

NRC INSPECTION MANUAL

ARCB

INSPECTION MANUAL CHAPTER 1245, APPENDIX C3

HEALTH PHYSICS INSPECTOR
TECHNICAL PROFICIENCY
TRAINING AND QUALIFICATION JOURNAL

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Introduction

Each inspector will be assigned a supervisor or a qualified inspector to assist with this training. Each inspector must complete the Inspector Manual Chapter (IMC) 1245, Appendix A, Basic Level Training and Qualification Journal before beginning this IMC 1245, Appendix C3, with the exception of the courses identified below. However, an inspector may complete the General Proficiency requirements contained in IMC 1245, Appendix B together with the Technical Proficiency requirements outlined in Appendix C3.

There are 16 Individual Study Activities (ISA) and eight on-the-job (OJT) study assignments. Several of the ISAs have an associated OJT activity (e.g., ISA-HP-3 and OJT-HP-1). You must complete the individual ISA before beginning the corresponding OJT activity. However, it is not necessary to complete all the ISAs before beginning the OJTs. Consider discussing potential strategies for completing your qualification activities with your supervisor.

The reference documents listed in the Reference section of the ISA may be found on the Radiation Protection and Consequence Branch (ARCB) SharePoint site (<http://fusion.nrc.gov/nrr/team/dra/arcbradprotection/default.aspx>). The ANSI Standards may be obtained through the NRC electronic Library at <https://login.ihserc.com/login/erc>.

Required Health Physics Inspector Training Courses

For the two courses listed below, completion of IMC 1245, Appendix A, is recommended, but the trainee's branch chief can override this recommendation based on the trainee's experience.

R-104B, GE Technology
R-104P, Westinghouse Technology

The courses listed below do not require the completion of Appendix A, but one must complete course prerequisites.

E-110S, Power Plant Engineering, Self-study of chapters: 1.0, 2.0, 3.0, 4.0, 6.0, 14.0, 15.0, and 16.0
H-308, Transportation of Radioactive Materials
H-311, Respiratory Protection
H-111, Environmental Monitoring for Radioactivity
H-201, Health Physics Technology
H-202S, Radioactive Waste Management, Self-Study Course

Prerequisites and Documentation

Some of the references listed in each ISA are underlined for emphasis because they are directly associated with the ISA training module's evaluation criteria or are needed to complete a task. The inspectors are expected to review these references as necessary to adequately address the topics covered in the evaluation module. Mentors are expected to provide guidance on how best to use these references during the performance of the ISA.

References that are not underlined are provided to give inspectors additional information related to the topic of the ISA. Inspectors should discuss with their mentors which of these references may provide additional insights into the performance of the ISA.

Independent Study Activities should be completed (in office) prior to performing the corresponding OJT at a licensee site. However, there are in-office aspects of the OJTs that could be completed concurrently with the related ISA.

OJT tasks are to be performed concurrent with an inspection at an operational nuclear power plant under the direction of a qualified inspector. Any unexpected findings or questions that you may have should be brought to the attention of the inspector rather than to a licensee's attention.

An inspector may be given credit for equivalent training or experience. The approval process is provided in Section 05.02 of IMC 1245.

Post-Qualification and Refresher Training

This section has been moved to Appendix D-1

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-1) Code of Federal Regulations (CFR)

PURPOSE: This ISA will help the inspector develop knowledge of the appropriate radiation protection regulatory requirements and learn how to apply these requirements to radiation protection programs at nuclear power plants.

The Code of Federal Regulations (CFR) requires that licensees comply with those Parts of the CFR that pertain to the possession, use, storage, disposal and transportation of radioactive materials. Nuclear power reactor licensees, for example, are required to develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities within the plants. The CFR provide the content and scope that licensees must comply with or receive an exemption from the NRC to deviate from the requirements.

COMPETENCY AREA: REGULATORY FRAMEWORK

LEVEL OF EFFORT: 40 hours

- REFERENCES:
1. 40 CFR Part 190
 2. 29 CFR Part 1910
 3. 49 CFR Parts 170-189
 4. 10 CFR Part 19
 5. 10 CFR Part 20
 6. 10 CFR Part 21
 7. 10 CFR Part 30
 8. 10 CFR Part 31
 9. 10 CFR Part 37
 10. 10 CFR Part 34
 11. 10 CFR Part 36
 12. 10 CFR Part 40
 13. 10 CFR Part 50
 14. 10 CFR Part 51

15. 10 CFR Part 52
16. 10 CFR Part 61
17. 10 CFR Part 70
18. 10 CFR Part 71
19. 10 CFR Part 72
20. 10 CFR Part 74
21. 10 CFR Part 100
22. 40 CFR Part 141
23. NRC Enforcement Policy
24. IMC 0308, "Reactor Oversight Process"
25. IMC 0608, "Performance Indicator Program"
26. IMC 0609, "Significance Determination Process"
27. IP 71124, "Radiation Safety – Public and Occupational"
28. IP 71151, "Performance Indicator Verification"

EVALUATION
CRITERIA:

Upon completion of this ISA, the inspector should be able to:

1. Identify, recognize and locate radiation protection topics presented in the CFR that are relevant to radiation safety at nuclear power plants.
2. Discuss the content of radiation protection requirements identified in the CFR.
3. Discuss the definitions of radiation protection terms identified in the CFR.
4. Recognize and discuss the regulatory bases for the Safety Analysis Report and the Technical Specifications as found in 10 CFR 50. Discuss Part 50, Appendix I and discuss how these numerical criteria are used in the Reactor Oversight Process (ROP)
5. Relate the requirements of the CFR from Evaluation Criterion 1 to the ROP. Discuss how the enforcement process as described in the Enforcement Policy is reflected in the implementation of the health physics aspects of the ROP. (See NRC Enforcement Policy on the NRC Office of Enforcement Web site).

