

CCP-TP-119

Revision 4

CCP

Operating the Real-Time Radiography (RTR) System #5

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Larry Porter

PRINTED NAME

APPROVED FOR USE

RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	09/08/2005	Initial issue.
1	05/16/2006	Revised Section 4.0 to add console EMERGENCY STOP Button and clarify procedural steps and documentation of semi-annual safety checks and inspections.
2	11/16/2006	Revised to remove reference to CCP-TP-102 and replace with CCP-TP-053, and 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	11/08/2007	Revised to keep personnel safe from standing on conveyor per CCP-PO-005, <i>Conduct of Operations</i> , when testing emergency stop (E-STOP) buttons.
4	02/24/2011	Revised document to clarify correct management position titles at the request of the Host site. Procedure updated to correct missing step for manual warm-up of RTR unit. Address alternative Method for Controlling Hazardous Energy for compliance with Host site procedures.

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1.0 PURPOSE

The purpose of this procedure is to provide instructions for the startup, operation, and shutdown of the Real-Time Radiography (RTR) System #5.

1.1 Scope

This procedure specifies actions necessary for startup, daily operational safety checks, operations, and shutdown of RTR System #5, for use in fast scanning waste containers in conjunction with CCP-TP-066, *CCP Radiography Screening Procedure for Prohibited Items*, or for use in certified scanning of waste containers in conjunction with CCP-TP-053, *CCP Standard Real-Time Radiography (RTR) Inspection Procedure*.

2.0 REQUIREMENTS

2.1 References

Referenced Documents

- CCP-HSP-009, *CCP RTR Health and Safety Plan*
- CCP-QP-002, *CCP Training and Qualification Plan*
- CCP-QP-008, *CCP Records Management*
- CCP-TP-053, *CCP Standard Real-Time Radiography (RTR) Inspection Procedure*
- CCP-TP-066, *CCP Radiography Screening Procedure for Prohibited Items*
- CCP-TP-140, *CCP Equipment Maintenance*

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 Precautions and Limitations

2.3.1 The equipment used in this procedure has an alternative isolation device for routine operational activities or minor servicing as defined in 29 Code of Federal Regulations (CFR) 1910.147, The Control of Hazardous Energy (Lockout/Tagout), and American National Standards Institute (ANSI) Z244.1, Control of Hazardous Energy Lockout/Tagout and Alternative Methods. The specific isolation device and its application are detailed in the risk assessment, which is incorporated into the hazard assessment for this operating instruction.

2.3.2 Any equipment modifications that could alter radiation protection shall be reviewed and approved by the Vendor Project Manager (VPM), Rad Engineer, and the Subcontract Technical Representative (STR). After the modifications are completed, a survey shall be conducted to ensure personnel will **NOT** be exposed to unnecessarily high levels of radiation. This step must comply with the Host site configuration management system.

2.3.3 If this procedure can **NOT** be implemented as written, RTR personnel shall notify appropriate supervision. 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, work shall be STOPPED and the VPM and Shift Supervisor (SS) shall be notified, **AND** the RTR system SHALL be placed in the SUSPENSION mode of operation. Work will **NOT** be resumed until this procedure is modified or replaced by a new document that reflects the current work practice.

2.3.4 The personal protective equipment (PPE) for normal operations is contained in CCP-HSP-009, *CCP RTR Health and Safety Plan*. Personnel will don the required or specified PPE before starting RTR operations.

2.3.5 High energy X-Rays, high voltages (HVs), and pinch points are the potential hazards associated with the RTR System. These hazards are addressed in CCP-HSP-009, for personnel who operate the RTR system.

2.4 Prerequisite Actions

- 2.4.1 When approaching the radiation source, use a suitable operable calibrated survey instrument to verify that the source is in its fully shielded condition or that the X-Ray tube has been de-energized.

NOTE

The RTR System #5 SHALL be placed in Suspension mode anytime the facility process, or equipment is **NOT** capable of being operated and maintained as intended.

