

CCP-TP-080

Revision 3

CCP Operating the WMF 610 Real-Time Radiography (RTR) System

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APPROVED FOR USE

RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	07/01/2005	Initial issue.
1	05/16/2006	Revised Section 2.4, Prerequisite Actions, and Section 4.0 to procedure steps and clarify documentation of semi-annual safety and inspection checks.
2	06/01/2010	Revised document to clarify correct management position titles at the request of the host site.
3	02/24/2011	Revised to address an alternative method for Controlling Hazardous Energy for compliance with Host site procedures.

TABLE OF CONTENTS

1.0 PURPOSE 4
1.1 Scope..... 4

2.0 REQUIREMENTS..... 5
2.1 References 5
2.2 Training Requirements..... 5
2.3 Precautions and Limitations..... 5
2.4 Prerequisite Actions..... 7
2.5 Definitions 8

3.0 RESPONSIBILITIES..... 9
3.1 WMF 610 RTR Operator (RTR Operator) 9

4.0 PROCEDURE..... 10
4.1 RTR Operator 10
4.2 Performing WMF 610 RTR Door Interlocks Safety Checks 11
4.3 Testing Audible/Visual Warning Devices and Minimum 20 Second Time
Delay..... 12
4.4 Beginning of Shift Activities..... 13
4.5 End of Shift Activities 14
4.6 Complete Shutdown 15

5.0 RECORDS..... 16

LIST OF ATTACHMENTS

Attachment 1 – YXLON® X-Ray Controller Error Codes.....17

1.0 PURPOSE

The purpose of this procedure is to provide instructions for the startup, operation, and shutdown of the Waste Management Facility (WMF) 610 Real-Time Radiography (RTR) System.

1.1 Scope

This procedure specifies actions necessary for startup, daily operational safety checks (Limiting Conditions of Operations [LCO] and non-LCO) and shutdown of the WMF 610 RTR System for use in fast scanning waste containers in conjunction with CCP-TP-066, *CCP Radiography Screening Procedure for Prohibited Items*.

2.0 REQUIREMENTS

2.1 References

Baseline Documents

- CCP-PO-001, *CCP Transuranic Waste Characterization Quality Assurance Project Plan*
- CCP-PO-002, *CCP Transuranic Waste Certification Plan*
- CCP-PO-003, *CCP Transuranic Authorized Methods for Payload Control (CCP CH-TRAMPAC)*

Referenced Documents

- CCP-HSP-009, *CCP RTR Health and Safety Plan*
- CCP-QP-002, *CCP Training and Qualification Plan*
- CCP-TP-066, *CCP Radiography Screening Procedure for Prohibited Items*

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 **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.
- 2.3.6 Workers who will be working in a radiation area must have read and signed that they understand the applicable Radiation Work Permit (RWP) or Approved Method of Work (AMOW).
- 2.3.7 The barcode scanner, cart homing sensor, and alignment laser present a laser eye hazard. Eye contact with the beams must be avoided.
- 2.3.8 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.

2.4 Prerequisite Actions

NOTE

Work is authorized via the Plan of the Day (POD).

NOTE

The WMF 610 RTR System SHALL be placed in SUSPENSION mode anytime the facility, process, OR equipment is **NOT** capable of being operated and maintained as intended.

NOTE

The following implements a Technical Safety Requirement (TSR).

- 2.4.1 Prior to initial startup, perform shielding surveys in accordance with Host site work orders.
- 2.4.2 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 of CCP-TP-066.
 - [B] **IF** Radiation Survey is **NOT** current,
THEN STOP WORK AND notify RTR Lead Operator (LO) and VPM.
- 2.4.3 Verify door interlocks, audible and visual warning signals, minimum 20 second delay function and emergency shut down switches have been inspected and tested semi-annually.
 - [A] Record status on Attachment 1 of CCP-TP-066.
 - [B] **IF** inspections and tests are **NOT** current,
THEN STOP WORK AND notify RTR LO and VPM
- 2.4.4 If any of the system checks fail, STOP WORK, **AND** notify the RTR LO and VPM .
- 2.4.5 Verify that the existing working copy of this procedure is current by comparing the revision number of the working copy to the revision number of the controlled copy of the procedure on the Central Characterization Project (CCP) file transfer protocol (ftp) site. If the CCP ftp site is **NOT** available, contact CCP Document Control to determine the current revision.