6. Relate the occupational and public radiation safety Performance Indicators to the requirements in the CFR.
7. Correlate the requirements of the CFR to the Radiation Safety cornerstone (See IMC 0308) and the inspection objectives of the occupational and public radiation safety inspection procedures (71151 and 71124.01, .02, .03, .04, .05, .06, .07, and .08). Cross reference the applicable CFR requirements to the inspection findings.

TASKS:

1. Locate general and specific radiation protection activities described in the CFR.
2. Compare and contrast the requirements contained in the health physics inspection procedure IP 71124 to the requirements of the CFR.
3. Review the CFR to identify the regulatory bases for the radiation protection programs at nuclear power plants. Be aware of the Supplementary Information (previously called Statements of Consideration) that are published in the Federal Register when a rule is promulgated or revised. The Supplementary Information is the information that serves as the background for the rule and is published with the rule in the Federal Register. An inspector should be aware that at the end of each section in the regulations, there are citations that reference the federal register notice when the rule was published (and corresponding "supplemental information"). The Federal Register Notices contain additional information explaining how the rule was developed in case there may be questions regarding interpretation of a particular section of the rule by the licensee. For HP related regulations, one can find most of the applicable federal register notices at the Radiation Protection and Consequence Branch (ARCB) SharePoint site.
<http://fusion.nrc.gov/nrr/team/dra/arcb/radprotection/SharedDocumentsLibrary/FederalRegisterNotices>. Alternatively, one can search <https://www.federalregister.gov/articles/search>.
4. Review the CFR and IMC 0608, "Performance Indicator Program" to identify the regulatory significance of Performance Indicators.
5. Review how the health physics significance determination processes are related to the Enforcement Policy.
6. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this ISA. Discuss the answers to the questions listed under the Evaluation Criteria section of this study guide with your supervisor.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-1.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-2) Licensee Documents for Health Physics Inspectors

PURPOSE: This ISA will help Health Physics Inspectors develop a working knowledge of the contents of the Updated Final Safety Analysis Report (UFSAR), the Technical Specifications (TS), the Technical Requirements Manual (TRM) (or equivalent), the Process Control Program (PCP), and the Offsite Dose Calculation Manual (ODCM).

Three other important programs for an inspector to be familiar with are the Radiation Protection Program, the Emergency Plan, and the Ground Water Protection Program. These documents also implement regulatory requirements.

The NRC requires that licensees maintain an Updated Final Safety Analysis Report (UFSAR). These are available on the NRC internal SharePoint site at <http://fusion.nrc.gov/nrr/team/dorl/FSARs/Forms/AllItems.aspx>. The UFSAR describes the design features, systems, programs, and design basis operation of the facility. For this reason, it is important that health physics inspectors gain a detailed knowledge of certain sections of the UFSAR that are relevant to Radiation Safety (e.g., Chapters 11, 12, and 15). Additionally, the NRC requires that licensees operate their facilities in compliance with the Technical Specifications (TS) that are available at Open ADAMS P8 Folder (TECH SPECS). The TS can also be found at <http://fusion.nrc.gov/nrr/team/dss/stsb/default.aspx>.

Each licensee maintains additional required documents such as the TRM (or equivalent), the PCP, and the ODCM. It is important that Health Physics inspectors become knowledgeable of the ODCM, TRM (or equivalent), PCP and applicable sections of the TS.

COMPETENCY
AREA: TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL
OF EFFORT: 40 Hours

- REFERENCES:
1. Plant Updated Final Safety Analysis Report
 2. Technical Specifications
 3. Technical Requirements Manual (or site-specific equivalent)
 4. Process Control Program
 5. Radiation Protection Program
 6. Emergency Plan

7. Groundwater Protection Plan
8. NEI-07-07, Industry Groundwater Protection Initiative – Final Guidance Document,” August 2007
9. Generic Letter 89-01, “Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the TS and the Relocation of Procedural Details of RETS to the ODCM or to the PCP,” January 31, 1989.
10. Licensee Basis Documents

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Identify the applicable sections of the designated facility UFSAR (meteorology, engineered safety features ventilation/filtered systems, radiation monitoring instrumentation, radiation protection, radioactive waste management, technical specifications, and quality assurance) and discuss the content.
2. Identify the applicable sections of the designated facility TS (definitions, radiation monitoring instrumentation, engineered safety features ventilation, radioactive effluents, solid radioactive waste (PCP), radiological environmental monitoring, administrative controls) and TRM (definitions, limiting conditions for operation and surveillance requirement applicability, instrumentation, radioactive effluents, radiological environmental monitoring, and administrative controls) and discuss the content and basis for the requirements.
3. Discuss the content and basis for the requirements of the designated facility ODCM.
4. Discuss definitions and terms found in the designated facility UFSAR, TS, TRM, PCP and ODCM.
5. Discuss the legal basis, purpose, license conditions, and how these documents (UFSAR, TS, TRM, PCP and ODCM) can be changed.
6. Discuss the delineated programs, processes, equipment, and limits, and the reasons they are required.
7. Discuss the requirements for surveillances, action statements, and reporting.
8. Discuss the administrative controls section of the TS and the types of information located in this section. Focus on high radiation area alternative controls and radioactive materials effluent requirements.

9. Discuss the TRM (or equivalent) purpose, legal basis, and how it can be changed.
10. Discuss the Emergency Plan's purpose, legal bases, Emergency Classifications, Protective Action Guidelines, Post Accident Sampling and Radiological Dose Assessment.
11. Discuss the Radiation Protection Plan's purpose, legal bases and its contents.
12. Discuss the Groundwater Protection Program's purpose, legal bases and its contents as recommended in NEI 07-07.

