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CCP-TP-066

Revision 11

CCP
Radiography Screening Procedure for Prohibited Items

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APPROVED FOR USE

RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	03/08/2002	New procedure to allow screening drums using RTR equipment to determine if prohibited items exist in the drum.
1	12/12/2004	Changes made to correspond with CCP-TP-011, CCP-TP-045 and CCP-TP-102. Updated references in procedure. Changes were made throughout the procedure for use at various sites.
2	05/11/2005	Revised to implement Idaho National Laboratory (INL) requirements and aligned with RTR Procedures.
3	06/14/2005	Revised for operation of the Real-Time Radiography (RTR) System for screening at Idaho National Laboratory (INL).
4	10/27/2005	Removed references to CCP-TP-045 and CCP-TP-102 and replaced with CCP-TP-119 and CCP-TP-116.
5	11/08/2005	Revised CAUTION above step 4.2.2 to clarify use at SRS only.
6	02/07/2006	Revised to change the OUT button to the OFF/STOP/AUTO OUT and the ON button to the ON/START/X-RAY ON button on the control console.
7	10/23/2006	Revised to support the use of any Real-Time Radiography (RTR) unit for fast scan. Currently this procedure limits use to four specific systems.
8	10/25/2006	Minor revision to correct dates in the header.
9	11/16/2006	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).
10	10/18/2007	Revised to incorporate use of SRS RTR unit on Pad 4. Added missing Record of Revision entries for Revisions 7 and 8.
11	12/29/2010	Revised to implement the revision of the *Waste Isolation Pilot Plant Hazardous Waste Facility Permit*.

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LIST OF ATTACHMENTS

1.0 PURPOSE

This procedure will be used to screen candidate containers to determine if prohibited items are present in the waste. Waste containers that contain prohibited items will be returned to the Host site; otherwise the containers will receive full Nondestructive Examination (NDE) characterization under the Central Characterization Project (CCP).

1.1 Scope

The purpose of this procedure is to screen candidate containers to determine if they qualify for the extensive formal certification process. Screening is defined as a preliminary check to determine if a container contains obvious prohibited items such as liquid. This time-saving preliminary check will expedite the overall waste certification process and reduce operating costs. This procedure will **NOT** be used to certify waste. As a result, CCP-PO-001, *CCP Transuranic Waste Characterization Quality Assurance Project Plan*, will **NOT** apply.

This procedure specifies instructions for performing Real-Time Radiography (RTR) of Contact-Handled (CH) Transuranic (TRU) waste containers. It also specifies methods for documenting the screening results.

2.0 REQUIREMENTS

2.1 References

Referenced Documents

- CCP-PO-001, *CCP Transuranic Waste Characterization Quality Assurance Project 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*

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

2.3.1 Real-Time Radiography (RTR) System

[A] A control and data acquisition console/station

[B] An x-ray producing component with controls allowing the RTR operator to vary the voltage (e.g., 0-450 Kilovolt [kV]) to control the image quality

[C] An imaging system

[D] An enclosure for protection from radiation and potentially contaminated items

[E] A waste container handling system with turntable dolly assembly

[F] A video monitoring system

2.4 Precautions and Limitations

2.4.1 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. Work will **NOT** be resumed until this procedure is modified or replaced by a new document that reflects the current work practice.

2.4.2 The personal protective equipment (PPE) for normal operations is leather gloves (when handling containers). Additional PPE may be specified by Host site work control procedures. Personnel will don the required or specified PPE before starting RTR operations.

2.4.3 High energy x-rays, high voltages, and pinch points are the potential hazards associated with the RTR system. These hazards are addressed in safety training for personnel who operate the RTR System.

2.4.4 Workers who will be working in a radiation area must have read and signed the applicable Host site work control procedure(s).

2.5 Prerequisite Actions

2.5.1 Perform the RTR daily and semi-annual interlock and safety inspections in accordance withapproved controlling procedures.

