

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 71124 ATTACHMENT 01

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### RADIOLOGICAL HAZARD ASSESSMENT AND EXPOSURE CONTROLS

Effective Date: January 1, 2018

**PROGRAM**

**APPLICABILITY:** IMC 2515 App A

**CORNERSTONE:** Occupational Radiation Safety

**INSPECTION BASIS:** 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
Radiological Hazard Assessment	02.01	Annual	1 per site	1 per site	36 +/- 4 per site
Instructions to Workers	02.02	Annual	1 per site	1 per site	
Contamination and Radioactive Material Control	02.03	Annual	1 per site	1 per site	
Radiological Hazards Control and Work Coverage	02.04	Annual	1 per site	1 per site	
High Radiation Area and Very High Radiation Area Controls	02.05	Annual	1 per site	1 per site	
Radiation Worker Performance and Radiation Protection Technician Proficiency	02.06	Annual	1 per site	1 per site	

## 71124.01-01 INSPECTION OBJECTIVES

- 01.01 Review and assess licensee performance in assessing the radiological hazards in the workplace associated with licensed activities and the implementation of appropriate radiation monitoring and exposure controls.
- 01.02 Verify that the licensee is properly identifying and reporting PIs for the Occupational Radiation Safety Cornerstone.
- 01.03 To conduct a Routine Review of problem identification and resolution activities per Inspection Procedure (IP) 71152, "Problem Identification and Resolution."

## 71124.01-02 INSPECTION REQUIREMENTS

### 02.01 Radiological Hazard Assessment

- a. Evaluate whether current station survey protocols are reasonable to identify the magnitude and extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazard.
- b. Determine if, since the last inspection, there have been changes to plant operations that may result in a significant new radiological hazard for onsite workers or members of the public. If a new hazard is identified, verify that, consistent with 10 CFR 20.1501, the licensee has assessed the potential impact of these changes and has implemented periodic monitoring to detect and quantify the radiological hazard.
- c. Review two radiological surveys from each of 3-6 selected plant areas. Verify that the thoroughness and frequency of the surveys is appropriate for the provided radiological hazard.
- d. Conduct walk-downs of the radiological control area (RCA)—including radioactive waste processing, storage, and handling areas—and other areas of the facility to evaluate material conditions and potential radiological conditions.
- e. Select 3-5 radiologically risk significant work activities. Verify that appropriate pre-work surveys were performed.
- f. Evaluate the radiological survey program to determine if radiological hazards are properly identified.
- g. Select 3-5 air sample survey records and verify that samples are collected and counted in accordance with licensee procedures. When possible, observe work in potential airborne areas, and verify that air samples are representative of the breathing air zone when used to assess dose.
- h. Verify the licensee has a program for monitoring levels of loose surface contamination in areas of the plant with the potential for contamination to become airborne.

## 02.02 Instructions to Workers

- a. Review 3-5 radiation work permits (RWPs) used to access high radiation areas (HRAs) and identify the work control instructions or control barriers and verify that workers have been made aware of the RWP work restrictions, requirements and work area dose rates.
- b. Verify that electronic alarming dosimeter (EAD) dose and dose rate alarm set points are based on current radiological survey data and plant procedures.
- c. As available, review 3-4 occurrences where worker's received valid EAD alarms. Verify the licensee responded to EAD alarms as directed by plant procedures.
- d. Verify that the licensee informs workers of changes in plant operations or radiological conditions that could significantly impact their occupational dose.
- e. Select 3-5 containers holding nonexempt, licensed radioactive materials that may cause unplanned or inadvertent exposure of workers, and verify that they are labeled and controlled in accordance with 10 CFR 20.1904, "Labeling Containers," or meet the requirements of 10 CFR 20.1905(g).

