

NRC INSPECTION MANUAL

ARCB

INSPECTION PROCEDURE 71124 ATTACHMENT 01

RADIOLOGICAL HAZARD ASSESSMENT AND EXPOSURE CONTROLS

INSPECTABLE AREA: Access Control to Radiologically Significant Areas

CORNERSTONE: Occupational Radiation Safety

EFFECTIVE DATE: January 1, 2016

INSPECTION BASIS: Title 10 of the Code of Federal Regulations (10 CFR) Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," and 10 CFR Part 20, "Standards for Protection against Radiation," have regulatory requirements to ensure that licensees provide adequate protection of occupational workers from the exposure to radiation and radioactive materials during the normal operation, including anticipated operational occurrences, of a nuclear power plant. In general, adequate protection from routine exposures is demonstrated by maintaining the resultant doses below the applicable limits and as low as reasonably achievable (ALARA).

This inspectable area is partially covered by the Occupational Radiation Safety Performance Indicator (PI) in terms of controlling access to radiologically significant areas and maintaining control over occupational radiation exposures. However, the PI may not reflect situations where the radiological hazards are not adequately identified, or where the risk to the workers' health and safety from the exposure situation is not necessarily reflected by the dose outcome (i.e., substantial potential exists for an overexposure or substantial release of radioactive materials). The identification and control of radioactive materials that have a potential for release outside the restricted area, and the resultant risk of radiation exposures to members of the public, are not reflected in the Public Radiation Safety PI.

LEVEL OF EFFORT: Inspect Annually

PROGRAM APPLICABILITY: 2515 App A

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 control measures for both individual and collective exposures.
- 01.02 Verify that the licensee is properly identifying and reporting PIs for the Occupational Radiation Safety Cornerstone.
- 01.03 Identify those performance deficiencies that were reportable as a PI and which may have represented a substantial potential for overexposure of the worker.

71124.01-02 INSPECTION REQUIREMENTS

02.01 Inspection Planning.

- a. Inspectors should perform this inspection during an outage if possible, in order that the inspector can directly observe the licensee's implementation of radiological work controls and execution of work activities.
- b. Inspectors should review all licensee PIs for the Occupational Exposure Cornerstone for followup, review the results of radiation protection program audits (e.g., licensee's quality assurance audits or other independent audits), and review any condition reports related to occupational radiation safety since the last inspection. The results of the audit and operational 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."

02.02 Radiological Hazard Assessment. (1 sample)

- a. Determine if the licensee's radiation protection staff has reviewed the plant's current and historical isotopic mix and isotopic percent abundance, including current and historical presence of hard-to-detect radionuclides and potential alpha hazards.

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. Verify that, consistent with 10 CFR 20.1501, the licensee has assessed the

potential impact of these changes and has implemented periodic monitoring, as appropriate, to detect and quantify the radiological hazard. Review two radiological surveys from each of three to six selected plant areas. Verify that the thoroughness and frequency of the surveys is appropriate for the provided radiological hazard.

- c. Conduct walk-downs of the facility to evaluate material conditions and potential radiological conditions. At a minimum, walkdown the radiological control area (RCA), including radioactive waste processing, storage, and handling areas. Other areas to evaluate can include the protected area, controlled area, contaminated tool storage, contaminated machine shops, satellite RCAs, and infrequently accessed high radiation areas of the plant.

Perform independent radiation measurements as needed to verify conditions are consistent with documented licensee radiation surveys.

- d. Select three to five radiologically risk significant work activities. Verify that appropriate pre-work surveys were performed (type of survey, sensitivity of survey technique), which identify and quantify the radiological hazard and to establish adequate protective measures.
- e. Evaluate the radiological survey program to determine if radiological hazards are properly identified. Discuss with radiation protection staff (supervisors and technicians), the procedures, equipment, and performance of radiation surveys for both routine and non-routine activities. Determine in part through observation if the technicians are 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, and
 - 6. severe radiation field dose gradients that can result in non-uniform exposures.
- f. Select three to five 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.

If the licensee uses continuous air monitors (CAMs) to monitor real-time airborne conditions, verify that they are 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 (PING)-type instruments to monitor airborne conditions, verify that the instrument is serving its intended purpose, and that air being monitored is representative of the actual work areas.

Verify that the licensee has a program for monitoring levels of loose surface contamination in areas of the plant with the potential for the contamination to become airborne.

02.03 Instructions to Workers. (1 sample)

- a. Review 3-5 radiation work permits (RWPs) used to access high radiation areas (HRAs) and identify the work control instructions or control barriers that have been specified. Use plant-specific technical specification HRA requirements as the standard for work control instructions and barriers.

Verify that workers have been made aware of the RWP work restrictions and requirements, and have been informed of the work area dose rates (e.g., review of survey maps, attendance at pre-job briefings).

- b. Verify that electronic alarming dosimeter (EAD) dose and dose rate alarm set points are based on current radiological survey data and plant procedures.

As available, select 3-4 occurrences where a worker's EAD alarmed. Verify the workers responded to EAD alarms as directed by plant procedures.

