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CCP-TP-121

Revision 3

CCP RTR #1 Operating Procedure

EFFECTIVE DATE: 12/18/2007

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APPROVED FOR USE

RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	03/16/2004	Initial issue.
1	09/14/2005	Procedure revised to reflect changes made to the real-time radiography (RTR) system. Incorporated site standing orders into procedure.
2	11/20/2006	Revised to implement the Waste Isolation Pilot Plant Hazardous Waste Facility Permit requirements resulting from the Section 311/Remote-Handled (RH) Permit Modification Request (PMR).
3	12/18/2007	Revised to incorporate additional hazard control methods.

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1.0 PURPOSE

The purpose of this procedure is to provide instructions for the safe start-up, operation, and shut-down of the mobile real-time radiography (RTR) system, Los Alamos National Laboratory (LANL) RTR #1.

1.1 Scope

This procedure applies to LANL RTR #1 activities performed by qualified RTR Operators. Maintenance activities are outside the scope of this procedure.

2.0 REQUIREMENTS

2.1 References

Baseline Documents

- CCP-TP-053*, CCP Standard Real-Time Radiography (RTR) Inspection Procedure*

Referenced Documents

- CCP-PO-005, *CCP Conduct of Operations*
- CCP-QP-002, *CCP Training and Qualification Plan*
- CCP-QP-008, *CCP Records Management*
- CCP-QP-011, *CCP Notebooks and Logbooks*
- LANL ISD 101-3, *Lockout/Tagout for Hazardous Energy Control*
- LANL ISD 121-1.0, *Radiation Protection*

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
- Personal Protective Equipment (PPE)
- Nondestructive Examination (NDE) Operational Logbook
- Allen Wrench

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 in this procedure, RTR Operators shall IMMEDIATELY STOP WORK and notify the Vendor Project Manager (VPM) and the RTR Lead Operator (LO) or designee.

2.5.2 Verify container numbers and their status outside of the X-ray vault.

2.5.3 If a container is not able to be unloaded from the system, RTR Operators will record the container number and status in the NDE Operational Logbook and notify the TA-54 Operations Center.

CAUTION

Gloves should **NOT** be worn around rotating equipment.

2.5.4 PPE for entering the X-ray vault are safety shoes and safety glasses. Leather gloves will be worn when handling drums or performing activities where pinch point hazards exist.

2.5.5 Personnel will remain clear of the X-ray vault loading doors, conveyor, and moving equipment when the system is energized.

2.5.6 The RTR system generates X-rays (up to 420 kV). Personnel will avoid radiation exposure by observing all warning devices and personnel barriers. An interlock system will de-energize X-ray generation when one of the X-ray vault doors are opened. A radiation survey is required before entering the X-ray vault.

2.5.7 RTR Operators will ensure the X-ray vault is clear of personnel and that all X-ray vault doors are closed prior to start-up of the X-ray system. To facilitate this, a Closed-Circuit Television (CCTV) system has been installed and there is a leaded viewing window on the door leading from the Control Room into the X-ray vault.

2.5.8 By design, there is NO exposed lead. However, precautions should be taken **NOT** to damage the internal stainless steel skin as this may cause exposure to lead. If exposed lead is discovered, report this condition to the VPM so it can be isolated.

2.5.9 RTR Operators will ensure electrical panels and junction boxes are closed, equipment and moving parts are clear of foreign objects, and personnel are clear of the equipment prior to start-up of the RTR system.

2.5.10 Workers who will be working in a radiation area must have read and signed that they understand the applicable Radiation Work Permit (RWP) and Integrated Work Document (IWD).

2.5.11 A radiation survey must be performed when X-ray vault doors are opened following operation of the X-ray system to verify the X-ray tube has been de-energized.

2.5.12 Personnel will minimize entry into the X-ray vault. A lockout/tagout (LO/TO) SHALL be applied by qualified personnel in accordance with LANL ISD 101-3, *Lockout/Tagout for Hazardous Energy Control* to the PLC Power Supply prior to entry into the X-ray vault.

