

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 71124 ATTACHMENT 06

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### RADIOACTIVE GASEOUS AND LIQUID EFFLUENT TREATMENT

Effective Date: March 30, 2020

PROGRAM APPLICABILITY: IMC 2515 App A

CORNERSTONE: Public Radiation Safety

INSPECTION BASES: See IMC 0308 Attachment 2

#### SAMPLE REQUIREMENTS:

| Sample Requirements        |            | Minimum Baseline Sample Completion Requirements |             | Budgeted Range |                   |
|----------------------------|------------|---|-------------|----------------|-------------------|
| Sample Type                | Section(s) | Frequency                                       | Sample Size | Samples        | Hours             |
| Walkdowns and Observations | 03.01      | Triennial                                       | 3 per site  | 3-5 per site   | 29 +/- 4 per site |
| Sampling and Analysis      | 03.02      | Triennial                                       | 3 per site  | 3-5 per site   |                   |
| Dose Calculations          | 03.03      | Triennial                                       | 2 per site  | 2-3 per site   |                   |
| Abnormal Discharges        | 03.04      | Triennial                                       | 1 per site  | 1-3 per site   |                   |

#### 71124.06-01 INSPECTION OBJECTIVES

- 01.01 To verify the gaseous and liquid effluent processing systems are maintained so that radiological discharges are properly mitigated, monitored, and evaluated with regard to public exposure.
- 01.02 To verify that abnormal radioactive gaseous or liquid discharges and conditions, when effluent radiation monitors are out-of-service, are controlled in accordance with applicable regulatory requirements and licensee procedures.
- 01.03 To verify licensees' quality control program ensures radioactive effluent sampling and analysis requirements are satisfied so that discharges of radioactive materials are adequately quantified and evaluated from all established release points and any unmonitored and uncontrolled discharge path.
- 01.04 To verify the adequacy of public dose calculations and projections resulting from radioactive effluent discharges.

01.05 To conduct a routine review of problem identification and resolution activities per Inspection Procedure (IP) 71152, "Problem Identification and Resolution."

#### 71124.06-02 GENERAL GUIDANCE

To the extent possible, perform in-office preparation before the inspection, and complete the remaining inspection planning and follow-up actions during the onsite aspects of the inspection.

##### a. Event Reports and Effluent Report Reviews

Ensure that docketed reports since the previous inspection are included in the current inspection (e.g., annual radioactive effluent release reports, special 30-day reports, supplemental monitoring reports, offsite dose calculation manual revisions). Consider scheduling this inspection soon after the annual radiological environmental report has been submitted such that recent data can be compared between the effluent report and the environmental reports.

1. Review the Annual Radiological Effluent Release Report(s) issued since the last inspection. Determine if the reports were submitted as required by the ODCM/Technical Specifications. Note any anomalous results, unexpected trends or abnormal releases identified by the licensee for further inspection to determine if they were evaluated, were entered in the corrective action program and were adequately resolved.

##### b. ODCM and FSAR Reviews

1. Review FSAR descriptions of the radioactive effluent monitoring systems, treatment systems, and effluent flow paths so they can be verified during inspection walk-downs.
2. Review changes to the ODCM made by the licensee since the last inspection. If differences are identified, review the technical basis or evaluations of the change during the onsite inspection, to determine whether they were technically justified and maintain effluent releases ALARA.

Changes to the ODCM are provided in the latest Annual Radiological Effluent Release Report.

Review changes against the guidance in the following documents:

- (1) NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors,"
- (2) NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors,"
- (3) NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants,"
- (4) Regulatory Guide (RG) 1.109, "Calculation of Annual Doses to Man from

Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I,”

- (5) RG 1.21, “Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste,”
  - (6) RG 4.1, “Radiological Environmental Monitoring for Nuclear Power Plants,” and
  - (7) RG 4.15, “Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination)—Effluent Streams and the Environment.”
3. If applicable, evaluate the licensee’s management of non-radioactive systems that have become contaminated since the last inspection. Determine if any of the newly contaminated systems have an unmonitored effluent discharge path to the environment, whether any required ODCM revisions were made to incorporate these new pathways and whether the associated effluents were reported as required.

During the onsite inspection, review any event reports, ODCM entries and 10 CFR 50.59 evaluations that have been performed for systems that have been identified as contaminated since the last inspection. Bulletin 80-10 provides guidance on contaminated systems not originally designed to be contaminated.

c. Procedures, Special Reports, and Other Documents

1. Review LERs, event reports and/or special reports related to the effluent program issued since the previous inspection. Identify any additional focus areas for the inspection based on the scope/breadth of problems described in these reports.
2. Review effluent program implementing procedures, particularly those associated with effluent sampling, effluent monitor set point determinations and dose calculations.
3. Review copies of licensee and third party (independent) evaluation reports of the effluent monitoring program since the last inspection for insights into the licensee’s program and to aid the inspector in selecting areas for review (smart sampling). Such reports include Quality Assurance (QA) reports and reports describing the results of the inter-comparison program with third party analytical laboratories.