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 WMF 610 RTR Operator (RTR Operator)

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

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

NOTE

Cart, joggers, and vertical drive motors may be homed when necessary.

4.0 PROCEDURE

4.1 RTR Operator

4.1.1 Inspect the shielded vault and associated equipment for the following:

- [A] Foreign objects.
- [B] General cleanliness.
- [C] Oil on floor.
- [D] The drive rods on both the tube head and image intensifier lifting assemblies are free of obstruction.
- [E] The Image Intensifier (II) and x-ray shutters are CLOSED.
- [F] Turn the camera, monitor, and system display components and II power strip (inside the shielded vault) ON, if necessary.
- [G] Door interlock damage.
- [H] Drum cart condition.

4.1.2 In the control room, turn on camera monitors, system display components and RTR-CPU-1003 ATR system display computer. Insert power key, turn to the on position and press the reset button.

4.1.3 Test **AND** inspect all (7) Emergency Stop Switches Daily located on the East and West side of the vault door, control console, motor control center cabinet, and inside the vault on the West, East and South wall as follows:

- [A] Ensure the E-STOP occurred light is out, by pressing the E-stop reset button and the Motion Enables Button.
- [B] Visually inspect the emergency stop switch for damage.
- [C] Press the emergency stop switch.
- [D] Ensure the E-STOP occurred light is lit.
- [E] Reset the emergency stop switch.

- [F] Press the E-STOP RESET Button on the control console.
- [G] Wait until the light stops flashing.
- [H] Press the MOTION ENABLE Button
- [I] Repeat steps 4.1.3[A] through 4.1.3[H] to test all (7) emergency stop switches.

NOTE

The x-ray controller may have to be turned OFF and ON to get the x-ray tube conditioning prompt.

4.2 Performing WMF 610 RTR Door Interlocks Safety Checks

- 4.2.1 Turn ON the YXLON[®] controller.
- 4.2.2 Select tube conditioning No = 0.
- 4.2.3 Set the x-ray control to 40 kilovolt (kV) and 1.0 milli amp (mA).
- 4.2.4 Ensure the cart, x-ray head, and Image Intensifier are homed.
- 4.2.5 Move the cart in, **AND CLOSE** the door.
- 4.2.6 Using the closed circuit television (CCTV) camera, ensure NO personnel are inside the shielded vault.
- 4.2.7 Slightly OPEN the shielded vault door.
- 4.2.8 Energize the x-ray tube head by pressing the black x-ray ON Button.
- 4.2.9 Ensure the x-ray tube head DOES NOT energize.
 - [A] **IF** the x-ray head attempts to energize, **THEN STOP** RTR operations, **AND** inform the VPM, and RTR LO.
- 4.2.10 CLOSE the shielded vault door.

4.3 Testing Audible/Visual Warning Devices and Minimum 20 Second Time Delay

- 4.3.1 Using the CCTV camera, ensure NO personnel are inside the shielded vault.

NOTE

After step 4.3.3 has been performed, the x-ray will switch to ON and the kv and mA indicators will change to previously programmed values. The remainder of the warm-up sequence will be completed automatically.

NOTE

The white lamp on the YXLON[®] controller console will be ON for a minimum of 20 seconds indicating a pre-warning time. Warning indicators and alarms listed in step 4.3.3 will actuate quickly upon energizing the x-ray head.

NOTE

Steps 4.3.3 and 4.3.4 may be performed simultaneously.

- 4.3.2 Energize the x-ray head.

- 4.3.3 Ensure the following:

- [A] Warning light inside the shielded vault flashes for a minimum of 20 seconds before x-ray generation.
- [B] Amber warning lights on the roof of the shielded vault flashes for at least 20 seconds before x-ray generation.
- [C] Audible alarm inside the shielded vault is activated for at least 20 seconds before x-ray generation.
- [D] Warning light inside the shielded vault flashes when x-rays are being generated.
- [E] Exterior red warning lights flash and the "Grave Danger – Very High Radiation Inside When Illuminated" warning light is illuminated when x-rays are generated.

- 4.3.4 STOP x-rays by pressing the red x-ray OFF Button.