TASKS:

1. Request or suggest a facility be designated by your supervisor or mentor.
2. For the facility designated by your supervisor or mentor, locate a copy of the following documents and review the various sections as listed in the Evaluation Criteria section:
 - a. UFSAR
 - b. TS
 - c. RM (or site-specific equivalent)
 - d. ODCM
 - e. PCP
 - f. Emergency Plan
 - g. Radiation Protection Plan
 - h. Ground Water Protection Plan
3. Which license amendment(s) removed c, d, and e from the TS?
4. Meet with your supervisor or qualified inspector to discuss any questions you may have as a result of this ISA. Discuss the answers to the questions listed under the Evaluation Criteria section of this study guide with your supervisor.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-2.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-3) Radiological Hazard Assessment and Exposure Controls

PURPOSE: The purpose of this ISA is to familiarize you with the regulatory basis and historical agency position that provide adequate protection of occupational workers from exposure to radiation and radioactive materials. The information is addressed in generic correspondence, regulatory guides and regulations that pertain to the assessment of occupational radiological hazards, controlling access to radiologically significant areas, maintaining control over occupational radiation exposures and controlling the release of radioactive materials. The related inspection procedure is IP 71124.01, "Radiological Hazard Assessment and Exposure Controls."

The inspection procedure has three main objectives:

1. To review and assess licensee performance in assessing the radiological hazards in the workplace associated with license activities and the implementation of appropriate radiation monitoring and exposure control measures for both individual and collective exposures.
2. To verify that the licensee is properly identifying and reporting PIs for the Occupational Radiation Safety Cornerstone.
3. To identify those performance deficiencies that were reportable as a PI and which may have represented a substantial potential for overexposure of the worker.

COMPETENCY
AREA:

TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL

OF EFFORT:

40 hours

REFERENCES:

1. 10 CFR 19.12
2. 10 CFR 50.120
3. NUREG-1736, "Consolidated Guidance: 10 CFR Part 20- Standards for Protection Against Radiation" Review the sections that address the following
 - a. 10 CFR 20.1003
 - b. 10 CFR 20.1101
 - c. 10 CFR 20.1203 through 1204
 - d. 10 CFR 20.1501 through 1502

- e. 10 CFR 20.1601 through 1602
 - f. 10 CFR 20.1701 through 1704
 - g. 10 CFR 20.1902 through 1906
 - h. 10 CFR 20.2207
4. Regulatory Guide 8.2, "Guide for Administrative Practices in Radiation Monitoring," May 2011, and other revisions as applicable
 5. Regulatory Guide 8.25, "Air Sampling in the Workplace," June 1992, and other revisions as applicable
 6. Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas of Nuclear Plants," May 2006, and other revisions as applicable
 7. Information Notice 80-22, "Breakdowns in Contamination Control Programs," May 28, 1980
 8. Information Notice 82-31, "Overexposure of Diver During Work in Fuel Storage Pool," July 28, 1982
 9. Information Notice 84-61, "Overexposure of Diver in Pressurized Water Reactor (PWR) Refueling Cavity," August 8, 1984
 10. Information Notice 84-82, "Guidance For Posting Radiation Areas," November 19, 1984
 11. Information Notice 85-06, "Contamination of Breathing Air Systems," January 23, 1985
 12. Information Notice 88-79, "Misuse of Flashing Lights for High Radiation Area Controls," October 7, 1988
 13. Information Notice 90-33, "Sources of Unexpected Occupational Radiation Exposures at Spent Fuel Storage Pools," May 9, 1990
 14. Information Notice 90-47, "Unplanned Radiation Exposures to Personnel Extremities Due to Improper Handling of Potentially Highly Radioactive Materials," July 27, 1990
 15. Information Notice 92-75, "Unplanned Intakes of Airborne Radioactive Materials by Individuals at Nuclear Power Plants," November 12, 1992
 16. Information Notice 97-36, "Unplanned Intakes by Workers of Transuranic Airborne Radioactive Materials and External Exposure Due to Inadequate Control of Workers," June 20, 1997

17. Information Notice 97-68, "Loss of Control of Diver in a Spent Fuel Storage Pool," September 3, 1997
18. Information Notice 85-92, "Surveys of Wastes before Disposal from Nuclear Reactor Facilities," December 2, 1985
19. Information Notice 86-44, "Failure to Follow Procedures when Working in High Radiation Areas," June 10, 1986
20. Information Notice 88-63, "High Radiation Hazards from Irradiated In-core Detectors and Cables," August 15, 1988
21. Information Notice 90-44, "Dose Rate Instruments Under responding to the True Radiation Fields," June 29, 1990
22. IE Circular 81-07, "Control of Radioactively Contaminated Material," May 14 1981
23. IE Circular 76-03, "Radiation Exposures in Reactor Cavities," September 10, 1976
24. IE Bulletin 78-08, "Radiation Levels From Fuel Element Transfer Tubes," June 12, 1978
25. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base," HPPOS-016, 018, 020, 021, 022, 217, 221, 245, and 250
26. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," Questions 118, 134, 380, 447 and 448
27. Regulatory Guide 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," May 2000, and other revisions as applicable
28. ANSI/ANS 3.1, "Selection, Qualification and Training of Personnel for Nuclear Power Plants," and other revisions as applicable
29. ANSI 18.1, "Selection and Training of Nuclear Power Plant Personnel," and other revisions as applicable

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Discuss the regulatory requirements associated with airborne radioactivity areas, radiation areas, high radiation areas, and very high radiation areas.
2. Discuss the regulatory requirements associated with surveys and be able to describe what may constitute a survey other than documented direct meter measurements.

3. Discuss the acceptance criteria for training and qualifications for radiation workers, radiation protection technicians, and contract radiation protection personnel.
4. Discuss and identify free release criteria for contaminated materials from RCA to the public domain.
5. Discuss the answers to the questions associated with each scenario given in the context of regulatory requirements without using licensee procedures.

TASKS:

1. Review each underlined reference and discuss its application with a qualified inspector.
2. Read the scenarios and answer the associated questions.
3. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this ISA. Discuss the answers to the questions.

Scenario A:

The following is provided in a pre-job ALARA briefing to the work crew and support personnel.