- d. For each sample, conduct a routine review of problem identification and resolution activities using Inspection Procedure (IP) 71152, “Problem Identification and Resolution.” Per IP 71152, it is expected that routine reviews of Problem Identification and Resolution (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.

## 71124.06-03 INSPECTION REQUIREMENTS

### 03.01 Walk Downs and Observations Sample

**Walk down selected effluent monitoring, ventilation and discharge systems to verify that the current system configurations, flow paths and operation are consistent with the descriptions in the FSAR, ODCM, and site procedures.**

#### Specific Guidance

- a. Focus on any flow measurement devices and all accessible point-of-discharge liquid and gaseous effluent monitors of the selected systems. Look for monitor degradation and out-of-service tags. For effluent sampling systems, look for indications of non-representative sampling such as severe bends in sample line tubing, non-isokinetic sampling, or lack of heat tracing in areas where temperature extremes could have an impact (causing condensation and plate-out). Additionally, be alert to degraded ventilation system connections (e.g., flexible duct connectors) that could contribute to releases.
- b. Be alert for potential unmonitored release points (such as open roof vents in BWR turbine decks, temporary structures butted against turbine, auxiliary or containment buildings), building alterations which could impact airborne, or liquid, effluent controls, and ventilation system leakage that communicates directly with the environment. Be aware of system contamination that may have impacted otherwise non-contaminated systems (e.g., PWR turbine sumps, plant boilers, RHR heat exchangers, etc.).
- c. Identify conditions that would impact the performance, or the effluent monitoring capability, of the system. Conditions that may impact ventilation system performance include degraded HEPA/charcoal banks, improper alignment, or system installation issues.
- d. When possible for gaseous waste processing, observe the routine processing and discharge of effluents. Consider if appropriate treatment equipment is used and the processing activities align with discharge permits.
- e. When possible for liquid waste processing, observe the routine processing and discharge of effluents. Consider if appropriate treatment equipment is used and the processing activities align with discharge permits.
- f. Consider if significant changes, since the last inspection, to the licensee's effluent release points were adequately evaluated.

In general, discharge points that are secondary dispersion/dilution points (i.e., those originating from authorized effluent discharges such as rain-out into storm drains or drainage from equipment condensation, including freezers) do not need further

evaluation (see RIS 2008-03). However, the discharge of radioactive material from unusual discharge points (e.g., pumping of water from cable trays) needs an evaluation prior to discharge. This evaluation can be a bounding evaluation for less significant release points (see RG 1.21, Rev. 2). Some changes may require the licensee to perform a 10 CFR 50.59 evaluation (e.g., burning contaminated oil in an auxiliary boiler). Consider if changes require NRC approval.

### 03.02 Sampling and Analyses Sample

**Verify representative samples are obtained and that, if applicable, compensatory sampling is done consistent with the ODCM.**

#### Specific Guidance

- a. Evaluate sampling system configurations or situations that may impact representative sampling (e.g., media by-pass, humidity, line loss, heat trace, sample line flushing, vessel recirculation, composite samplers, etc.). Guidance for review of reasonableness and consistency of sample data is covered in RG 4.15, Rev. 1, Section C. 8. For those licensees committed to Rev. 2 of RG 4.15, guidance is included in Section C.7 for quality assurance, Section C.8 for verification and validation, and Section 10 for preventive and corrective action. In general, the licensee's program in this area should be sufficient to detect anomalous data indicative of potential deficiencies in sample collection or analysis. For example, if the licensee's sample line for a system (e.g., stack) has lost integrity resulting in non-representative samples, would the program provide a means of detecting the deficiency?
- b. For inoperable effluent radiation monitors consider if compensatory sampling is performed consistent with the ODCM and that compensatory actions are appropriate.

### 03.03 Dose Calculations Sample

**Evaluate licensee calculations of doses resulting from effluent activities and confirm that projected doses to members of the public are within 10 CFR Part 50, Appendix I numerical guides.**

#### Specific Guidance

- a. Review radioactive liquid and gaseous waste discharge permits. Consider how the licensee is quantifying discharges and if projected doses to members of the public are accurate and calculated using methods described in the licensee's ODCM.
- b. Consider if the licensee's method(s) used to determine source term isotopes included all applicable radionuclides within detectability standards. Review the current Part 61 analyses to ensure hard-to-detect radionuclides are included in the source term.
- c. Review significant changes in reported dose values compared to the previous Annual Radiological Effluent Release Reports and evaluate the factors which may have resulted in the change. Consider dose values that change by a factor of 5, or that increase such that they approach an Appendix I criterion. Factors that may result in changes to dose values include fuel integrity, recent changes in coolant chemistry, extended outage, or major decontamination efforts. Review the licensee's dose

calculation methods. If any concerns arise, use available NRC computer codes (agreement should be within a factor of 2) to verify dose values, perform manual calculation, or review the licensee's dose calculation methods.