2.5.13 The VPM must be notified before entry into the X-ray vault.

2.5.14 DO **NOT** sit, stand, climb, or walk on the conveyor system or equipment in the X-ray vault due to potential pinching/falling hazards.

2.5.15 The personnel access door to the X-ray vault SHALL remain bolted shut when the X-ray vault is unoccupied.

2.5.16 RTR Operator will ensure all equipment guards are installed prior to system operation.

2.6 Prerequisite Actions

2.6.1 Conduct a safety walk-down of the equipment **AND** record results in the NDE Operational Logbook in accordance with CCP-QP-011, *CCP Notebooks and Logbooks* 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 Verify the X-ray RP-3 Compliance Label, located on the X-ray control panel, is current.

[A] **IF** the radiation leak check has expired,
THEN DO **NOT** proceed with RTR operations until Radiation Protection Services personnel perform and document a radiation leak check and certify the RTR system is radiation leak free.

2.6.4 Ensure the conveyor drum stops are in place prior to loading any containers on the conveyor.

3.0 RESPONSIBILITIES

3.1 RTR Operator

3.1.1 Operates the RTR system.

3.1.2 Maintain 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 Provides supervision for the overall operation of the mobile RTR system and is, at a minimum, a qualified RTR Operator.

3.2.3 Ensures RTR Operators are trained and qualified; or trainees are under direct supervision of the qualified Subject Matter Expert (SME)/On-the-job training (OJT) Instructor in accordance with CCP-QP-002 and CCP-PO-005, *CCP Conduct of Operations*.

3.2.4 Requests pre-approval from the VPM for visitor or trainee access to the RTR system control area.

3.3 Radiological Control Technician (RCT)

3.3.1 Conduct radiological surveys to verify radiation and contamination levels are maintained in accordance with LANL ISD 121-1.0, *Radiation Protection*.

3.4 Vendor Project Manager (VPM)

3.4.1 Ensures Central Characterization Project (CCP) personnel comply with LANL integrated work management, environmental, safety, and security requirements and CCP safety requirements.

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

4.0 PROCEDURE

NOTE

The RTR Operator performs all steps within this procedure unless otherwise indicated.

Section 4.4 may be performed at anytime, as required.

4.1 RTR System Startup

4.1.1 Verify NO personnel are in the X-ray vault.

4.1.2 Obtain the Control Panel Power key and the X-ray key from the lock box adjacent to the RTR Operator's control panel.

4.1.3 Insert the Control Panel Power key into the Control Panel Power key switch, on the left side of the center Control Panel shelf, **AND** turn the switch to the ON position to provide power to the RTR system.

[A] Verify each component power indication light or display illuminates **AND** the monitors function properly.

[B] Verify audio/video recording, display, and processing equipment are energized.

[C] Verify surveillance monitors are powered ON.

[D] Notify and receive acknowledgement from all affected workers that X-ray system is about to be energized.

NOTE

The X-ray key on the MP1 Controller has three positions:

1. (Symbol O) Power switched OFF to controller;
2. (Symbol ~) Mains is ON;
3. (Symbol  Lightning Bolt) High Tension (HT) on Enable.

4.1.4 Insert the X-ray key into the X-ray key switch on the MP1 controller, **AND** turn the X-ray key to position 2.

4.1.5 Verify the operability of door interlocks by performing the following:

[A] Verify the green safety light is illuminated on the MP1 controller.

[B] OPEN the X-ray vault loading doors by depressing the Door Open/Close button on the control panel.

[C] Verify the green safety light is extinguished.

[D] CLOSE the X-ray vault loading doors by depressing the Door Open/Close button on the control panel.

[E] Verify the green safety light is illuminated.

WARNING

Use caution when opening or closing X-ray vault personnel access door due to potential pinch points.

[F] OPEN the X-ray vault personnel access door by removing the three cap head screws using an allen wrench.