- 2.4.2 Prior to initial startup, perform shielding surveys in accordance with Host site work orders.
- 2.4.3 Verify that the most recent documented radiation survey of the RTR system has been performed within the last six months, **AND** after any maintenance or modification of the X-Ray shielding.
- [A] Record status on Attachment 1, CCP Radiography System Safety Checks.
- [B] **IF** Radiation Survey is **NOT** current,
THEN STOP WORK AND notify RTR Lead Operator (LO) and VPM.
- 2.4.4 Verify Vault Door Interlocks, Audible and Visual Warning Signals, Minimum 20 Second Delay Function and EMERGENCY STOP Buttons have been inspected and tested semi-annually.
- [A] Record status on Attachment 1.
- [B] **IF** inspections and tests are **NOT** current,
THEN STOP WORK, AND notify RTR LO and VPM.

NOTE

System repairs, including replacement of parts, will be performed in accordance with CCP-TP-140, *CCP Equipment Maintenance*.

- 2.4.5 **IF** any of the system checks fail,
THEN STOP WORK, AND notify the RTR LO and VPM.

2.5 Definitions

- 2.5.1 **Operation** – The facility, process, or equipment is capable of being operated and maintained as intended.
- 2.5.2 **Shutdown** – The facility, process, or equipment is **NOT** being operated because of an unplanned shutdown directed by a management official for safety or other appropriate reasons.
- 2.5.3 **Suspension** – The facility, process, or equipment is **NOT** capable of being operated and maintained as intended.

3.0 RESPONSIBILITIES

3.1 RTR Operator

3.1.1 Implements this procedure to conduct waste container scanning in conjunction with CCP-TP-053 or CCP-TP-066.

3.1.2 Reports failure of any operational safety check to the VPM and RTR LO.

3.2 Facility Records Custodian

3.2.1 Receives, processes, and transmits all records generated by this procedure in accordance with CCP-QP-008, *CCP Records Management*.

4.0 PROCEDURE

NOTE

Section 4.1 MUST be performed prior to operating RTR System #5.

4.1 Pre-Startup Operations

4.1.1 **IF** during this operation any abnormal conditions are observed, **THEN STOP WORK**, place equipment in a safe configuration, **AND** notify the RTR LO and VPM to place the system in SUSPENSION mode.

4.1.2 Perform the following pre-startup operations before powering up the RTR System #5:

- [A] Verify the conveyor doors are unlocked, open, **AND** secured, as needed.
- [B] Verify all radiation warning signs are posted in accordance with applicable Host site procedures.
- [C] Visually check the conveyors to make sure they are free from obstructions.
- [D] Enter the Control Room, **AND** perform the following:

NOTE

The Hydraulic Control Panel EMERGENCY STOP Button is **NOT** part of the daily or semi-annual INTERLOCK/EMERGENCY STOP switch checks.

- [D.1] Visually inspect the Hydraulic Control Panel EMERGENCY STOP Button for damage.
- [D.2] Energize the Hydraulic Control Panel by pulling the EMERGENCY STOP Button to the OUT position, **AND** turn ON the hydraulic pump at the end of the Operator's Bench **OR** exit the control room and enter the equipment room, **AND** energize the hydraulic pump locally if necessary.
- [D.3] Turn ON all monitors, **AND** all rack-mounted equipment.

[D.4] OPEN vault doors and ensure that applicable RAD survey is performed, **AND** conditions are safe.

[D.5] CLOSE the Vault Doors after RAD survey.

4.2 Powering the X-Ray System

NOTE

The key switch, Red and Green Buttons, and display readouts referenced in this Section are located on the PANTAK Industrial X-Ray Controller.

- 4.2.1 Verify that NO one is in the vault by visually checking the vault monitor.
- 4.2.2 Verify the vault doors are CLOSED by checking the conveyor monitor, switching the camera inputs as necessary, **AND** that the Door Closed Indicator light on the control panel is illuminated.
- 4.2.3 Verify that NO one is on the conveyors by checking the conveyor monitor, **AND** switching camera inputs, as necessary.
- 4.2.4 Maintain constant surveillance during the test to make sure that NO personnel enter the area.
- 4.2.5 Insert the X-Ray console X-Ray key into the switch, **AND** turn the key from the OFF (O) position to the SAFE (~) position.

4.3 EMERGENCY STOP Button and Interlock Operation Check and Inspection

NOTE

This section will verify the operation of the X-Ray safety interlocks. This verification will be documented on Attachment 1, CCP Radiography System Safety Checks.