- d. Review changes in the licensee's offsite dose calculations since the last inspection for consistency with ODCM methods and RG 1.109. Review meteorological dispersion and deposition factors used in the ODCM and effluent dose calculations to ensure appropriate factors are being used for public dose calculations. Consider if in-plant dilution factors and dilution factors applied beyond the point of discharge into unrestricted areas are appropriately used in dose calculations for liquid effluents.
- e. Review the results of the latest Land Use Census for changes that may need to be factored into the dose calculations. Consider significant increases or decreases to population in the plant environs, changes in critical exposure pathways, the location of nearest member of the public, or critical receptor, etc.

#### 03.04 Abnormal Discharges Sample

**Verify that abnormal gaseous and liquid discharges, which occurred since the last inspection, were evaluated for the impact to the public.**

##### Specific Guidance

No Guidance.

#### 71124.06-04 REFERENCES

RG 1.21, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste"

RG 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I"

RG 4.1, "Radiological Environmental Monitoring for Nuclear Power Plants"

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

NRC Generic Letter 1989-01, "Implementation of Programmatic and Procedural Controls for Radiological Effluent Technical Specifications"

NRC Regulatory Issue Summary RIS 2008-03, "Return/Re-use of Previously Discharged Radioactive Effluents"

NRC Bulletin 1980-10, "Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release to Environment"

NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants"

NUREG-0737, "Clarification of TMI Action Plan Requirements"

NUREG-1301, "Offsite Dose Calculation Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors"

NUREG-1302, "Offsite Dose Calculation Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors"

NUREG/CR-5569, Revision 1, "Health Physics Positions Data Base" (Health Physics Positions [HPPOS] 040 and 229)

ANSI N13.1-1969, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities"

ANSI N13.10-1974, "Specification and Performance of On-site Instrumentation for Continuously Monitoring Radioactivity in Effluents"

ANSI N42.18-2004, "Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents"

ASME N510-1989, "Testing of Nuclear Air Treatment Systems"

END

Attachment 1: Revision History for IP 71124.06

| Commitment Tracking Number   | Accession Number<br>Issue Date<br>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<br>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 71122.</p>  | Yes<br>09/09/2009                                    | ML092810414   |
| C1 Reference: SRM-SECY-11-019 (August 15, 2011)<br>Senior Management Review of Overall Regulatory Approach to Groundwater Protection | ML12321A387<br>06/06/13<br>CN 13-013            | This revision directs the inspection staff to document observations of incomplete or discontinued implementation of the NEI/industry ground water protection Initiative (GPI). The revision also instructs inspection staff that if the licensee is not implementing the GPI, to review the adequacy of the licensee's implementation of the Decommissioning Planning Rule under 10 CFR 20.1406(c) and 10 CFR 20.1501, including Part 52 licensee requirements to implement the GPI and NEI-08-08A. | N/A  | ML13085A201<br>ML13129A076  |
| N/A  | ML15345A054<br>04/01/16<br>CN 16-010            | <p>Revisions to the IP 71124.06 procedure attachment were made in response to the 2013 ROP Enhancement Project.</p> <p>The revision changed how inspection samples are counted, moved the sections on ground water inspections from 71124.06 to 71124.07. It incorporates effluent monitoring instrumentation from 71124.05 into 71124.06.</p>  | N/A  | IP revised only to include new sample sizes. There is no valid comment resolution at this time.       |

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|----------------------------|---|---|---|---|
| N/A                        | ML17286A290<br>12/21/17<br>CN 17-031            | <p>Major editorial revision of IP 71124.06. Inspection Bases was updated to reference applicable regulations. Guidance added to address sample quality assurance in response to ROPFF 71124.06-1639.</p> <p>Section 02 was audited and modified to move guidance to Section 03 and to concisely state actions necessary to complete each requirement</p> <p>Modified 02.04 to add requirement for inspectors to review rad monitor calculations used to establish EAL thresholds in response to ROPFF 71124.06-2237. Reduced 02.02.a to 2-3 from 3-5.</p> <p>Moved requirement to review results of inter-lab comparison to 71124.05 (02.02.a.2).</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 | <p>ML17300A475</p> <p>Closed FBFs:</p> <p>71124.06-1639<br/>ML17300B385</p> <p>71124.06-1743<br/>ML17300B383</p> <p>71124.06-2237<br/>ML17300B384</p> |

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|----------------------------|---|---|--|---|
| N/A                        | ML19253C913<br>03/04/20<br>CN 20-014            | <p>Major editorial revisions of IP 71124.06 to conform with IMC 0040 formatting guidance</p> <p>Moved Effluent Monitoring Calibration and Testing Program Sample from IP 71124.06 to IP 71124.05 along with 6 inspection hours.</p> <p>This revision also adjusts the inspection frequency from biennial to triennial. Notified the Commission of this change in accordance with Management Directive 8.13, "Reactor Oversight Process" January 31, 2020 (ML19317D673 [Non-public])</p> | Verbal discussion of changes during 2019 HP Counterpart Meeting.<br>09/04/2019 | ML19253C930   |