Verify that the cause of EAD alarms were evaluated; including validity of the EAD alarms and worker compliance with access into HRA work locations and permitted work activities.

Verify that follow-up investigations of actual radiological conditions for unexpected radiological hazards were performed as needed.

- c. Verify that the licensee informs workers of changes in plant operations or radiological conditions that could significantly impact their occupational dose.
- d. Select three to five 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). 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).

02.04 Contamination and Radioactive Material Control. (1 sample)

- a. Observe several locations (if there are several release points from the RCA, or if there are several RCAs on site) where the licensee monitors potentially contaminated material leaving the RCA, and verify the methods used for control, survey, and release from these areas are appropriate. Verify that the radiation monitoring instrumentation has appropriate sensitivity for the type(s) of radiation present.

When possible, observe Health Physics personnel surveying and releasing material for unrestricted use to verify 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. 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.

Review the licensee's criteria for the survey and release of personal items using small-article monitors (SAMs). Verify that there is guidance and that workers are 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 verify by review of one or two controls points that workers are complying with applicable guidance and training.

- c. Verify that radiation detection instrumentation is used at its typical sensitivity levels based on appropriate counting parameters (i.e., counting times and background radiation levels).

Verify that the licensee has not 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.

- d. Select two to three 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).

Verify that any transactions (since the last inspection) involving nationally tracked sources were reported in accordance with 10 CFR 20.2207.

02.05 Radiological Hazards Control and Work Coverage. (1 sample)

- a. During tours of the facility and review of ongoing work selected in 02.02 (above), evaluate ambient radiological conditions, radiological postings (e.g., radiation areas, radioactive material areas and associated radiation levels or potential radiation levels).

Verify that existing conditions are consistent with posted surveys, RWPs, and workers are complying with the RWP and pre-job briefings.

- b. During job performance observations, verify the adequacy of radiological controls, including required surveys (including radiation, contamination, and airborne surveys for a system breach), radiation protection job coverage (including audio and visual surveillance for remote job coverage), and contamination controls. Evaluate the licensee's means of using EADs in high noise areas as HRA monitoring devices.
- c. Dosimeter selection and placement criteria: During job performance observations, verify that personnel radiation monitoring devices (thermoluminescent (TLD) dosimeters, optically stimulated luminescence (OSL) dosimeters, etc.) are placed on the individual's body consistent with the method that the licensee is employing to monitor dose from external radiation sources. Verify that the dosimeter is placed in the location of highest expected dose or that the licensee is properly applying an NRC-approved method of determining effective dose equivalent (for external exposures) (EDEX).
- d. If available, for high-radiation work areas with significant dose rate gradients (a factor of 5 or more), review the application of dosimetry to effectively monitor exposure to personnel. Verify that licensee controls are adequate.

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

- e. If available, observe work in airborne or potentially airborne areas. Review three to five RWPs for work within airborne radioactivity areas with the potential for individual worker internal exposures.

Evaluate airborne radioactive controls and monitoring, including potentials for significant airborne levels (e.g., grinding, grit blasting, system breaches, entry into tanks, cubicles, reactor cavities).

For these selected airborne radioactive material areas, verify containment barrier integrity (e.g., tent or glove box) and temporary high-efficiency particulate air (HEPA) ventilation system operation.

- f. Examine 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.

02.06 High Radiation Area and Very High Radiation Area Controls. (1 sample)

- a. Observe posting and physical controls for high radiation areas (HRAs), HRAs with dose rates greater than 1 rem/hour, and very high radiation areas (VHRAs). These areas provide the potential for significant worker overexposures, and in some cases, potentially lethal acute exposures.

- b. Conduct selective inspection of posting and physical controls for HRAs and VHRAs to verify conformance with the Occupational PI. Focus on verifying aspects of the licensee PI activities for high-risk HRAs (greater than 25 rem in 1 hour at 30 centimeters from the source) and for all VHRAs.
- 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 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.

02.07 Radiation Worker Performance and Radiation Protection Technician Proficiency.
(1 sample)

- a. During job performance observations, observe radiation worker performance with respect to stated radiation protection work requirements. Determine if workers are aware of the significant radiological conditions in their workplace and the RWP controls/limits in place and that their performance reflects the level of radiological hazards present.
- 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.

Verify that workers are aware of the guidance on how to respond to EAD alarms in accordance with plant procedures.
- c. During job performance observations, observe the performance of the radiation protection technician with respect to all radiation protection work requirements.

Determine 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.
- d. 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.

02.08 Problem Identification and Resolution. (1 sample)

- a. Verify that problems associated with radiation surveys, radiological controls, and exposure control are being identified by the licensee at an appropriate threshold and are properly addressed for resolution in the licensee corrective action program.

Verify the appropriateness of the corrective actions for three to five problems (if available) documented by the licensee that involve radiation monitoring and exposure controls.

Because a licensee's evaluation of industry operating experience can be critical, determine whether licensees are assessing the applicability of operating experience to their respective plants.