A job has been scheduled that entails the consolidation of highly radioactive filters (stored individually in canisters) into a high integrity container (HIC) for disposal. A radiological pre-job survey was done earlier this week. The Radiation Protection (RP) tech providing job coverage will confirm survey results on entry.

There are approximately 110 used filters that originally had dose rates of up to 40 R/hr contact and 3 filters that had dose rates up to 600 R/hr contact. The dose rate in the general area where the filters are stored is approximately 25 R/hr with the lowest dose rate in the room being 1.8 R/hr at the exit door. The room is 8 by 12 feet with 8 feet ceiling. There are 2 installed CVCS filters with the housing of the one in service reading 4 R/hr contact on the side away from the old filters and 9 R/hr on the side toward the old filters. The out of service filter housing is 2.2 R/hr contact on the side away from the old filters and about 9 R/hr on the side towards the old filters. (The filter element in the out of service filter is unused but full of water.)

Most of the filters were originally stored in polyethylene bags and the bags have generally degraded and many are open. The filters are dry. In the room, general area contamination levels on horizontal surfaces range up to 200 mrad/hr smearable and vertical surfaces up to 50 mrad/hr smearable. Alpha contamination levels up to 200,000 dpm/100 cm² are common. Airborne activity in the room is typically about 0.2 DAC. The airborne activity increases to about 0.4 DAC when someone enters the room to perform a dose rate survey on the in-service filter. Room ventilation is poor, air from the room communicates with the corridor through grating used to support lead plate shielding on the top of the room. The room is at the same relative pressure as the adjacent clean corridor.

The consolidation and removal of the filters will allow the area to be decontaminated to a reasonable level so that valve repairs can be done. The consolidation will be done using 3

personnel: a RP Tech, a Rad Waste Tech and a QC inspector. It is estimated that the task can be done in 10 minutes with a total dose expenditure of approximately 1 rem.

Questions:

1. What are the legally required postings for the room?
2. What are the significant radiological risks associated with the job?
3. What surveys are appropriate given the above scenario?
4. Where should air sampling be done? Why?
5. How will workers be monitored for radiation/internal dose?
6. What protective clothing and equipment will be used for this job?

Scenario A Continued:

Because of the limited room and high dose rates it was decided to create a contaminated area in the corridor outside the room to allow moving to a low dose area (<5 mR/hr) to undress. Concerns with high airborne activity potentials led the radiation protection staff to set up a portable HEPA ventilation system with the suction "elephant trunk" (flexible 6 inch ventilation hose) run in through the open door and the discharge was routed using an "elephant trunk" to an area that had a continuous air monitor (Particulate, Iodine, Noble Gas) at the end of the corridor. Since there was no practical way to control the breathing zone airborne activity of the workers, a powered air purifying respirator (PAPR) (when blower is running, it is a positive pressure air supplied full face respirator and when blower is not running, then it is a negative pressure air purifying respirator) was chosen to provide an appropriate protection factor, provide cooling and reduce worker fatigue.

Questions:

1. Does the door blocked open with the "elephant trunk" pose a potential regulatory compliance problem?
2. What are the licensee options with regard to the "elephant trunk?"
3. What would be the best location for the suction of the "elephant trunk"?
4. Can flashing lights be used under these circumstances?
5. What is the protection factor allowed for a PAPR when the blower is running?
6. What is the protection factor allowed for a PAPR when the blower is not running?
7. If the room is not expected to exceed 1.5 DAC for the 10 minute duration of the job is posting of the area as an airborne radioactivity area required?

Assume:

The filters have been removed and the decontamination effort has begun with an expected duration of 12 hours. The airborne radioactivity is expected to average 1 DAC over the interval of work.

Questions:

1. Does the room have to be posted airborne?
2. Can credit be taken for the PAPR respirators to avoid posting the room as an airborne radioactivity area?
3. Can credit be taken for the PAPR respirator when assigning DAC-Hours for exposure tracking?

Assume:

A painter in an adjacent previously clean area is found to be contaminated, after decontamination it is determined by whole body counting that he has received an intake of 13 DAC-hours (32.5 mrem).

There is no air sample in the area to confirm the air concentration. It is believed that air diffused out of the top of the room into the corridor and was subsequently drawn into the adjacent room by normal ventilation flow.

Questions:

1. What ALARA considerations should have been made in order to reduce the Total Effective Dose Equivalent?
2. Is this a Performance Indicator (PI) occurrence?
3. What are the potential violations that could be identified?
4. If potential violations are identified, construct legally valid citations for each identified potential violation. Present the constructs to either a Senior Health Physics Inspector or Supervisor for critique.

Scenario B

The licensee is performing a 10 year in-service inspection of the reactor core support barrel and as part of the inspection the Stellite mounting lugs and snubbers will be removed using EDM (electrical discharge machining). Due to the dose rates (up to 10,000 R/hr) on the core support barrel the work will be done under water in the refueling cavity using vendor provided divers. The licensee has built diving platforms which will serve as a tool rest/ support and restrict the motions of the diver to surveyed areas that have less than 100 mrem/hr dose rates. The reactor vessel is defueled.

The work will be covered by a special RWP. Diver will be provided with two alarming dosimeters in his helmet, and has the full multi-badge complement including wearing extremity dosimetry on his fingers and toes. Pocket ion chambers are to be placed on wrists and ankles.

A small underwater survey instrument probe is to be attached to his dominant wrist to provide continuous dose rate readings to the RP technician. The RP technician will be maintaining constant line of sight on the diver by the use of viewing boxes (i.e., Floating Plexiglas windows that eliminate the visual distortion caused by ripples on the water.) All communications with the diver will be through the Dive Supervisor. The Dive Supervisor has wired 2 way communications with the diver. The RP technician can listen in on the circuit. The diver shall not enter the water until there is agreement between the RP technician and the Dive Supervisor. Both have stop work authority.