2.5.2 Initiate Attachment 1, RTR Measurement Control Report, **AND** record Site Location and Examination Date.

2.5.3 Check the RTR warning lights, audible alarm, and that the semi-annual radiation survey and Estops/interlocks test and inspection certification has been performed within the last six months.

[A] Verify each item at the beginning of each day, or any time after the Power Key Switch is turned OFF and before the RTR System is powered up and used to x-ray waste containers.

2.5.4 Record the successful completion of system maintenance and safety checks, verifying that the system maintenance and system checks were performed on Attachment 1 or NA if **NOT** applicable.

2.5.5 Record YES, NO or N/A on system maintenance and safety checks on the same Attachment 1 as the Lines-Pair Resolution Test.

2.5.6 **IF** any of the system checks are recorded NO, which is fail, **THEN STOP WORK**, notify the RTR Lead Operator (LO), Vendor Project Manager (VPM), **OR** Operations Foreman (OF), and Line management as necessary, **AND DO NOT** perform RTR operations until the failed system is repaired or replaced.

[A] Verify the Audible and/or visual warning, audible alarm, minimum 20 second delay and RTR door interlocks as operating properly at the beginning of each day **OR** any time after the Power Key Switch is turned OFF.

[B] Verify the x-ray compliance label, located in the RTR control room is current, and checked after maintenance, or after any modifications.

[C] **IF** the x-ray certification is past due, **THEN** DO **NOT** use the RTR system until the appropriate surveys, tests and inspections have been completed.

[D] Ensure to conduct a radiation survey with a calibrated meter in accordance with Host site procedures prior to entering the vault.

2.6 Definitions

2.6.1 **CH TRU Waste** – Packaged TRU waste with an external combined gamma/neutron surface dose rate that does not exceed 200 millirem (mrem) per hour.

2.6.2 **Internal Container** – A container inside the outermost container examined during radiography or visual examination (VE). Drum liners, liner bags, plastic bags used for contamination control, capillary-type labware, and debris not designed to hold liquid at the time of original waste packaging are not internal containers.

2.6.3 **Observable Liquid** – Liquid that is observable using radiography or VE as specified in Permit Attachment C, Waste Analysis Plan.

2.6.4 **RTR** – A type of remote NDE that uses a luminescent screen to form a moving image from x-rays that have passed through a test object. RTR is relied on for detection of waste form shapes, the presence of observable liquid, and the presence of unvented gas cylinders.

2.6.5 **TRU Mixed Waste (TRU MW)** – TRU waste that includes hazardous constituents as identified in Title 40 *Code of Federal Regulations* (CFR) Part 261, Appendix VIII, *Hazardous Constituents*.

2.6.6 **TRU Waste** – Without regard to source or form, waste that is contaminated with alpha-emitting radionuclides with half lives greater than 20 years and concentrations greater than 100 nanocuries per gram (nCi/g) at the time of examination and that have an atomic number greater than 92.

2.6.7 **Image Intensifier** – An electronic device used to detect x-radiation and convert the energy into a visible light image viewable by the human eye.

3.0 RESPONSIBILITIES

3.1 RTR Operator

3.1.1 Operates the RTR System to determine the waste content attributes of a waste container.

3.1.2 Performs review of the data.

3.1.3 Complete Attachment 1, RTR Measurement and Control Report and Attachment 2, RTR Container Quick Screening Log Sheet.

3.2 Radiological Control Technician (RCT)

3.2.1 Prepares required Radiation Work Permits (RWPs), where applicable, for testing containers.

3.2.2 Performs contamination and swipe surveys of the RTR System.

3.3 Facility Records Custodian

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

4.0 PROCEDURE

4.1 Pre-Start Operations

NOTE
If during this operation, any abnormal conditions are observed, the operation must be STOPPED, equipment placed in a safe configuration, and the Facility Shift Manager notified.

4.1.1 Perform pre-start operations in accordance with appropriate Radiography Operating Procedure, before powering up the RTR system.