- b. Review four to six condition reports (if available) since the last inspection that find the cause of the event to be human performance errors. Determine if there is an observable pattern traceable to a similar cause. Determine if this perspective matches the corrective action approach taken by the licensee to resolve the reported problems. Discuss with the RPM any problems with the corrective actions planned or taken.
- c. Review three to five condition reports (if available) since the last inspection that find the cause of the event to be radiation protection technician error. Determine if there is an observable pattern traceable to a similar cause. Determine if this perspective matches the corrective action approach taken by the licensee to resolve the reported problems.

71124.01-03 INSPECTION GUIDANCE

03.01 Inspection Planning.

- a. To the extent practicable, inspections should be scheduled to coincide with refueling outages or other radiologically significant plant modifications so as to maximize the opportunities for the inspector to verify licensee performance through direct observation.
- b. See NEI 99-02, "Regulatory Assessment Performance Indicator Guideline" (ML13261A116) and information on changes at Frequently Asked Questions at <http://www.nrc.gov/reactors/operating/oversight/program-documents.html#pi>.
- c. 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.

03.02 Radiological Hazard Assessment.

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

- a. See also IP 71124.04.
- b. Changes in plant operations that may result in changes to the scope of radiological hazards include but are not limited to the following:
 - 1. 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,
 - 2. 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,
 - 3. 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,
 - 4. storage of radioactive materials in the owner-controlled area (e.g., remote or satellite RCAs within the plant site), and
 - 5. degraded material conditions of radwaste systems or other plant components containing radioactivity.
- c. No guidance provided.
- d. 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."

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.
- e. No guidance provided.
- f. The inspector can assess the knowledge and skill of the Health Physics technicians through discussions with and observation of performance.

- g. Potential airborne radioactivity area activities may include licensee planned entry into non-routinely entered areas subject to previous contamination from failed fuel. Work activities that could suddenly and significantly increase radiological conditions include in-core detector movement, impact of fuel moved in affected areas of drywell or auxiliary building, movement of irradiated materials in the spent fuel pool. The information gained from completion of inspection requirement 02.02 will also provide insights on radiological hazards and potential hazards that the licensee's survey program should assess.

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.

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.

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.

03.03 Instructions to Workers.

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

Workers should be able to remember their work restrictions established on the RWPs 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).

Focus this review on valid EAD alarms. Malfunctions and invalid alarms are inspected in IP 71124.04.

- c. 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 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), and
 6. degraded material conditions of radwaste systems or other plant components containing radioactivity.
- d. 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.

03.04 Contamination and Radioactive Material Control.

- 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.

- b. No guidance provided.
- c. During plant walk-downs, verify that plant background dose rates do 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.

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. Some plants may have original Technical Specification requirements for inventory and leak testing of sources > 100 μCi beta/gamma, and > 5 μCi alpha activity. Other plants with improved Technical Specifications may have moved this requirement to a licensee controlled document. For other plants with no comparable requirements, licensees are required under 10 CFR 20.1101(a) and 20.1501(a)(2) to control and maintain integrity of sealed sources.

Sealed sources in calibrators may contain levels of radioactivity that require additional security measures. 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.

03.05 Radiological Hazards Control and Work Coverage.

- a. No guidance provided.
- b. No guidance provided.
- c. Dosimeter selection and placement criteria: The review should include 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. Focus on any work areas with a history of, or the potential for, airborne transuranic radionuclides, or other hard-to-detect radionuclides.
- f. 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.

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,

3. HPPOS-016 and HPPOS-245 in NUREG/CR-5569, "Health Physics Positions Data Base" (ML093220108) and HPPOS-333 at ADAMS Accession No. ML040760364); and
4. Questions and Answers number 447 and 448 in NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," (ML12166A179).

03.06 High Radiation Area and Very High Radiation Area Controls.

- a. Posting and physical control requirements are provided in the technical specifications, 10 CFR Part 20, specifically 20.1602, and Regulatory Guide 8.38, as regards administrative controls, barrier enhancements, and key controls.
- b. 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 high radiation areas greater than 1 rem/hour. Doors should be locked, and or flashing lights installed in accordance with Technical Specification 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).

03.07 Radiation Worker Performance and Radiation Protection Technician Proficiency.

- a. No guidance provided.
- 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. Note: Some EAD alarms are anticipated for workers traversing a high dose rate work area.
- c. No guidance provided.
- d. No guidance provided.

03.08 Problem Identification and Resolution Problem Identification and Resolution.

See Inspection Procedure 71152, "Identification and Resolution of Problems," for additional guidance.

71124.01-04 RESOURCE ESTIMATE

For planning purposes, it is estimated to take 32 hours on average (with a range of 26 hours to 38 hours) annually to perform the requirements of this attachment.

71124.01-05 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 seven, defined as the sum of all the inspection requirements.

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.

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 and Feedback Resolution 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	<p>Major revisions to the IP 71124.01 procedure attachment 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 changes how inspection samples are counted.</p> <p>In addition, two feedback forms were incorporated.</p>	N/A	<p>ML15344A245</p> <p>Closed FBF 71124.01-1636 ML15352A047</p> <p>Closed FBF 71124.01-2132 ML15352A060</p>

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Att 1-1

71124.01