The work area will be surveyed using two independent remote probe instruments at the beginning of each shift. The rescue diver will be ready to enter the water with the exception of putting on his helmet prior to the diver entering the water. The diver will survey the dive platform using the remote probe attached to his wrist at the beginning of each working dive and the RP technician shall ensure the diver, rescue diver and Dive Supervisor are aware of the dose rates. The survey shall extend, in all directions, as far from the edge of the platform as the diver can reach without lifting his feet from the platform.

Chemistry will sample the water once a shift to determine nuclide content and activity. Tritium concentration will be analyzed daily. Pool clarity shall be maintained consistent with refueling visibility requirements by the use of two 600 gpm underwater filters. One will have a vacuum hose attached that can be used to remove any sediment that may accumulate on the dive platform. Chemistry controls can be used to supplement the filter system if needed (precipitation of colloidal iron with hydrogen peroxide).

Questions:

1. What are the radiological hazards associated with this job?
2. What is the purpose of the dive platforms?
3. Does the RP organization have to post signs under water?
4. Does the RP organization have to post the entire cavity as a Very High Radiation Area while diving operations are in progress?
5. Why is the alarming dosimeter in the diver's helmet instead of on his chest?
6. Why is the water analyzed periodically? Is it a regulatory requirement?
7. Why is extremity dosimetry required?
8. As it relates to diving operations, define radiation dose gradient and explain and discuss the impact of this on the needed controls and monitoring to ensure a diver is adequately protected. Compare the dose gradients from a 100 Ci Co-60 point source in air and under water.
9. Does the RP technician performing continuous coverage from the cavity walkway meet requirements?
11. Are bioassays required and if so what type should be performed?

Scenario C

On March 20, 2003, a whole body count vendor operator was conducting whole body counting of contract personnel as part of their station in-processing in the General Training and Orientation Center (GTOC). The GTOC is located outside of the station's Protected Area but is within the Owner Controlled Area (OCA) of the station. At approximately 11:39 a.m., the first contract individual was identified as having a positive whole body count (WBC) with Mn-54, Co-58, and Cs-137 (6.3 nanocuries (nCi), 6.4 nCi, and 4.2 nCi, respectively). The vendor operator instructed the contractor to remove his lanyard and conducted a second WBC which was negative for the presence of measurable radioactivity. Subsequently, the vendor operator returned the lanyard to the contractor with the instructions that he discard the old lanyard, since it may be mildly contaminated. At approximately 12:12 p.m., a second contractor's WBC was positive for the presence of radioactivity (approximately 9.8 nCi Co-60). The vendor operator had the contractor remove his fleece vest and repeated the WBC. The follow-up WBC was negative for the presence of measurable radioactivity, and, similarly, the vendor operator returned the fleece vest to the contractor with a suggestion that he launder the vest. At approximately 1:59 p.m., a third contractor's WBC indicated possible positive activity with a 143 keV peak. The contractor indicated that his boots may have been previously contaminated, thus the vendor operator performed another WBC of the contractor with his boots removed; the follow-up WBC was negative for the presence of measurable radioactivity.

At approximately 2:15 p.m., the Radiation Protection (RP) Instrument Supervisor and a principle radiological engineer went out to the GTOC to check on the vendor operator and they were subsequently informed about the recent positive WBCs and apparent external contaminations. The RP Instrument Supervisor initiated an investigation and was able to take control of the contaminated materials/clothing from two of the individuals who were still within the OCA by approximately 5:30 p.m. However, the first contractor had apparently left the OCA with the externally contaminated lanyard. Radiation Protection management was able to contact the first contractor later that evening; the contractor indicated that he was still in possession of the lanyard, and RP management requested that he place the lanyard in a bag and bring it into the station the following morning.

The licensee's investigation revealed that the vendor operator was apparently not cognizant of the procedural and regulatory requirements to take control of any measurable radioactive material outside of the radiologically restricted areas. The licensee additionally identified that there was less than adequate vendor oversight by the RP department and procedure deficiencies which contributed to the occurrence.

Questions:

1. What Code of Federal Regulations applies?
2. If applicable, what were the violations and by whom?

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-3.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-4) Occupational ALARA Planning and Controls

PURPOSE: The purpose of this ISA is to familiarize you with concepts that will be important to conducting the related inspection requirements contained in IP 71124.02, "Occupational ALARA Planning and Controls."

As Low As Reasonably Achievable (ALARA) is the central concept of occupational radiation protection. In the United States the linear non-threshold dose response model was selected for its ease of application in a regulatory environment. This model assumes that any exposure to ionizing radiation constitutes a risk and risk increases proportionally with exposure. An outgrowth of this is the concept of maintaining collective dose ALARA, thereby minimizing the total risk associated with the use of radioactive materials. In order to minimize individual risk, individual exposures are also maintained ALARA with the collective exposure taking the precedent. ALARA is implicitly an optimization process that attempts to maximize the benefit for a given level of total risk. Performance in this area is judged on whether the licensee has taken appropriate measures to track, and if necessary, to reduce exposures and not whether each individual exposure and dose represent an absolute minimum or whether the licensee has used all possible methods to reduce exposures. In addition, an ALARA analysis that includes engineering controls and health and safety risks is performed when elevated concentrations of radioactive material in air exist. This analysis should be consistent with maintaining the total dose equivalent ALARA.

The objective of IP 71124.02 is to assess performance with respect to maintaining individual and collective radiation exposures as low as is reasonably achievable. The inspection will determine whether the licensee has an adequate program, including administrative, operational, and engineering controls, to maintain occupational exposure ALARA.