4.2 Video Setup

4.2.1 Video Monitor Setup

[A] Check that the POWER switches are in the ON position for all video monitors.

[B] Check that the power ON lights are illuminated on all video monitors.

4.3 Powering the X-ray System

4.3.1 Power ON x-ray with appropriate Radiography Operating Procedure.

4.3.2 Perform check on x-ray system interlocks with appropriate Radiography Operating procedure.

WARNING
If any RTR interlock is **NOT** functional, work may **NOT** continue until all corrective actions have been completed, and all interlocks are functional.

NOTE
The time required to perform a warm-up sequence for the RTR system following the manufacturer's recommended procedure.

4.3.3 Perform a warm-up sequence for the RTR system following the manufacturer's recommended procedure.

4.4 Container Loading

NOTE

Prior to loading the first container of the day, the RTR Operator will ensure that the Lines-Pair Resolution Test Gauge is affixed to the upper one-third of the container. The RTR Operator will also request that the Lines-Pair Resolution Test Gauge is removed after the first container or set of container(s) are scanned. The RTR Operator will request that the measuring device is affixed to each container loaded for scanning as necessary.

4.4.1 Load the container(s) onto the waste container handling system, as determined by the RTR Operator, utilizing the approved site-specified container handling procedures and equipment.

4.4.2 Transport the container(s) into the x-ray vault.

4.4.3 While maintaining visual surveillance on the video monitor, at the RTR Operator's Bench Board, CLOSE the vault doors **OR** verify the vault doors are closed.

NOTE

The Lines-Pair Resolution Test must be conducted at the beginning of each day (or at the beginning of each shift when operations are continuous).

The Lines-Pair Resolution Test must include observation of a Lines-Pair Resolution Test Gauge affixed to the upper one-third of the first container to ensure that the RTR System has adequate video quality.

To pass, at least 5 lines-pair per centimeter (5 LP/cm) must be visible.

The Lines-Pair Resolution Test Gauge shall consist of a lead-foil raster screen with a maximum thickness of 0.1 cm. The lead foil may be bonded between two plastic plates for mechanical strength. The Lines-Pair Resolution Test Gauge SHALL be capable of demonstrating a range of resolution of 5 – 50 LP/cm.

The RTR Operator may vary the following settings and controls as applicable to obtain the desired image results: kV and Milliampere (mA) settings, turntable controls, camera controls, and Image Intensifier magnifications.

4.5 Lines-Pair Resolution Test

4.5.1 Rotate the container until the Lines Pair Resolution Test Gauge appears on the raw image monitor.

4.5.2 **IF** the test FAILS,
THEN repeat this section.

4.5.3 **IF** the test FAILS a second time,
THEN STOP WORK, **AND** inform the RTR LO, vendor project manager (VPM) or operations foreman (OF), as necessary.

4.5.4 Record the results (e.g., Pass or Fail) of the Lines-Pair Resolution Test on Attachment 1, **AND** print name, sign and date.

4.5.5 Place Attachment 1 in holding file.

4.6 Performing RTR Operations

NOTE
Steps 4.6.2 through 4.6.10 are performed for each new container entering the vault for RTR examination.

4.6.1 Record date at the top of Attachment 2.

4.6.2 Obtain the correct container number by checking the video monitor, looking through the lead glass window of the vault personnel door, **OR** going outside, **AND** record on Attachment 2.

4.6.3 At the control console, ensure that the initial values for kV and mA are set in their minimum settings position.

4.6.4 At the control console, press the ON/START/X-RAY ON button, as applicable.

4.6.5 At the control console, enhance the image by varying the kV and mA values.

4.6.6 Rotate the container to the desired rotation start position using the turntable switch.

4.6.7 Use the joystick, turntable switch, and the rotation speed switch to position the turntable in the desired position to make a detailed inspection of an item or items in the container.

