

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 71124 ATTACHMENT 08

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### RADIOACTIVE SOLID WASTE PROCESSING AND RADIOACTIVE MATERIAL HANDLING, STORAGE, AND TRANSPORTATION

Effective Date: January 1, 2018

**INSPECTABLE AREAS:** Radioactive Material Processing and Transportation  
Access Control to Radiologically Significant Areas

**CORNERSTONE:**

Public Radiation Safety	80%
Occupational Radiation Safety	20%

**INSPECTION BASES:** The plant-specific application of Criterion 60, "Control of Releases of Radioactive Materials to the Environment," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," as reflected in the plant's current licensing basis, and the requirements of 10 CFR Parts 20, 61, and 71 and U.S. Department of Transportation regulations in 49 CFR parts 107, 171 through 180, and 390 through 397, as appropriate to the mode of transport" to ensure adequate protection for members of the public from the processing, handling, storage, and transportation of radioactive materials.

This inspection area verifies aspects of the Public Radiation Safety Cornerstone for which there are no performance indicators for unplanned public exposure during transportation of radioactive material.

**LEVEL OF EFFORT:** Inspect Biennially

**PROGRAM APPLICABILITY:** IMC 2515 App A

#### 71124.08-01 INSPECTION OBJECTIVES

- 01.01 To verify the effectiveness of the licensee's programs for processing, handling, storage, and transportation of radioactive material.
- 01.02 To conduct a Routine Review of problem identification and resolution activities per Inspection Procedure (IP) 71152, "Problem Identification and Resolution."

## 71124.08-02 INSPECTION REQUIREMENTS

### 02.01 Radioactive Material Storage (1 Sample)

- a. Select 1-3 areas where containers of radioactive waste are stored, and verify that the containers are labeled and controlled.
- b. Verify that the radioactive materials storage areas are controlled, posted and secured against unauthorized removal.
- c. Verify that the licensee has established a process for monitoring the impact of low-level radioactive waste storage sufficient to identify potential unmonitored, unplanned releases or nonconformance with waste disposal facility requirements.
- d. Verify that the licensee is performing periodic container inventories and inspections sufficient to meet 10 CFR 20.1406(c) and 10 CFR 20.1501(a)(2) requirements. Select 5-10 containers of stored radioactive materials, and verify that there are no signs of swelling, leakage, and deformation.

### 02.02 Radioactive Waste System Walk-down (1 Sample)

- a. Select 1-3 liquid or solid radioactive waste processing systems. Walk down accessible portions of systems to verify that the current system configuration and operation agree with the descriptions in the FSAR, Offsite Dose Calculation Manual (ODCM), process control program (PCP) and, if applicable, vendor manuals, diagrams and procedures.
- b. If applicable, select radioactive waste processing equipment that is not operational, or abandoned in place, or both, and verify that the licensee has established administrative, or physical controls, or both, to ensure that the equipment will not contribute to an unmonitored release path, or affect operating systems, or be a source of unnecessary personnel exposure.
- c. Review the adequacy and impact on radiation doses (public and occupational) of any changes made to the radioactive waste processing systems since the last inspection. Verify that changes from what is described in the FSAR were reviewed and documented as required, and, if applicable, that the licensee has reviewed the safety significance of systems and equipment abandoned in place.  
  
If the licensee uses a vendor to perform onsite waste handling or processing, verify that any changes in the system configuration were made in accordance with vendor manuals, diagrams and procedures.
- d. Select 1-3 processes for transferring radioactive waste resin and/or sludge discharges into shipping/disposal containers. Verify that the waste stream mixing, sampling procedures, and methodology for waste concentration averaging are consistent with the PCP, and provide representative samples of the waste product for the purposes of waste classification
- e. For those systems that provide tank recirculation, verify that the tank recirculation procedure provides sufficient mixing.

- f. Verify that the licensee's PCP correctly describes the current methods and procedures for dewatering and waste stabilization.

02.03 Waste Characterization and Classification (1 Sample)

- a. Select 2-3 radioactive waste streams, and verify that the licensee's radiochemical sample analysis results are sufficient to support radioactive waste characterization and verify that the licensee's use of scaling factors and calculations to account for hard to detect radionuclides is technically sound and based on current 10 CFR Part 61 analysis.
- b. For the waste streams selected above, verify that changes to plant operational parameters are taken into account to (1) maintain the validity of the waste stream composition data with respect to the sample analysis update, and (2) verify that waste shipments continue to meet the requirements of 10 CFR Part 61.
- c. Verify that the licensee has established and maintains an adequate QA program to ensure compliance with the waste classification and characterization requirements of 10 CFR 61.55, "Waste classification" and 10 CFR 61.56, "Waste characteristics."