## 02.03 Contamination and Radioactive Material Control

- a. Observe locations where the licensee monitors potentially contaminated material leaving the RCA, and verify the methods used for control, survey, and release from these areas are sufficient to control the spread of contamination and prevent the unintended release of radioactive materials from the site.
- b. Observe workers exiting the RCA and performing contamination monitoring. Verify that there is guidance and that workers are knowledgeable on how to respond to an alarm that indicates the presence of radioactive material.
- c. Verify that radiation monitoring instrumentation has appropriate sensitivity for the type(s) of radiation present and that instrumentation is used at its typical sensitivity levels based on appropriate counting times and background radiation levels.
- d. Select 2-3 sealed sources from the licensee's inventory records that present the greatest radiological risk. Verify that sources are accounted for and have been verified to be intact (i.e., they are not leaking their radioactive content).
- e. Verify that any transactions since the last inspection involving nationally tracked sources were reported in accordance with 10 CFR 20.2207.

## 02.04 Radiological Hazards Control and Work Coverage

- a. Verify that existing radiological conditions are consistent with posted surveys, RWPs, and workers are complying with RWPs and pre-job briefings.
- b. Verify the adequacy of surveys, radiation protection job coverage and contamination controls during job performance observations.

- c. During job performance observations, verify that personnel radiation monitoring devices are placed on the individual's body consistent with the method the licensee is employing to monitor dose from external radiation sources.
- d. For high-radiation work areas with dose rate gradients of a factor of 5 or more, review the application of dosimetry to effectively monitor exposure to personnel. If available, evaluate the work controls and dosimetry used for underwater diving activities with severe dose gradients.
- e. If available, evaluate 3-5 RWP's for work within airborne radioactivity areas to verify adequate containment barrier integrity and temporary ventilation system operation. Observe actual work in airborne or potentially airborne areas, as available.
- f. Evaluate the licensee's physical and programmatic controls for highly activated or contaminated materials (non-fuel) stored within spent fuel pool and other storage pools. Verify that appropriate controls (i.e., administrative and physical controls) are in place to preclude inadvertent removal of these materials from the pool.

02.05 High Radiation Area and Very High Radiation Area Controls

- a. Observe posting and physical controls for HRAs, HRAs with dose rates greater than 1 rem/hour, and very high radiation areas (VHRAs).
- b. Inspect a representative selection of posting and physical controls for HRAs and VHRAs to verify conformance with the Occupational PI and review the circumstances of any occurrences that are potentially reportable under the licensee's Occupational PI.
- c. Review any procedural changes since the last inspection to determine the adequacy of access controls for HRAs / VHRAs. Verify that any changes to licensee procedures did not substantially reduce the effectiveness and level of worker protection.
- d. Verify the adequacy of the controls in place for HRAs with dose rates greater than 1 rem/hour for compliance with technical specifications (T.S.) and licensee procedures. This includes areas of the plant that have the potential to become risk-significant HRAs during certain plant operations.
- e. Verify the adequacy of the controls for high risk areas, such as for VHRAs, including areas that have the potential to become VHRAs during certain plant operations. Verify that an individual is unable to gain unauthorized access to any VHRA.

02.06 Radiation Worker Performance and Radiation Protection Technician Proficiency

- a. During job performance observations, evaluate radiation worker performance and awareness with respect to stated radiation protection work requirements.
- b. Verify that workers are aware of their EAD dose and dose rate set points, and allowable stay times or permissible dose for radiologically significant work under each RWP.
- c. Verify that workers are aware of the guidance on how to respond to EAD alarms in accordance with plant procedures.

- d. During job performance observations, evaluate the performance and awareness of the radiation protection technician with respect to all radiation protection work requirements.
- e. Observe radiation protection technician performance of radiation surveys. Verify the appropriateness of the instrument(s) being used, and verify instrument(s) used have been calibrated and source checked.

#### 02.07 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."

### 71124.01-03 INSPECTION GUIDANCE

To the extent practicable, inspections should be scheduled to coincide with refueling outages or other radiologically significant plant activities so as to maximize the opportunities for the inspector to verify licensee performance through direct observation.

Note: Walk-downs and work activity observations required by Section 02.01, 02.02, 02.03, 02.04, 02.05, 02.06 and 02.07 should be performed together, to the extent practical.

Review all licensee PIs for the Occupational Exposure Cornerstone. For more information on Performance Indicators, see NEI 99-02, "Regulatory Assessment Performance Indicator Guideline" (ML13261A116) and information on changes in Frequently Asked Questions at <http://www.nrc.gov/reactors/operating/oversight/program-documents.html#pi>.