COMPETENCY
AREA:

TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL
OF EFFORT:

40 hours

REFERENCES:

1. 10 CFR 20.1101, 20.2206
2. NUREG 1736, "Consolidated Guidance: 10 CFR 20 - Standards for Protection Against Radiation," Section 3.20.1101
3. Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Plants Will Be as Low As Is Reasonably Achievable," June 1978, and other revisions as applicable

4. Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low As Is Reasonably Achievable," May 1977, and other revisions as applicable
5. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base," HPPOS-091.
6. NCRP Report 116, "Limitation to Exposure of Ionizing Radiation," 1993
7. NCRP Report 120, "Dose Control at Nuclear Power Plants," 1994
8. NUREG-0713, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities"
9. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," Questions 62, 133, 381 and 384
10. Supplementary Information, 10 CFR 20 Final Rule, Subpart B, "Radiation Protection Programs," Federal Register Vol. 56, No. 98, pages 23366-23367, May 21, 1991
11. EPRI TR-107991, "Radiation Field Control Manual," October 1997
12. EPRI TR-1003390, Radiation Field Control Manual," December, 2004
13. EPRI TR-108737, "BWR Iron Control Monitoring Interim Report," December 1998
14. EPRI TR-107566, "Evaluation of PWR Radiation Fields: 1991 – 1996," March 1997

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Explain ALARA using a working definition that would be understandable to someone not affiliated with nuclear power or its regulation
2. Describe the considerations to be taken in the determination if an activity or process is ALARA. (Example: Risk from other hazards should not be increased substantially in the application of ALARA.)
3. Name the activities which account for the greatest percentage of the collective exposure received in a nuclear power plant.
4. Explain where in the life cycle of a nuclear plant the most significant ALARA impacts can be achieved.

5. Explain why corrosion control is an ALARA consideration and how it can affect the overall radiation exposure of the plant staff.
6. Explain the key elements to an ALARA program as described in Regulatory Guide 8.8.
7. Explain the NRC philosophy with regard to assigning a set dollar value for ALARA planning purposes.
8. Explain the interrelationship between economics and other factors such as other risk.
9. Explain the concept of "TEDE ALARA."
10. Explain the 4 factors that determine the strength of a radiation field.
11. Explain the principles of time, distance and shielding with respect to ALARA.
12. Explain the potential impact from use of temporary shielding on reactor system safety, and the licensee actions and evaluations needed to properly use this shielding.
13. Explain the modes by which radioactive material can be deposited in the body.
14. Explain why, it may not be ALARA to use protective gear or perform decontamination when work is being performed in a contaminated area with the risk of an intake.
15. Describe the role and qualifications of the Radiation Protection Manager with regard to the ALARA and radiation protection programs. This includes management access, training program approval and the program implementation.
16. Describe how the ALARA work planning is a vital, key component in the identification of hazards.
17. Describe the benefits of early HP and working craft involvement and coordination and how this affects station collective exposures.
18. Describe and discuss the benefits of using employee ALARA suggestions, feedback and lessons learned in the planning and evaluation process.
19. List the elements of information provided in an RWP, and how this information can be effectively used to brief workers before the start of the work.
20. Identify the information that should be available during an inspection of an ALARA package.

21. Discuss the qualifications and requirements for HP technician shift coverage and its purpose.
22. Explain how ALARA planning depends on extrapolating the future from past experience where successes and failures can be identified to aid in future planning.
23. State the regulatory basis of ALARA and identify what condition must exist in order to cite a violation on the basis of ALARA.

TASKS:

1. Read Regulatory Guide 8.8 and complete the following:
2. Define ALARA.
 - a. Identify the factors that must be taken into account when making ALARA recommendations.
 - b. Identify the types of activities typically accounting for the majority of the exposures.
 - c. Identify where in the life cycle of a power plant ALARA considerations should be taken.
 - d. Identify how initial material selection and subsequent chemistry control regimens to reduce reactor, feed and steam generator systems corrosion contribute to the ALARA concept.
 - e. Identify the key elements of a radiation control program.
 - f. Determine the NRC defined dollar per rem amount to be used in these analyses for occupational exposure (if any)?
 - g. Determine if an ALARA cost benefit analysis indicates that for a given action there is a net benefit does that mean that a particular action must be performed?
 - h. Determine if ALARA applies equally to internal and external exposures.
 - i. List the 4 factors that determine the intensity of a radiation field at a given point.
 - j. List the 3 principles/techniques that are commonly used to reduce exposure to radioactive material.
 - k. List the 4 modes of entry for radioactive materials into the body.
 - l. Determine how the risk of worker skin contamination fits into ALARA decision making.

- m. Determine the roles of the Radiation Protection Manager:
 - Where does he normally fit in the reporting chain?
 - Why does he normally fit there?
 - What are his specific responsibilities with regard to the ALARA program?
 - What is his responsibility with respect to the sites radiation protection training program?
 - n. Identify the purpose of the ALARA briefings and how they contribute to the ALARA program.
 - o. List the typical contents of a radiation work permit as described in Regulatory Guide 8.8.
 - p. List the typical contents and considerations of an “ALARA Package.”
 - q. Determine the purpose of having a Health Physics (Radiation Safety or Radiation Protection) technician assigned to each operating shift.
 - r. Determine the purpose of a post-operational debriefing with regard to ALARA.
3. Review the regulatory basis, including the supplementary information, for the application of the ALARA regulations.
 4. Read the scenario provided and answer the associated questions.
 5. Meet with your supervisor or a qualified inspector and discuss any questions you may have as a result of this ISA. Discuss the answers to the questions and your work products listed under the Evaluation Criteria section of this study guide with your supervisor.

Scenario A:

The following is provided as part of a post-refueling outage ALARA inspection.

The inspector found that doses for some jobs conducted during Refueling Outage 15 were not maintained as low as was reasonably achievable. From the licensee’s Refuel 15 ALARA Outage Report, the following examples were noted:

Job/RWP	Estimated Dose (Rems)	Actual Dose (Rems)
Scaffolding in the reactor building	13.000	26.125
Remove and install steam generator manway covers and inserts	4.234	7.675

Steam generator Eddy current testing/tube plugging	18.985	42.295
Health physics support for Refueling Outage 15	3.450	6.279
Spent fuel pool cleanup/diving operations	3.198	6.723
Reactor coolant pump seal removal and replacement	3.745	7.176

The licensee experienced fuel pin leakage over the last year that had increased reactor coolant activity and the level of transuranic isotopes. The cause of the fuel pin damage had been attributed to several foreign objects that were left in the reactor coolant system after Refueling Outage 14.