02.04 Shipment Preparation (1 Sample)

- a. If possible, observe radiation workers during the conduct of radioactive waste processing and radioactive material shipment preparation and receipt activities.
- b. If possible, observe shipment packaging, surveying, labeling, marking, placarding, and vehicle checks, emergency response information, disposal manifests, shipping papers provided to the driver, and licensee verification of shipment readiness.

If direct observation is limited, review the technical instructions presented to workers during routine training. Verify that the licensee's training program provides training to personnel responsible for the conduct of radioactive waste processing and radioactive material shipment preparation activities.

- c. Determine if one or more shippers are knowledgeable of the shipping regulations and whether shipping personnel demonstrate adequate skills to accomplish the package preparation requirements for public transport. Verify the licensee is maintaining awareness of changes to DOT and NRC regulations, and is maintaining shipping procedures in accordance with current regulations.
- d. For Type B shipments, verify that the requirements of any applicable transport package Certificate of Compliance (CoC) have been met; that the user is a registered package user and they have an NRC approved QA program; and that the licensee's procedures for cask loading and closure procedures are consistent with the vendor's current approved procedures.
- e. For Non-Type B shipments (Type A, IP, General Design packages), verify that the shipment is made in accordance with the package quality documents.
- f. Verify that the receiving licensee is authorized to receive the shipment packages. If

applicable, verify that the licensee's procedures for package loading and closure procedures are consistent with the vendor's current approved procedures.

#### 02.05 Shipping Records (1 Sample)

Select 3-5 non-excepted package shipment (LSA I, II, III; SCO I, II; Type A or Type B) records. As a minimum, verify that the shipping documents indicate the proper shipper name; emergency response information and a 24-hour contact telephone number; accurate curie content and volume of material; and appropriate waste classification, transport index, and United Nations (UN) identification number assigned to each proper shipping name. Verify that the shipment marking, labeling, and placarding is consistent with the information in the shipping documentation.

#### 02.06 Problem Identification and Resolution

For each sample, conduct a routine review of problem identification and resolution activities using Inspection Procedure (IP) 71152, "Problem Identification and Resolution.

### 71124.08-03 INSPECTION GUIDANCE

#### Inspection Planning

- a. Whenever possible, inspectors should coordinate the inspection schedule with the licensee to coincide with risk-significant activities so that licensee performance can be directly observed.
- b. Inspectors should review the solid radioactive waste system description in the Final Safety Analysis Report (FSAR), the Process Control Program (PCP), and the most recent Annual Radiological Effluent Release Report (ARERR) for information on the types and amounts of radioactive waste disposed.

FSAR's are available on the NRC internal SharePoint site at:

<http://fusion.nrc.gov/nrr/team/dorl/FSARs/Forms/AllItems.aspx>.

Guidance on PCP documents is provided in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," and NEI 07-10A, "Generic FSAR Template Guidance for Process Control Program" (PCP), Rev. 0, (ML091460627).

- c. Inspectors should review results of radiation protection program audits related to this area (e.g., licensee's quality assurance (QA) audits, self-assessments, or other independent audits) since the last inspection. The reviews of these audits should be used to gain insights into overall licensee performance in the area of radioactive waste processing, radioactive material control, storage, accountability, characterization and shipment, and focus the inspector's activities consistent with the principle of "smart sampling."
- d. Inspectors should review the radioactive waste and radioactive shipment logs since the last inspection. The reviews of the shipment logs should be used to gain insights into

the types of shipments made and the type of transport packages used. Request licensee identify the types and classes of radioactive material shipments made.

- e. Inspectors should review latest changes to DOT and NRC regulations. See “Changes to the Radioactive Material Packaging and Transportation Regulations, Webinar for NRC and Agreement State Staff,” (ML16004A174).

#### 03.01 Radioactive Material Storage

- a. Labelling should be in accordance with 10 CFR 20.1904, “Labeling Containers,” or material should be controlled in accordance with 10 CFR 20.1905, “Exemptions to Labeling Requirements,” as appropriate. Do not duplicate inspection effort performed under Inspection Procedure 71124.01.
- b. For materials stored or used in the controlled or unrestricted areas, verify that they are secured against unauthorized removal and controlled in accordance with 10 CFR 20.1801, “Security of Stored Material,” and 10 CFR 20.1802, “Control of Material Not in Storage,” as appropriate.
- c. Inspectors should consider buildup of any gases produced by waste decomposition, chemical reactions, container deformation, loss of container integrity, or re-release of free-flowing water. Additional guidance of LLW storage is provided in Regulatory Issue Summary 08-32, “Interim Low Level Radioactive Waste Storage at Reactor Sites,” Additionally, see Information Notice 90-50, “Minimization of Methane Gas in Plant Systems and Radwaste Shipping Containers,” August 8, 1990.
- d. See Regulatory Guide 4.22, “Decommissioning Planning during Operations.” for guidance on container inventories and inspections.