Review the results of radiation protection program audits and review any condition reports related to occupational radiation safety since the last inspection. The results of the radiation protection program audit (e.g., licensee's quality assurance audits or other independent audits) and condition report reviews should be used to gain insights into overall licensee performance and focus the inspector's inspection activities on areas that are most likely to yield safety-significant results, consistent with the principle of "smart sampling." Annual radiation protection program audits are required by 10 CFR 20.1101(c). NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," (ML12166A179) provides further guidance on annual program audits in Q&A # 118, #134, and # 380.

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 attachment should be declared "Complete – full sample not available" with a comment addressing the specific steps or activities that could not be completed.

#### 03.01 Radiological Hazard Assessment Sample

- a. Survey protocol should consider the current and historical isotopic mix and isotopic percent abundance, including current and historical presence of hard-to-detect radionuclides and potential alpha hazards. See IP 71124.04 for further guidance on source term determination.

Independent surveys (or having the licensee perform a supervised confirmatory survey) may be performed on a limited basis when there is some doubt about the efficacy of the licensee's survey.

The inspector can assess the knowledge and skill of the Health Physics technicians through discussions and observation of performance.

- b. Changes in plant operations that may result in changes to the scope of radiological hazards include but are not limited to the following:
  - Degraded reactor fuel integrity that can result in hot particle contamination, or the presence of transuranic nuclides (or other hard-to-detect radionuclides), for work activities previously unaffected,
  - Changes in reactor water chemistry (e.g., hydrogen injection in a BWR) that can result in significant changes to the in-plant radiation source term,
  - Significant onsite spills, or contamination of uncontaminated systems, that can result in a new pathway for the release, or potential release, of radioactive materials off site,
  - Storage of radioactive materials in the owner-controlled area (e.g., remote or satellite RCAs within the plant site), and
  - Degraded material conditions of radwaste systems or other plant components containing radioactivity.
- c. No guidance provided.
- d. Other areas to evaluate during walkdowns can include the protected area, controlled area, contaminated tool storage, contaminated machine shops, satellite RCAs, and infrequently accessed HRAs of the plant.
- e. The results of the audit and condition report reviews should be used to gain insights into overall licensee performance and focus the inspector's inspection activities on areas that are most likely to yield safety-significant results, consistent with the principle of risk significance and "smart sampling." An appropriate survey should be of the right type, sensitivity and technique and the survey should enable adequate quantification of the radiological hazard and establishment of protective measures.
- f. Consider discussing with radiation protection staff (supervisors and technicians) the procedures, equipment, and performance of radiation surveys for both routine and non-routine activities. Technicians should be knowledgeable about when and how to survey areas for:
  - 1. Hot particles,
  - 2. Alpha emitters,
  - 3. Neutron radiation,

4. Airborne radioactivity, including the potential presence of transuranic radionuclides and/or other hard-to-detect radionuclides,
  5. Work activities that could suddenly and significantly increase radiological conditions such as in-core detector movement, fuel moved in affected areas of drywell or auxiliary building, movement of irradiated materials in the spent fuel pool, and
  6. Severe radiation field dose gradients that can result in non-uniform exposures.
- g. If the licensee uses continuous air monitors (CAMs) to monitor real-time airborne conditions, the CAM units should be properly located to serve their intended function, and in low background areas to minimize false alarms. If the licensee uses skid-mounted particulate, iodine, and noble gas (SPING)-type instruments to monitor airborne conditions, the instrument should be serving its intended purpose, and the air being monitored should be representative of the actual work areas.

Continuous air monitors positioned throughout the power plant are often used as initial trending indicators of increasing airborne radioactive material levels. While identified increases in airborne levels may not be dose significant (as indicated by the directly measurable beta- and gamma-emitting radionuclides), power plants with known transuranic contamination problems should consider and assess this transuranic component when appropriate. This focus is especially vital during certain maintenance activities in known transuranic-contaminated areas.

General area air samples are typically used by licensees to verify the effectiveness of engineering controls to mitigate airborne radiological hazards at the work site. Breathing zone air samples are necessary when the licensee assigns individual internal doses from airborne concentrations of radioactive material.

