "Save Tiff Image."

[B] GO TO appropriate directory in "Save Image" window.

[C] Enter drum number, underscore, rotation degree, underscore, and exam type ("T" for WIPP, "O" for other).

[D] Press "Save."

[E] PRESS LDA scan button twice to rotate drum 90°.

4.3.10 Repeat Steps 4.3.7 through 4.3.9[D] for second LDA scan.

4.3.11 **WHEN** scan is complete,
THEN press red button on NDE console to TERMINATE x-ray generation.

4.3.12 Go back to RTR mode by selecting “To RTR.”

4.4 Shut Down

4.4.1 **WHEN** last exposure is complete,
THEN leave x-ray control key in vertical position (~) for three to five minutes to ensure adequate x-ray tube head cooling before turning x-ray MAIN switch to OFF position.

4.4.2 Verify x-ray vault door is closed.

4.4.3 **WHEN** x-ray head is cool,
THEN turn x-ray main switch to OFF, **AND** remove key.

4.4.4 Turn OFF the NDE Control Panel, **AND** remove key.

4.4.5 Record operations end time in NDE Operations Logbook.

4.4.6 Secure and return keys to DOS, **AND** sign key log.

5.0 RECORDS

5.1 The NDE Operational Logbooks generated during the performance of this procedure are identified as quality assurance (QA) records and are maintained as QA records in accordance with CCP-QP-008, *CCP Records Management.*