However, the licensee acknowledged that the increase in reactor coolant activity was responsible for only approximately 30 percent of the dose overrun. The licensee conducted post job reviews and identified additional causes for higher-than-projected doses. Some of the causes were common to more than one job. The inspector reviewed the post job reviews, received additional explanation of the licensee’s findings from the ALARA supervisor, and reached the following conclusions:

Some activities were not scheduled or sequenced optimally to reduce personnel dose. In an effort to advance the outage schedule, steam generator work was started three to four days earlier than normal, providing less time for radioactive decay. The licensee set up platforms around the steam generators while reactor coolant system cleanup was still in progress and before steam generator bowl drains were flushed.

In the original outage schedule, all reactor coolant pumps (RCP) seal work was to occur when the steam generator secondary sides were full. However, because all four RCP seals had to be worked, this was not possible. To support the revised schedule, some seal work was performed with the generators empty. In past outages when this work was conducted, “an orderly process” was followed by moving from pump to pump. This process resulted in lower personnel dose by minimizing tool movement. In Refueling Outage 15, work crews moved from pump to pump as the other work allowed. This forced the crews to move their tooling multiple times.

Insufficient mockup training was conducted to familiarize the workers with plant equipment, use of tools, and techniques to reduce dose. Workers spent more than the expected staff-hours in high dose areas because “the crews were inexperienced” and “used poor ALARA practices.” Additional mockup training should have been provided to individuals that installed and removed steam generator manways and inserts and those that used robotic eddy current equipment.

Communication between radiation protection personnel and contractor personnel was “poor.” Radiation protection personnel “seldom” knew job status or the schedule for the upcoming shift work. Therefore, they could not plan their activities to reduce dose.

There was a “lack of involvement and ownership” of the scaffolding program by craft supervisors. Reviews of scaffolding packages were not completed in a timely manner. Alternatives to erecting scaffolding were not pursued. Scaffolding was allowed to be erected during times in the outage when dose rates were high, such as during reactor coolant system cleanup.

The inspector also found that high collective radiation dose has been a continuing problem. Dose information obtained from the licensee is shown in the following chart.

	3 years ago	2 years ago	Last year	This year
Annual Collective Dose	237	21.5	220.2	332
Outage Dose	212	NA	197	313
3-Year Average Collective Dose	142.6	149.2	159.6	191.2

Questions:

1. What are acceptable reasons for giving credit for exceeding dose projections?
2. What are not legitimate reasons for giving credit for exceeding dose projections?
3. What constitutes an ALARA finding?
4. How many ALARA findings can be identified in the above scenario?
5. When would an ALARA violation be warranted?

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-4.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-5) In-Plant Airborne Radioactivity Control and Mitigation

PURPOSE: The purpose of this ISA is to familiarize you with various regulatory requirements that support Inspection Procedure 71124.03, In-Plant Airborne Radioactivity Control and Mitigation. The objectives of this procedure are to verify that the licensee is employing, to the extent practicable, process and engineering controls such that in-plant airborne concentrations are being controlled consistent with ALARA, to the extent necessary to validate plant operations as reported by the PI, and to verify that the practices and use of respiratory protection devices on site do not pose an undue risk to the wearer.

Title 10 of the Code of Federal Regulations (10CFR) Part 20, Subpart H, Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas,” requires licensees to use, to the extent practical, process or other engineering controls (e.g., permanent and installed filtered ventilation, temporary HEPA units, downdraft tables, glove boxes, tents and other enclosures, limitation of exposure times, and decontamination) to control the concentration of radioactivity in the air. If process or other engineering controls alone are not able to maintain airborne concentrations of radionuclides below those defined as an airborne radioactivity area, then licensees must take other actions, consistent with the ALARA principle, to limit the intake of these radionuclides. The use of respiratory protection devices is one of the optional measures to limit intake.

COMPETENCY
AREA:

TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL

OF EFFORT: 19 hours

REFERENCES:

1. 10 CFR 20.1101(b)
2. 10 CFR Part 20, Subpart H, “Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas”
3. 10 CFR Part 20, Appendix A, “Assigned Protection Factors for Respirators”
4. 29 CFR Part 1910, Subpart I, “Personal Protective Equipment”
5. Regulatory Guide 8.15, “Acceptable Programs For Respiratory Protection,” October 1999, and other revisions as applicable
6. NUREG-1400, “Air Sampling in the Workplace”

7. NUREG/CR-0041, Rev. 1, "Manual of Respiratory Protection Against Airborne Radioactive Materials"
8. NUREG-0938, "Information for Establishing Bioassay Measurements and Evaluations of Tritium Exposures"
9. ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989
10. Information Notice 85-87, "Hazards of Inerting Atmospheres," November 18, 1985
11. Information Notice 98-20, "Problems with Emergency Preparedness Respiratory Protection Programs," June 3, 1998
12. Information Notice 99-05, "Inadvertent Discharge of Carbon Dioxide Fire Protection System and Gas Mitigation," March 8, 1999
13. Information Notice 00-07, "National Institute for Occupational Safety and Health Respirator User Notice: Special Precautions for Using Certain Self-Contained Breathing Apparatus Air Cylinders," April 13, 2000
14. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base," HPPOS-94, 103, and 147
15. NUREG 1736, "Consolidated Guidance: 10 CFR 20 - Standards for Protection Against Radiation, Section 3.20.1703
16. Supplementary Information, 10 CFR Part 20, "Respiratory Protection and Controls to Restrict Internal Exposures," Final Rule Summary, Federal Register Vol. 64, No. 194, page 54543, October 7, 1999
17. Information Notice 94-35, "NIOSH Respirator User Notices," "Inadvertent Separation of the Mask Mounted Regulator (MMR) from the Face piece of the Mine Safety Appliances (MSA) Company Self Contained Breathing Apparatus (SCBA) and Status Update," May 16, 1994
18. Information Notice 95-01, "DOT Safety Advisory: High Pressure Aluminum Seamless and Aluminum Composite Hoop Wrapped Cylinders," January 4, 1995
19. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," Questions 91, 124 and 418
20. ANSI Z88.2-1992, "Practices for Respiratory Protection," and other revisions as applicable