See Information Notice (IN) 97-36, "Unplanned Intakes by Worker of Transuranic Airborne Radioactive Materials and External Exposure Due to Inadequate Control of Work," June 20, 1997, for a discussion of previous problems and guidance in this area.

- h. Licensees should have a program for monitoring levels of loose surface contamination in areas of the plant with the potential for the contamination to become airborne.

Potential airborne radioactivity area activities may include entry into areas that are not routinely entered and subject to previous contamination from failed fuel. The information gained from completion of inspection requirement 02.01 will also provide insights on radiological hazards and potential hazards that the licensee's survey program should assess.

#### 03.02 Instructions to Workers Sample

- a. The radiological controls (e.g., RWPs) for entry into high radiation areas may be plant specific. Review plant T.S.s to determine the requirements for entry and work in HRAs; e.g., authorization to enter into HRAs, EAD set points, pre-job briefings, continuous job coverage, and stay time limitations.

Consider reviewing survey maps and attending pre-job briefings to observe instructions to workers. Workers should be able to remember their work restrictions established on the RWP and as instructed in pre-job briefs (i.e., where they are allowed to work, what they are allowed to do and what they are not allowed to do, and stop work conditions (e.g., contact HP prior to system breach or worker actions that may cause a change in radiological conditions)).

- b. The initial EAD set points (e.g., pre-outage) for EAD dose and dose rate alarms are commonly set based on historical data. The EAD alarm set points should be adjusted as needed based on actual dose rates and for changes in radiological conditions (e.g., during an outage).
- c. Focus the review on valid EAD alarms. Malfunctions and invalid alarms are inspected in IP 71124.04. The causes of EAD alarms should be evaluated; including validity of the EAD alarms and worker compliance with access into HRA work locations and permitted work activities. Follow-up investigations should be conducted as needed to determine the actual radiological conditions for unexpected radiological hazards.
- d. Changes in plant operations or plant conditions that may result in changes to radiological hazards include:
  - 1. Reactor head lifts, lifting or disassembly of reactor internals, fuel movement, system breaches, in core detector movement or removal, control rod drive replacement, temporary storage of highly radioactive material, resin sluicing and filter changes, and loss of airborne radioactivity control (e.g., due to system breach, lack or improper use of high-efficiency particulate air [HEPA] units, etc.),
  - 2. Degraded reactor fuel integrity that can result in hot particle contamination, or the presence of transuranic nuclides (or other hard to detect radionuclides), for work activities previously unaffected,
  - 3. Changes in reactor water chemistry (e.g., hydrogen injection in a BWR) that can result in significant changes to the in-plant radiation source term,
  - 4. Significant onsite spills, or contamination of uncontaminated systems, that can result in a new pathway for the release, or potential release, of radioactive materials off site,
  - 5. Storage of radioactive materials in the owner-controlled area (e.g., remote or satellite RCAs within the plant site, radioactive material or radioactive waste stored in drums, taped plastic bags or other containers onsite awaiting release offsite), and
  - 6. Degraded material conditions of radwaste systems or other plant components containing radioactivity.
- e. Emphasis should be on the review of containers that have the potential for containing the most significant radiological hazard (i.e., containers that provide shielding of the source, or that contain significant amounts of loose contamination that could become an airborne hazard). Containers that have the potential for containing the most significant



radiological hazards (i.e., newly generated and temporarily stored containers in out-of-the way locations such as in corners or under stairwells), or that contain significant amounts of loose contamination that could become an airborne hazard should be labeled and controlled. New containers with high dose rates generated during an outage that create radiological hazards for workers must be labeled and area postings updated.

### 03.03 Contamination and Radioactive Material Control Sample

- a. 10 CFR Part 20 does not contain release limits for the release of contaminated material to unrestricted areas; thus, the licensee's criteria should be that no detectable licensed radioactive material (radioactive gaseous and liquid effluents excepted) is released for unrestricted use or as waste into an unrestricted area.