WARNING

Work may **NOT** continue if the x-ray warning lights DO **NOT** extinguish when the OFF/STOP/AUTO OUT button on the control console is depressed. The RTR LO, VPM or OF, as necessary, must be notified immediately.

4.6.8 At the control console, press the OFF/STOP/AUTO OUT button, as applicable.

4.6.9 **IF** the x-ray warning lights DO **NOT** extinguish,
THEN STOP WORK, **AND** immediately notify the RTR LO, VPM or OF, as necessary.

4.6.10 **IF** any items from CCP-TP-053, *CCP Standard Real-Time Radiography (RTR) Inspection Procedure,* Table 1, Prohibited Items, are found,
THEN check FAIL, **AND** record on Attachment 2:

NOTE

The description and location of prohibited items shall be recorded in the "Remarks" column on Attachment 2. For liquids, include the volume and container description (if applicable), and location of liquids (e.g. one cup of liquid in small plastic container, 6 inches from bottom).

4.6.11 **IF** none of the conditions identified in step 4.6.10 are noted during RTR,
THEN check PASS on Attachment 2.

4.6.12 **IF** a prohibited item was identified in the container,
THEN notify the RTR LO, VPM or OF, as necessary.

4.7 Container Unloading

4.7.1 OPEN the vault doors while maintaining visual surveillance on the video monitor.

4.7.2 Unload the container(s) from the waste container handling system utilizing the approved site-specified container handling procedures and equipment.

4.7.3 **IF** scanning operations are to continue,
THEN request that a container(s) be loaded on the turntable or conveyor using the approved site-specified container handling procedures and equipment, **AND** GO TO step 4.7.5.

4.7.4 **IF** scanning operations are **NOT** to continue,
THEN GO TO Section 4.8.

4.7.5 Using the joystick or switch, transport the container(s) into the vault.

4.7.6 CLOSE the vault doors while maintaining visual surveillance on the video monitor.

4.7.7 GO TO Section 4.6.2 to resume scanning operations.

4.8 RTR System Shutdown

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

4.8.1 Perform the shutdown operations with the appropriate Radiography Operating Procedure.

4.9 Video System Shutdown

4.9.1 Shut down all components on the control panel using the main power switch located on the control console, if applicable.

4.9.2 **IF** individual components are to be shut down,
THEN power down all video monitors by pressing the POWER switch on each video monitor.

4.10 Data Validation

RTR Operator

4.10.1 Retrieve Attachment 1 from holding file, **AND** check that data is recorded accurately on Attachment 1 and Attachment 2.

[A] Print name, sign, and date Attachment 2.

4.10.2 Forward Attachments 1 and 2 to the Facility Records Custodian.

Facility Records Custodian

4.10.3 Receive, process, and transmit Attachments 1 and 2 in accordance with CCP-QP-008.

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, RTR Measurement Control Report

[B] Attachment 2, RTR Container Quick Screening Log Sheet

Attachment 1 – RTR Measurement Control Report

Site Location:_____

Examination Date:_____

System Maintenance and Safety Checks:

X-Ray Compliance Certification Current	☐ YES	☐ NO	
Audible and/or Visual Warning Signals	☐ YES	☐ NO	
RTR Door Interlocks Operating	☐ YES	☐ NO	
Coolant Level Acceptable	☐ YES	☐ NO	☐ N/A
Minimum 20 Second Delay Function	☐ YES	☐ NO	☐ N/A
Emergency Shutdown Switches	☐ YES	☐ NO	

Control Checks:

Lines-Pair Resolution Test (lines-pair/cm) lp/cm _____ ☐ PASS ☐ FAIL

(Minimum Acceptable 5 lines-pair/cm)

RTR Operator: _____ Date: _____

Print Name/Signature

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Attachment 2 – RTR Container Quick Screening Log Sheet

Date:_____ Page _____ of _____

CONTAINER #	PASS	FAIL	REMARKS

RTR Operator:

_____ _____ _____
Printed Name Signature Date