- 4.3.1 Visually inspect the following for damage:
 - [A] Vault EMERGENCY STOP Button, while performing step 4.3.8.
 - [B] X-Ray control panel EMERGENCY STOP Button
 - [C] (2) Vault door Interlock switches

- 4.3.2 Ensure that the vault doors are closed.
- 4.3.3 Turn X-Ray key to the X-Rays ON position.
- 4.3.4 Verify that the Interlock status LED is OFF.
 - [A] **IF** the LED remains ON,
THEN STOP WORK, AND notify the RTR LO and VPM.
- 4.3.5 Turn the X-Ray key to X-Rays safe position, **AND** remove key.
- 4.3.6 OPEN the vault doors.
- 4.3.7 Press EMERGENCY STOP Button inside the vault.
- 4.3.8 Re-enter control room, insert the X-Ray key, **AND** turn to the X-Rays ON position.
- 4.3.9 Close the vault doors.
- 4.3.10 Verify that the Interlock status LED is ON.
 - [A] **IF** the LED remains OFF,
THEN STOP WORK, AND notify the RTR LO and VPM.
- 4.3.11 Turn the X-Ray key to the X-Rays safe position, **AND** remove the key.
- 4.3.12 OPEN the vault doors.
- 4.3.13 Reset EMERGENCY STOP Button inside the vault.
- 4.3.14 Re-enter the control room, insert the X-Ray key, **AND** turn to the X-Rays ON position.
- 4.3.15 Close the vault doors.
- 4.3.16 Verify that the Interlock status LED is OFF.
 - [A] **IF** the LED remains ON,
THEN STOP WORK, AND notify the RTR LO and VPM.
- 4.3.17 Press the EMERGENCY STOP Button on the X-Ray control panel.

4.3.18 Verify that the X-Ray control cabinet and control panel powers down.

[A] **IF** the power remains ON,
THEN STOP WORK, AND notify the RTR LO and VPM.

4.3.19 Reset the EMERGENCY STOP Button.

4.3.20 Verify that the X-Ray control cabinet and control panel powers back up.

[A] **IF** the power remains OFF,
THEN STOP WORK, AND notify the RTR LO and VPM.

4.3.21 On Attachment 1, record Vault Door Interlock and EMERGENCY STOP Button operating status.

4.4 X-Ray Unit Warm-Up

NOTE

This section must be carried out at the start of each day's work, **OR** after a period of more than four hours idle time. The warm-up complete condition can be canceled by turning the Key Switch to the OFF position. If the warm-up LED is illuminated, either automatic or manual warm-up sequence must be completed prior to beginning X-Ray operations.

4.4.1 Check the previous RTR Operational Logbook entry for last operation of the X-Ray unit, **AND** determine how long since the last operation, **AND** if any abnormalities were noted.

NOTE

If the unit has been inactive for greater than four weeks, a manual warm-up **MUST** be performed.

4.4.2 Verify that **NO** personnel are inside the vault.

4.4.3 Ensure vault doors are closed.

4.4.4 Ensure the Image Intensifier shutters are **CLOSED**.

NOTE

After the START Button is pushed, the X-Ray controller begins the 20 second pre-warning (delay function) period. Unless vault door interlocks or EMERGENCY STOP Buttons are operated, X-Ray generation will commence automatically at the end of this period.

NOTE

The warm-up is automatically completed once the maximum Kilovolt (kV) value for the X-Ray tube is achieved.

4.4.5 For Automatic Warm-up perform the following:

- [A] Insert key **AND** turn to X-Rays ON position.
- [B] Verify that the warm-up LED is illuminated.
- [C] Press the Green START Button.

4.4.6 For Manual Warm-up, perform the following:

- [A] Ensure the X-Ray key is in the X-Ray ON position.
- [B] Toggle the Manual Warm-up, if necessary, using the round key.
- [C] Holding the PRESET Switch, adjust the command parameters to 160kV, max mA.
- [D] Press the Green START Button.
- [E] Increase the kV demand by 10kV at approximately three minute intervals.
- [F] Maintain close observation of the kV and mA feedback meters watching for instability.
- [G] **IF** the readings fluctuate, **THEN** reduce the demand to a stable point, **AND** restart the interval timing.
- [H] Repeat steps 4.4.6[E] and 4.4.6[F] until maximum output is reached.
- [I] **AFTER** warm-up is complete, **THEN** press the Red STOP Button.