During plant tours, be aware of any openings in plant process buildings or structures (e.g., containment equipment hatches) that may provide a means for the inadvertent release of airborne radioactive material. The licensee's program should ensure that these openings maintain an inward airflow and are controlled to prevent inadvertent releases. If the airflow is outward verify that monitoring is being performed in accordance with RG 1.21, as appropriate. Also see procedure 71124.06 for additional guidance. When possible, observe Health Physics personnel surveying and releasing material for unrestricted use to ensure that the work is performed in accordance with plant procedures and the procedures are sufficient to control the spread of contamination and prevent the unintended release of radioactive materials from the site.

- b. Review the licensee's criteria for the survey and release of personal items using small-article monitors (SAMs). Workers should be provided guidance on how to use the SAMs and they should be knowledgeable on how to respond to an alarm that indicates the presence of licensed radioactive material. If workers are permitted to self-frisk personal items, selectively consider observing one or two controls points to ensure that workers are complying with applicable guidance and training.
- c. During plant walk-downs, consider background dose rates; they should not excessively interfere with the sensitivity of contamination monitoring equipment (e.g., friskers, personnel contamination monitors). Contamination monitoring equipment for free release of equipment and materials should be in a low background area. The licensee should not have established a de facto "release limit" by raising the instrument's detection sensitivity through such methods as raising the energy discriminator level or locating the instrument in a high-radiation background area.

Review the licensee's equipment to verify that the radiation detection sensitivities are consistent with the NRC guidance as follows:

1. IE Circular 81-07, "Control of Radioactively Contaminated Material,"
2. IN 85-92, "Surveys of Wastes Before Disposal from Nuclear Reactor Facilities," December 2, 1985, including surface contamination and final measurements of aggregated waste,

3. Health Physics Position (HPPOS) 221 from NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base," May 1, 1992, for volumetrically contaminated material, and
  4. HPPOS-250 for radionuclides that decay via electron capture.
- d. Licensees are required under 20.1501(a)(2) to conduct surveys that are reasonable under the circumstances to evaluate the magnitude and extent of radiation levels; evaluate quantities of radioactivity; and evaluate potential radiological hazards.

Some plants have T.S. requirements to inventory and leak test sources greater than a certain activity (e.g., > 100 microcurie beta/gamma, and 5 microcurie alpha activity). Other plants may have moved this requirement to a licensee controlled document. In cases where the specific requirements, as stated in a plant's license, are different than the applicable regulations, licensees are obligated to meet the specific requirements as stated in their license. Therefore, it is possible that a particular licensee would be obligated to leak test sources that are otherwise exempt from leak testing per NRC regulations because that licensee contains a provision in their T.S. that generically states that sources above a certain level require leak testing.

The focus of this specific inspection requirement is on sealed sources that present the greatest radiological risk in the event their leakage is not adequately monitored. Devices that only contain exempt concentrations (10 CFR 30.14) or exempt quantities (10 CFR 30.18); or certain devices that are exempt from NRC materials licensing requirements under 10 CFR 30.15, 10 CFR 30.19, 10 CFR 30.20 or 10 CFR 30.22; or devices that contain generally licensed by-product materials that are exempt from leak testing as described in 10 CFR 31.5(c)(2)(i) or (ii) do not require leak testing per NRC regulations and do not fall within the scope of this inspection requirement. Performance deficiencies that result from licensees failing to leak test sources that require leak testing by a T.S. or a procedure, but are exempt per NRC regulations specifically listed in this paragraph should be dispositioned as minor violations.

Sealed sources in calibrators may contain levels of radioactivity that require additional security measures in accordance with 10 CFR Part 37. Most calibrators are located inside the protected area where adequate security is maintained per the station's security plans. However, some licensees have irradiators/calibrators that are located outside the protected area. Control of these radioactive sources may need particular review.

High activity irradiators/calibrators are required to be registered in the NRC Sealed Source and Device Registry (SSDR). The SSDR lists which sources can be used in a particular device, the frequency for leak tests, the ANSI Category (ANSI CAT I is a self-shielded irradiator whereas a CAT II would fall under 10 CFR Part 36, "Licenses And Radiation Safety Requirements For Irradiators"), conditions of normal use, and other information related to the use of the device.

Routine maintenance can be performed by licensee personnel, but non-routine maintenance must be performed by the device manufacturer (or distributor) or a person specifically authorized by NRC or an Agreement State. Source installations and source reloads/exchanges (e.g., non-routine maintenance) can result in overexposures if not

done safely.