[G] Verify the green safety light is extinguished.

[H] CLOSE X-ray vault personnel access door, **AND** secure it with three cap head screws.

[I] Verify the green safety light is illuminated.

[J] Depress the red E-STOP button on the control panel.

[K] Verify the control panel de-energizes, **AND** the green safety light is extinguished.

[L] Reset the red E-STOP button.

[M] Re-energize the control panel.

[N] Verify the green safety light is illuminated.

[O] Record the results of door interlock checks in the NDE Operational Logbook.

4.1.6 Verify the conveyor system operates freely in the OUT and IN directions using the conveyor control joystick.

4.1.7 Verify the Imaging system moves freely in the UP/DOWN directions and the LEFT/RIGHT directions by using the Image system control joystick.

4.1.8 **IF** any abnormal condition is noted,
THEN STOP WORK, **AND** notify RTR LO and the VPM.

4.1.9 Turn the X-ray key to position 3.

NOTE

The warm-up cycle takes approximately 30 minutes to complete. An audible alarm will sound for 20 seconds before X-rays are generated. The 20 second pre-warning time begins immediately upon pressing the green X-ray On button.

4.1.10 Push the green Start button to begin the warm-up cycle.

[A] Verify the X-ray warm-up light is illuminated.

WARNING

If any of the X-ray warning lights fail to come ON during warm-up, the RTR system SHALL be shut-down by depressing the X-ray Off button, turning the X-ray key to position 1, OFF position, **AND** removing the X-ray key. The RTR LO and the VPM will be notified, **AND** RTR operations will **NOT** be performed until the failed RTR system(s) has been repaired or replaced.

NOTE

There are four X-ray warning lights in the following locations:

- On top of the X-ray vault above the X-ray vault personnel access door.
- Inside the X-ray vault beside the X-ray vault loading doors.
- Above the X-ray vault loading doors on the outside of the RTR trailer
- Yellow flashing light on the MP1 controller.

[B] Verify all X-ray warning lights are ON.

NOTE
Warm-up is complete when all X-ray warning lights turn OFF and the warm-up light on the center control panel is OFF.

[C] Record status of the 20-second audible alarm and visual indicators, and X-ray ON warning signals in the NDE Operational Logbook.

[D] Verify the kV and the milliamp (mA) displays start indicating voltage and current as the warm-up cycle progresses.

4.1.11 At the completion of the warm-up cycle, turn the X-ray key to position 2, **AND** record the completion of the warm-up cycle in the NDE Operational Logbook.

4.1.12 OPEN the X-ray shutters.

4.2 RTR System Operations

WARNING

Prior to any personnel entering the X-ray vault, the X-ray key switch SHALL be turned to position 1 and the X-ray key removed. Entry into the X-ray vault requires a LO/TO on the PLC power supply.

NOTE

To assist the RTR Operator in determining height and volume estimations, measuring devices with graduated scales may be placed on the drum.

Measuring devices will be affixed **OR** removed from the containers prior to loading the container in the X-ray vault **OR** after unloading the container from the X-ray vault.

NOTE

Steps 4.2.1 through 4.2.4 may be performed in any order. Sub-steps SHALL be performed in order.

4.2.1 Container Loading

[A] OPEN the X-ray vault loading doors.

CAUTION

Maintain separation and DO **NOT** strike any electric eyes or reflectors with the forklift or the drum. Failure to maintain separation can result in damage to the equipment.

[B] Direct the Forklift Operator to load the container on the conveyor.

[C] Move the container in using the conveyor control joystick.

[D] CLOSE the X-ray vault loading doors.

4.2.2 Container Scanning

[A] Turn the Mode Select switch to the proper position for the container to be scanned.

[B] Turn the Mag Mode switch to the 0 position.

[C] Turn the Scan Mode Switch to the II position.

NOTE

The RTR Operator may vary the kV and mA settings to obtain optimal results between 50 kV and 420 kV. DO **NOT** exceed the maximum of 420 kV and 20 mA.