4.4.7 During the pre-warning period, verify the Minimum 20 Second Delay, **AND** observe the following pre-warning alarms inside the vault:

[A] Amber warning light

[B] Audible alarm

4.4.8 With X-Rays ON, observe the following:

[A] X-Ray LED on the controller is illuminated.

[B] kV/mA displays are operational.

[C] Flashing red beacon inside the vault is illuminated.

[D] "GRAVE DANGER, VERY HIGH RADIATION AREA INSIDE" signs over the vault doors are illuminated.

4.4.9 Record the status of the audible and visual WARNING lights, including the Minimum 20 Second Delay on Attachment 1.

4.4.10 **IF** the audible or visual WARNING signals, **OR** the Minimum 20 Second Delay are inoperable, **THEN** notify the VPM, **AND** RTR LO to place the RTR system into SUSPENSION mode.

4.4.11 Record site location and examination date on Attachment 1.

4.4.12 Print name, sign, and date Attachment 1.

4.4.13 Submit Attachment 1 to the Facility Records Custodian.

Facility Records Custodian

4.4.14 Receive, process and transmit Attachment 1 in accordance with CCP-QP-008.

4.5 Audio/Video Recording System Setup

NOTE

The audio/video recording system is comprised of an Image Intensifier with integrated closed caption device (CCD) camera, raw video monitor, audio/video media recorders, video character generator, and video printer. Additionally, there is a CCD video camera and a dedicated monitor for surveillance of the X-Ray vault and two additional CCD video cameras, one at load and one at unload.

4.5.1 Audio/Video Recording System Power Up

NOTE

Powering of equipment can be verified with the pilot lights on each piece of equipment.

- [A] **IF** a piece of equipment is **NOT** powered ON, **THEN** check the individual power switch.
- [B] **IF** this **DOES NOT** correct the problem, **THEN** perform the following:
 - [B.1] Power OFF the individual piece of equipment, **AND** check the associated fuse, circuit breaker, **OR** electrical cord.
 - [B.2] **DO NOT** proceed until the equipment is repaired or replaced.
- [C] Insert the audio/video recording media to be used for recording the scans.
- [D] Verify counts are set to ZERO, if applicable.

4.5.2 Video Monitor Setup

- [A] Verify the POWER Switches for all video monitors are in the ON position.
- [B] Verify the power ON lights are illuminated on all video monitors.

4.5.3 Video Graphic Printer Setup (if required)

- [A] Verify the video graphic printer POWER Switch is in the ON position, **AND** the green light is illuminated.
- [B] Verify the printer paper supply is adequate to support the RTR scanning activities.
 - [B.1] **IF** printer paper is required,
THEN load paper in accordance with the manufacturer's instructions.

4.5.4 Character Generation (if required)

- [A] Press the POWER Button on the Character Generator Keyboard.
- [B] **IF** the Keyboard Power Switch **DOES NOT** function normally,
THEN perform the following:
 - [B.1] Check the ON/OFF Switch located in the back of the instrument rack as follows:
 - (a) **IF** the switch is in the OFF position,
THEN press the switch to the ON position.
 - (b) **IF** the switch is in the ON position,
THEN cycle the switch OFF for a few seconds,
AND return the switch to the ON position.
- [C] Press the New Page Key, **AND** verify the cursor appears on the monitor.
- [D] Perform the following at the Character Generator Keyboard:
 - [D.1] Type the container number,
AND press New Line.
 - [D.2] Type the date, **AND** press New Line.
 - [D.3] Type the RTR Operator name.
- [E] Press the PLAY key.

NOTE

The information entered will be the overlay for the container scan that is being recorded. This information will be entered for each container at the time of RTR for that particular container.

[F] Check that the information entered appears on the monitor.

4.6 Container Loading

NOTE

This section is performed for each container entering the vault for RTR scanning.