- e. No guidance provided.

#### 03.04 Radiological Hazards Control and Work Coverage Sample

- a. During tours of the facility and review of ongoing work selected in 02.01 (above), evaluate ambient radiological conditions, radiological postings (e.g., radiation areas, radioactive material areas and associated radiation levels or potential radiation levels).
- b. Adequate radiological controls include performing required surveys (e.g., radiation, contamination and airborne), radiation protection job coverage (e.g., audio and visual surveillance for remote job coverage) and contamination controls. Also, consider the licensee's use of EADs as HRA monitoring devices in high noise areas.
- c. Dosimeters (e.g., thermoluminescent (TLD) dosimeters, optically stimulated luminescence (OSL) dosimeters, etc.) should be placed in the location of highest expected dose or the licensee should use an NRC-approved method of determining effective dose equivalent (for external exposures) (EDEX). Inspectors should consider the adequacy of the licensee's criteria for utilization and placement of whole body and extremity dosimeters, including their use in non-uniform radiation fields. In 10 CFR 20.1201(c), no work areas are exempt from the requirement to measure deep dose equivalent (DDE) at the part of the body receiving the highest exposure.
- d. While not a focus of this inspection, the licensee's procedure should have reasonable criteria for complying with 10 CFR 20.1201(c) for workers where dose rates are greater than 10 millirem (mrem) per hour. Additionally, assuming a dose gradient of 1.5 or more, it would not be reasonable to move the personal dosimeter (or provide for additional dosimeters), unless an individual's dose missed by not moving the dosimeter was "significant" (e.g., 30 mrem for an individual for the work shift).

From a collective dose perspective (assuming a dose gradient of 1.5 or more), a "missed" collective dose of 250 mrem or more for a job is a reasonable threshold action criterion for the licensee to provide additional personal monitoring (or move the dosimeter) to measure the highest DDE, consistent with 10 CFR 20.1201(c). The licensee may be using an NRC-approved method of measuring effective dose equivalent for external exposure (EDEX). The dosimeter placement should be consistent with an approved method (see Regulatory Guide 8.40, "Methods for Measuring Effective Dose Equivalent from External Exposure).

Consider underwater diving activities, where the dose rate gradients are severe, thereby increasing the necessity of providing multiple dosimeters and/or enhanced job controls.

- e. Consider airborne radioactivity controls and monitoring, including potentials for significant airborne levels (e.g., grinding, grit blasting, system breaches, entry into tanks, cubicles, reactor cavities).
- f. Potential focus areas include any work areas with a history of, or the potential for, airborne transuranic radionuclides, or other hard-to-detect radionuclides. For these

selected airborne radioactive material areas, verify containment barrier integrity (e.g., tent or glove box) and temporary HEPA ventilation system operation.

Licensees may store highly activated materials (e.g., fuel channels and irradiated low power range monitors) underwater on short-hangers, which could be inadvertently raised to the pool surface. If unshielded, these materials could create an HRA or VHRA.

Consider if the licensee is abiding by time limits that apply to items stored in the spent fuel pool.

For applicable guidance and a history of previous events, see the following documents:

1. Regulatory Guide 8.38, Section C.4.2,
2. IN 90-33, "Sources of Unexpected Occupational Radiation Exposure at Spent Fuel Storage Pools," dated May 9, 1990, HPPOS-016 and HPPOS-245 in NUREG/CR-5569, "Health Physics Positions Data Base" (ML093220108) and HPPOS-333 at ADAMS Accession No. ML040760364); and
3. Questions and Answers number 447 and 448 in NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," (ML12166A179).