Note: The inspector should exercise caution in that some of these containers may exhibit elevated dose rates and some containers may not be accessible. Container conditions can be verified by review of licensee programs or by direct observation, consistent with as low as reasonably achievable (ALARA) principles.

#### 03.02 Radioactive Waste System Walk-down

- a. No guidance provided.
- b. Potential administrative controls include drainage and isolation of the system from other systems. See guidance documents:  
  
RG 1.187, “Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments,” and  
  
NEI 96-07, Rev.1, “Guidelines for 10 CFR 50.59 Evaluations,” (ML003686043),
- c. RG 1.181, “Content of the Updated Final Safety Analysis Report in Accordance with 10 CFR 50.71(e),” and

NEI 98-03, Rev. 1, "Guidelines for Updating Final Safety Analysis Reports," (ML003779028).

- d. See 10 CFR 61.55, "Waste classification." See guidance as follows:

NRC, Branch Technical Position "Concentration Averaging and Encapsulation Branch Technical Position," Rev.1," February 2015, (ML12254B065),

NRC, "Final Branch Technical Revision on Concentration Averaging and Encapsulation," March 12, 1994, (ML031750571),

NRC, "Revised Staff Technical Position on Waste Form (SP-91-13)," January 30, 1991, (ML033630746), and

NRC, "Final Waste Classification and Waste Form Technical Position Papers," May 11, 1983, (ML033630755).

- e. Generally, a minimum of three volumes of mixing is provided. See ASTM D3370-10, "Standard Practices for Sampling Water from Closed Conduits" section 11.4 for tank recirculation information and section 12.2 for sample line flushing.
- f. The PCP should be included in the ODCM or other documents maintained by the plant. Consider the removal of freestanding liquid. If the licensee uses a vendor to perform dewatering and waste stabilization, verify that the methods and procedures are in accordance with vendor manuals, diagrams and procedures.

### 03.03 Waste Characterization and Classification

- a. Shipments of licensed material (e.g., dry active waste, primary resins, filters, sludge, and activated materials) are not subject to waste classification requirements unless the waste is in final form for disposal. Guidance is provided on meeting the requirements of 10 CFR 61.55, "Waste classification" and 10 CFR 61.56, "Waste characteristics" as well as 10 CFR Part 20 Appendix G – "Requirements for Transfers of Low-Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests" as follows:
1. NRC, "Revised Staff Technical Position on Waste Form (SP-91-13)," dated January 30, 1991, (ML033630746).
  2. NRC, "Final Waste Classification and Waste Form Technical Position Papers," May 11, 1983, (ML033630755).
  3. Regulatory Issue Summary 2015-02, "Reporting Of H-3, C-14, Tc-99, and I-129 On The Uniform Waste Manifest," (ML14272A217).
  4. Information Notice 86-20, "Low-Level Radioactive Waste Scaling Factors, 10 CFR Part 61," March 28, 1986, (ML103420436).
  5. NUREG-1608, "Categorizing and Transporting Low Specific Activity Materials and Surface Contaminated Objects," July 1998.

6. Branch Technical Position (two volumes, as follows),
    - Vol. 1, "Concentration Averaging and Encapsulation Branch Technical Position," Rev. 1," February 2015, (ML12254B065), and
    - Vol. 2, "Concentration Averaging and Encapsulation Branch Technical Position," Rev. 1, "Response to Stakeholder Comments and Technical Basis," (ML12326A611).
  7. NUREG/BR-0204, "Instructions for Completing NRC's Uniform Low-Level Radioactive Waste Manifest," Rev. 2, July 1998, (ML071870172).
  8. Regulatory Issue Summary 2008-32, "Interim Low Level Radioactive Waste Storage at Reactor Sites."
- b. Frequency of sample analysis update may be increased or decreased based on consideration of the waste stream – see RIS 2015-02.

Changes in reactor coolant chemistry (e.g., fuel integrity or corrosion film morphology) can result in changes to the waste stream compositions. Licensee's shipping staff may monitor reactor coolant radiochemistry to ensure the stability of the waste stream analyses.

- c. See RG 4.15,"Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) -- Effluent Streams and the Environment."