- 4.6.1 Load one or more containers onto the in-feed conveyor using the applicable Host site procedures.
 - 4.6.2 **IF** applicable,
THEN obtain the container number and weights supplied by the governing procedure, **AND** verify the container number is listed in the Acceptable Knowledge (AK) documentation.
 - 4.6.3 **IF** applicable,
THEN ensure container number on the traveler matches the number on the container.
 - 4.6.4 **IF** the container number is **NOT** valid,
THEN notify the RTR LO, **AND DO NOT** process the container until the discrepancy is resolved.
 - 4.6.5 Verify that the measuring devices and/or the Lines-Pair Resolution Test Gauge are affixed to the containers as necessary.
-

NOTE

When the container reaches the staged location, the in-feed conveyor will automatically STOP if INFEED AUTO is selected. The in-feed conveyor may also be jogged in either direction using the INFEED FOR/OFF/REV Selector Switch on the Hydraulic Control Panel.

- 4.6.6 While viewing the in-feed and vault video monitors, perform the following:

- [A] Energize the in-feed conveyor, **AND** position container as necessary.

- [B] OPEN the Vault Doors,
- [C] Lower, **AND** shift the turntable to the front of the vault as needed.
- [D] Energize the pusher to the PART FWD position to stage the container on the center of the turntable.
- [E] Return the pusher to the HOME position.
- [F] View the vault monitor to ensure no personnel have entered the vault.
- [G] CLOSE the Vault Doors.
- [H] Verify the correct container number by viewing vault camera monitor.
- [I] START X-Rays, **AND** view the X-Ray image monitor

4.7 Radiography Operations

NOTE

During the performance of Radiography, the RTR Operator may adjust settings and rotate the drum, as required.

- 4.7.1 Commence RTR in accordance with CCP-QP-002, CCP-TP-066 or CCP-TP-053.
- 4.7.2 Continue RTR until all containers have been scanned for the shift or the day.

4.8 Container Unloading

- 4.8.1 At the Operator Control Panel, perform the following while maintaining visual surveillance on the out-feed and vault video monitors:
 - [A] OPEN the vault doors.
 - [B] Lower and shift the turntable to the rear of the vault.
 - [C] Energize the pusher to the Full FWD position to remove the container from the vault.

- [D] Jog the out-feed conveyor as needed to position the container for unloading.
- [E] Energize the pusher to the HOME position.
- [F] Unload the container(s) from the out-feed conveyor using the applicable Host site procedures.
- [G] Remove measuring devices from the containers, as necessary.

4.9 RTR System Shutdown

NOTE

This Section is used to shutdown the RTR system after all scanning activities have been completed.

- 4.9.1 At the X-Ray Controller, turn the X-Ray key to OFF (O) position, **AND** remove the key.
- 4.9.2 CLOSE the vault doors as directed by the Lead Operator or VPM.
- 4.9.3 Turn OFF hydraulic pump in the equipment room or at the end of the Operator's Bench, **AND** CLOSE the conveyor doors, as necessary.

NOTE

The Hydraulic Control Panel EMERGENCY STOP Button is **NOT** part of the daily or semi-annual interlock/emergency stop switch checks.

- 4.9.4 Push in EMERGENCY STOP Button at the Hydraulic Control Panel.
 - 4.9.5 CLOSE the II Shutters.
- #### 4.10 Audio/Video Recording System Shutdown
- 4.10.1 Rewind if applicable, **AND** remove the audio/video recording media from the recording equipment.
 - 4.10.2 Verify the audio/video recording media are marked as specified in accordance with CCP-TP-053.
 - 4.10.3 Power-down the audio/video media recorders.

4.10.4 Power-down all video monitors.

4.10.5 Power-down the video graphic printer, if required.

4.10.6 Power-down the character generator.

5.0 RECORDS

5.1 Records generated during the performance of this procedure are maintained as Quality Assurance (QA) records in accordance with CCP-QP-008. The records are the following:

5.1.1 QA Nonpermanent

[A] Attachment 1 – CCP Radiography System Safety Checks

Attachment 1 – CCP Radiography System Safety Checks

Site Location: _____

Examination Date: _____

X-Ray Compliance Certification Current	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Audible and Visual Warning Signals Operating	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Door Interlocks Operating	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Minimum 20 Second Delay Function	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Emergency Stop Buttons	<input type="checkbox"/> Yes	<input type="checkbox"/> No

RTR Operator Approval	
Operator's Printed Name: _____	
Signature: _____	Date: _____