[D] Turn the X-ray key to position 3.

[E] Push the green X-ray On button to start the X-ray system.

[F] Adjust the kV and mA knobs until the image on the monitor has the desired display.

[G] Move the imaging system in the desired direction using the Image system control joystick.

[H] Perform the RTR examination in accordance with applicable procedure **OR** work instruction.

[I] Depress the red X-ray Off button on the MP1 controller to shutdown X-ray system.

[J] Turn the X-ray key to position 2.

WARNING

A radiation survey or verification of the radiation monitoring device is required upon opening the X-ray vault door to verify the X-ray tube has been de-energized.

4.2.3 Unloading Containers

[A] Verify the X-ray key is in position 2.

[B] Press the Home button to return the turntable to the home position, **AND** OPEN the X-ray vault loading doors.

[C] Complete a radiation survey **OR** verify radiation monitoring device to verify X-ray tube has been de-energized.

[D] Move the container towards the X-ray vault loading doors using the conveyor control joystick.

[E] Direct the Forklift Operator to unload the container.

WARNING

A radiation survey or verification of the radiation monitoring device is required upon opening the X-ray vault door to verify the X-ray tube has been de-energized

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A radiation survey is required upon opening the X-ray vault doors to verify the X Ray tube has been de-energized.

4.2.4 Modifying Turntable Configuration

[A] Turn OFF the X-ray and Control Panel Power keys, and remove the keys, **AND** place the keys into the lockbox.

[B] Ensure a LO/TO to the PLC Power Supply has been applied by qualified personnel in accordance with LANL ISD 101-3 prior to entry.

[C] OPEN the X-ray vault personnel access door by removing the three cap head screws using an allen wrench.

[D] Complete a radiation survey **OR** verify radiation monitoring device to verify X-ray tube has been de-energized.

[E] Notify the VPM prior to entry into the X-ray vault.

[F] Enter the X-ray vault.

WARNING

Personnel SHALL **NOT** sit, stand, climb or walk on the conveyor system due to potential pinching/falling hazard.

[G] Move pins to proper position for size of container being loaded.

[H] Exit the X-ray vault.

WARNING

Personnel SHALL keep hands clear of X-ray vault personnel access door when closing, due to potential pinch points.

[I] Secure the X-ray vault personnel access door by inserting the three cap head screws.

[J] Remove the LO/TO to the PLC Power Supply in accordance with LANL ISD 101-3.

[K] Re-energize the control panel.

4.3 RTR System Shut-down

NOTE

It is recommended to leave the X-ray key in position 2 for 5-20 minutes prior to shut-down of the RTR system, to allow the cooling oil to thoroughly cool down the X-ray tube in a slow and more evenly manner.

4.3.1 **IF** the X-ray key is **NOT** in position 1,
THEN turn the X-ray key to position 1, **AND** remove the X-ray key.

4.3.2 CLOSE the X-ray vault loading doors.

4.3.3 CLOSE the X-ray shutters completely.

4.3.4 Power OFF all monitors.

4.3.5 Turn the Control Panel Power key to OFF, **AND** remove the Control Panel Power key.

[A] Return the Control Panel Power key and X-ray key to the lock box adjacent to the RTR Operator's control panel.

4.3.6 **IF** containers are to be left on the conveyor system overnight,
THEN notify the VPM and the Operations Center, **AND** record the container numbers and their status in the NDE Operational Logbook.

4.4 Contamination Surveys

NOTE

The X-ray vault will be periodically surveyed for radiological contamination as specified by site RCTs. All surveys will be kept on file. RTR Operators will be notified if radiological contamination is identified.

4.4.1 Record the date, time, and any abnormal results of the RCT's daily surveys in the NDE Operational Logbook.

5.0 RECORDS

5.1 The NDE Operational Logbooks generated during the performance of this procedure are identified as quality assurance (QA) records in CCP-QP-011 and maintained as QA records in accordance with CCP-QP-008, *CCP Records Management*