#### 03.05 High Radiation Area and Very High Radiation Area Controls Sample

- a. These areas provide the potential for significant worker overexposures, and in some cases, potentially lethal acute exposures. Posting and physical control requirements and guidance are provided in the T.S.s, 10 CFR Part 20, specifically 20.1602, and Regulatory Guide 8.38, as regards administrative controls, barrier enhancements, and key controls.
- b. Focus on verifying aspects of the licensee PIs associated with high-risk HRAs (greater than 25 rem in 1 hour at 30 centimeters from the source) and for all VHRAs. The intent of this limited inspection oversight/requirement is to maintain continued NRC vigilance of the licensee's program and procedural controls and plant staff awareness of these special, accessible areas where the potential for lethal overexposure exists. Do not repeat this HP inspection requirement during the site wide annual PI verification team inspection.
- c. Focus on any procedural changes since the last inspection to determine the adequacy of access controls for HRAs / LHRAs. Verify that any changes to licensee procedures do not substantially reduce the effectiveness and level of worker protection.
- d. Check on the adequacy of controls for HRAs greater than 1 rem/hour. Doors should be locked, and or flashing lights installed in accordance with T.S. requirements.
- e. High risk areas include:
  1. Operationally transient areas of the plant such as radioactive waste processing, handling and storage areas, tanks, etc.

2. Pressurized Water Reactors (PWRs) primary containments and Boiling Water Reactors (BWRs) drywells may have separate controls in place for full power operation, reduced power operations, and plant shut down or outage conditions.
3. Other vulnerable areas include, but are not limited to control of BWR traversing in-core probe (TIP) areas, PWR thimble withdrawal areas, reactor cavity sumps, fuel transfer areas, spent fuel pools, reactor cavities, and/or reactor storage pits. Include the radiological controls implemented for workers entering containment during power operations in your review.
4. The radiation fields in several of the above areas may also meet the dose rate criteria necessary for VHRA controls, depending on plant operations and design. Control of diving in these areas is also radiologically challenging and will require communication beforehand with the HP group; so as to allow corresponding timely actions to properly post, control, and monitor the radiation hazards including re-access authorization. For more information, see:
  - a. NUREG-1736 "Consolidated Guidance: 10 CFR Part 20 – Standards for Protection Against Radiation" sections 10 CFR 20.1601 and 10 CFR 20.1602 and Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas of Nuclear Plants,"
  - b. Regulatory Guide 8.38, Section C.4, Appendices A and B, for guidance for specific work areas and activities that have documented histories of worker overexposures, and
  - c. NUREG/CR-6204 (ML12166A179) and NUREG/CR-5569 (ML093220108).

03.06 Radiation Worker Performance and Radiation Protection Technician Proficiency Sample

- a. Workers should be made aware of the significant radiological conditions in their workplace and the RWP controls/limits in place and that their performance should reflect the level of radiological hazards present.
- b. Workers should be able to remember their EAD set points, stay time limitations, and what they are required to do if they receive an EAD alarm.
- c. Note: Some EAD alarms are anticipated for workers traversing a high dose rate work area.
- d. Consider if technicians are aware of the radiological conditions in their workplace and the RWP controls/limits and if their performance is consistent with their training and qualifications with respect to the radiological hazards and work activities.
- e. No guidance provided.

03.07 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.

#### 71124.01-04 REFERENCES

None

END

Attachment 1 - Revision History for IP71124 Attachment 01

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	Conducted four year search for commitments and found none. This new procedure is being issued as a result of the 2009 ROP IP Realignment. It supersedes inspection requirements in IP 71121 and 71122.	Yes 09/09/2009	ML092810383
N/A	ML15344A189 02/19/16 CN 16-007	Major revisions to the IP 71124.01 procedure attachment were made in response to the 2013 ROP Enhancement Project.  The revisions clarified the existing inspection requirements and enhanced the inspection guidance section. The revision also changes how inspection samples are counted.  In addition, two feedback forms were incorporated.	N/A	ML15344A245  Closed FBF 71124.01-1636 ML15352A047  Closed FBF 71124.01-2132 ML15352A060
N/A	ML17286A284 12/21/17 CN 17-031	Major editorial revision of IP 71124.01.  Added guidance applicable to leak testing radioactive sources.  Section 02 was audited and modified to move guidance to Section 03 and concisely state actions necessary to complete each requirement.	Verbal discussion of changes during 2017 HP Counterpart meeting, 09/06/2017	ML17300A479

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)
		<p>Added 4 hours to the total hours available to complete this attachment annually. 4 hours were moved from 71124.02.</p> <p>Added table with inspection resources and sample completion summary to the first page to pilot new IP format in support of future updates to IMC 0040.</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>		