- 4.3.5 Ensure safety checks have been completed and are recorded on Attachment 1 of CCP-TP-066.

4.4 Beginning of Shift Activities

4.4.1 Ensure the x-ray monitor is ON.

4.4.2 Ensure the CCTV monitor is ON.

4.4.3 Ensure the system display components are ON.

4.4.4 **IF** the shielded vault door is opened with the x-ray controller key in the ON position,
THEN the door interlocks must be reset by closing the shielded vault door and switching the YXLON[®] controller key to STANDBY,
AND then back to the ON position.

NOTE

Check Attachment 1, YXLON[®] X-Ray Controller Error Codes, when an error code is observed from the YXLON[®] X-Ray Controller.

4.4.5 Startup the YXLON[®] x-ray unit as follows:

[A] Move the cart into the shielded vault, if necessary.

[B] CLOSE the shielded vault door.

[C] Turn the YXLON[®] x-ray controller to STANDBY.

[C.1] **IF** the x-ray tube conditioning prompt is **NOT** visible,
THEN turn the x-ray controller OFF,
THEN back to STANDBY.

[D] Enter 1 at the tube conditioning prompt.

[E] Enter the rest period as follows: (0 – days [00–99]
Confirmation=F1).

[E.1] Determine the rest period from the RTR Operations Logbook.

[E.2] Enter the rest period (0 days is entered if the rest period is less than 8 hours).

[E.3] Press key F1 to confirm data entry.

- [F] **IF** warm-up is required,
THEN perform the following:
 - [F.1] Select the conditioning voltage of 450.
 - [F.2] Select between the three values with the cursor keys ["4" () and "6" ()].
 - [F.3] Using the CCTV camera, ensure NO personnel are inside the shielded vault.
 - [F.4] Ensure x-ray and II shutters are CLOSED.
 - [F.5] Initiate the conditioning process by switching the YXLON[®] controller key to ON.
 - [F.6] Energize the x-ray head by pressing the x-ray ON Button.
 - [F.7] Press the red x-ray OFF Button to turn OFF x-rays, once the warm-up is completed, if necessary.

4.4.6 Remove the cart from the shielded vault, if necessary.

NOTE

During the performance of Radiography screening, in accordance with CCP-TP-066, the RTR Operator may adjust settings and rotate the drum, as required.

4.4.7 Commence Radiography screening in accordance with CCP-TP-066.

4.4.8 Continue the screening process in accordance with CCP-TP-066 until the number of drums have been screened for the shift or the day.

4.5 End of Shift Activities

4.5.1 Ensure the x-ray shutters are CLOSED. Using the CCTV camera, ensure the II shutters are CLOSED.

4.5.2 Shut down the x-ray head as follows:

[A] Press the red x-ray OFF Button.

[B] Turn the YXLON[®] key to STANDBY.

4.5.3 OPEN the shielded vault door.

4.5.4 Move the cart out of the shielded vault.

RTR Operator

4.6 Complete Shutdown

NOTE

Steps 4.6.1 through 4.6.5 may be performed while waiting for the x-ray head to cool down.

4.6.1 Turn the x-ray monitor OFF.

4.6.2 Turn the CCTV monitor system display components OFF.

4.6.3 Enter the shielded vault, **AND** turn the power strip OFF, if necessary.

4.6.4 Turn the system power key OFF, **AND** remove the system power key.

4.6.5 Turn the YXLON[®] key to OFF, **AND** remove the key.

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, *CCP Records Management*.

Attachment 1 – YXLON® X-Ray Controller Error Codes

Code A	Text	Phillips Industrial X-ray System Manual Chapter
0001	Serial interface	Normally no error
0002	Time elapsed	Normally no error
0004	Filament	4.12
0008	Undervoltage prim	4.9
0010	Identification	4.11
0020	MA-reference	4.10
0040	KV-reference	4.10
0080	Undervoltage sec.	4.9
0100	Tube arcing	4.8
0200	Overcurrent	4.7
0400	Overvoltage	4.6
0800	Automatic systems	4.3
1000	Warning lamp	4.5
2000	Manual switch-off	Normally no error
4000	Safety circuit internal (cooling)	4.3
8000	Switching-on circuit	4.2
4800	Safety circuit external (door)	4.3