#### 03.04 Shipment Preparation

- a. Radiation workers should be using ALARA practices. See RG 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable."
- b. Guidance on shipping preparation is provided in the following documents:
  1. NUREG-1660, "U.S.-Specific Schedules for Transport of Specified Types of Radioactive Material Consignments,"
  2. Regulatory Guide 7.7, "Administrative Guide for Verifying Compliance with Packaging Requirements for Shipping and Receiving of Radioactive Material," Rev.1, March 2012, and
  3. NRC, "Changes to the Radioactive Material Packaging and Transportation Regulations," 2015, (ML16004A174).
- c. Verify the licensee is meeting the expectations of NRC Bulletin 79-19, "Packaging of Low-Level Radioactive Waste for Transport and Burial," dated August 10, 1979, and 49 CFR Part 172, "Hazardous Materials Table, Special Provisions, Hazardous Materials Communication, Emergency Response Information, Training Requirements, and Security Plans," Subpart H, "Training."

- d. See 10 CFR 71.38, 10 CFR 71 .106, and RG 7.10, “Establishing Quality Assurance Programs For Packaging Used In Transport Of Radioactive Material”, Revision 3.
- e. No guidance provided.
- f. No guidance provided.

#### 03.05 Shipping Records

Guidance on the content of shipping records is provided in NUREG-1660 and NUREG/BR-0204. The inspector should focus on those waste stream products that represent the most risk-significant waste shipments. Inspectors should review applicable shipment documentation which includes the package characterization report (or equivalent). Inspectors should focus on critical parameters such as waste volume, waste weight, radiological survey information, and 10 CFR 61 waste stream. For packages characterized using specific activity calculations, the inspectors should focus on the representativeness of the sample used (e.g., was the waste mixed to the extent practical prior to obtaining a sample). For packages characterized by dose to curie methodology, the inspectors should focus on the appropriateness of the radiological survey information used (e.g., were measurements taken at the appropriate distance and was the correct survey date used).

#### 03.06 Problem Identification and Resolution

Per IP 71152, it is expected that routine reviews of PI&R activities should equate to approximately 10 to 15 percent of the resources estimated for the associated baseline cornerstone procedures, this is a general estimate only based on the overall effort expected to be expended in each strategic performance area. It is anticipated that the actual hours required to be expended may vary significantly from attachment to attachment, depending on the nature and complexity of the issues that arise at the particular facility. Overall, an effort should be made to remain within the 10 to 15 percent estimate on a strategic performance area basis. Inspection time spent assessing PI&R as part of the baseline procedure attachments should be charged to the corresponding baseline procedure.

#### 71124.08-04 RESOURCE ESTIMATE

For planning purposes, it is estimated to take 34 hours, on average (with a range of 30 to 38 hours), to perform the requirements of this attachment.

#### 71124.08-05 COMPLETION STATUS

Inspection of the minimum sample size will constitute completion of this procedure in the RPS. The minimum sample size for this attachment is five, defined as the completion of the activities contained in sections 02.01 through 02.05.

If any of the sample inspection requirements cannot be completed, the procedure should be closed in accordance with IMC 0306, “Planning, Tracking and Reporting of the Reactor oversight Process (ROP).” For example, if certain steps could not be completed due to sample unavailability, the procedure should be declared “complete – full sample



not available” with a comment addressing the specific steps or activities that could not be completed.

END

Attachment 1 - Revision History for IP 71124 Attachment 08

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
N/A	12/02/09 CN 09-030	<p>Conducted four year search for commitments and found none.</p> <p>This new procedure is being issued as a result of the 2009 ROP IP Realignment. It supersedes inspection requirements in IP 71121 and IP 71122.</p>	YES 09/09/2009	ML092810433
N/A	ML15345A075 01/26/16 CN 16-003	<p>Major revisions to the IP 71124 Attachment 08 were made in response to the 2013 ROP Enhancement Project.</p> <p>The revisions clarified the existing inspection requirements and enhanced the inspection guidance section. The revision also changed how samples are counted.</p>	N/A	ML15345081

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
N/A	ML17286A292 12/21/17 CN 17-031	<p>Major editorial revision of IP 71124.08 to accommodate the launch of the new RRPS system.</p> <p>Added guidance to 03.05 concerning evaluation of shipping records.</p> <p>Section 02 was audited and modified to move guidance to Section 03 and concisely state actions necessary to complete each requirement</p> <p>PI&amp;R was transitioned from an independent sample to a requirement that would be completed as part of each sample. Guidance section updated to reflect resource estimates for routine review of PI&amp;R activities per IP 71152 Section 04.01.</p>	Verbal discussion of changes during 2017 HP Counterpart meeting, 09/06/2017	ML17300A477