21. ANSI Z88.10-2001, "Fit Testing Methods," and other revisions as applicable
22. IE Circular 80-03, "Protection From Toxic Gas Hazards," March 6, 1980
23. Information Notice 81-26, Part 4, "Personnel Entry Into Inerted Containment"
24. Information Notice 86-46, "Improper Cleaning and Decontamination of Respiratory Protection Equipment"
25. Information Notice 83-68, "Respirator User Warning: Defective Self-Contained Breathing Apparatus Air Cylinders," October 11, 1983
26. Information Notice 85-48, "Respirator User Warning: Defective Self-Contained Breathing Apparatus Air Cylinders," June 19, 1985
27. Information Notice 86-103, "Respirator Coupling Nut Assembly Failures," December 16, 1986
28. Information Notice 89-47, "Potential Problems with Worn or Distorted Hose Clamps on Self-Contained Breathing Apparatus," May 18, 1989
29. Information Notice 97-66, "Failure to Provide Special Lenses for Operators Using Respirator or SCBA During Emergency Operations," August 20, 1997

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Discuss the application of the relevant portions of 10 CFR 20 which pertain to respiratory protective equipment.
2. Discuss the regulatory philosophy for providing engineering controls to minimize airborne radioactivity (i.e., describe why Part 20 gives priority to engineering controls over the use respiratory protection devices.)
3. Discuss the importance of providing adequate monitoring for changing airborne radioactivity concentrations in the workplace.
4. Describe the essential elements of a basic respiratory protection program that would be acceptable to the NRC.
5. Describe the characteristics of Grade D air quality, and where, when, and how air quality is tested.

6. Explain the potential consequences of not using SCBA in IDLH environments, and describe the testing, maintenance, and replacement cycles for the various SCBA cylinders.
7. Describe deficiencies that are commonly found in respiratory protection training programs for the use of SCBA and how they might impact emergency preparedness.
8. Describe the relationship of NIOSH certification of SCBA designs to NRC regulatory compliance and explain how part substitution can invalidate the NIOSH certification.

TASKS:

1. Read 10 CFR 20, Subpart H portions applicable to SCBA.
2. Read Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," October 1999.
3. Read Information Notice 85-87, "Hazards of Inerting Atmospheres," November 18, 1985.
4. Read Information Notice 98-20, "Problems with Emergency Preparedness Respiratory Protection Programs," June 3, 1998 (This one is particularly important from an inspection standpoint.)
5. Read HPPOS-147, "Respirator User's Notice – Use of Unapproved Subassemblies" (This is a recurrent problem.)
6. Read the scenario provided and answer associated questions.
7. Meet with your supervisor or a qualified Health Physics inspector and discuss any questions you may have as a result of this ISA. Discuss the answers to the questions and your work products listed under the Evaluation Criteria of this study guide with your supervisor.

Scenario A

During a review of self-contained breathing apparatus maintenance and surveillance records, an inspector identified that 36 self-contained breathing apparatus air bottles were beyond the 3-year hydrostatic test dates. Hydrostatic testing had expired in April 2001 for 31 of the self-contained breathing apparatus air bottles that were in service. According to the NIOSH, self-contained breathing apparatus units with expired hydrostatic testing are no longer certified.

Questions:

1. Describe the relationship of NIOSH certification to SCBA designs to NRC regulatory compliance.
2. Could this be a violation? Why or why not.
3. Other than Radiation Protection, what NRC cornerstone would also need to be evaluated?

Scenario B

A plant is in a refueling outage in which the steam generators are scheduled to be replaced. As part of the steam generator project, the plant will have to cut out a large opening in the containment building to support the removal of the old generators and the installation of the new generators. One of the activities involves vacuuming out the "A" steam generator cold leg to remove debris prior to the pipe end decontamination work.

While performing the debris removal activity using a vacuum cleaner unequipped with a HEPA filter and designated "wet use", the exhaust from the vacuum cleaner caused airborne radioactivity levels to increase throughout containment. When various portable air monitoring systems alarmed alerting personnel to the presence of airborne radioactivity, Radiation Protection personnel initiated the evacuation of about 175 workers from containment. All of the individuals were monitored for external and internal contamination using personnel contamination monitors and whole body counting equipment. Of the 175 workers, 145 workers were determined to have sustained either low-level external radioactive contamination or low-level intakes of airborne radioactivity. The highest calculated internal committed effective dose equivalent to one individual was slightly over 10 mrem.

Low level contamination was detected outside the Personnel Hatch. Airborne environmental monitoring samples collected from two ODCM continuous monitoring stations identified statistically detectable radioactivity above background. Estimates of the projected maximum annual dose to the critical receptor ranged from 0.02 to 0.05 mrem (organ) in a year.

Questions

1. Assess the event for performance deficiencies, possible violations and significance of the event.
2. With respect to the occupational radiological safety aspects associated with the event, discuss what should be reviewed as part of your assessment.
3. What specific radiological hazard that can have a significant impact in the evaluation of occupational internal exposure does the licensee need to consider in their evaluation?
4. Has a violation of 10 CFR 20 occurred? If so, what regulation is applicable to the event?
5. What do you believe the safety significance of this event to be and why? Identify any cross cutting aspects that may be applicable.

6. With respect to the public radiological safety aspects associated with the event, discuss what should be reviewed as part of your assessment.
7. Are doses to the public significant? Explain answer.
8. What other possible violations could have occurred from this event? (Hint: Consider controls for the large additional opening of containment – did they work)

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-5.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-6) Occupational Dose Assessment

PURPOSE: The purpose of this ISA is to familiarize you with various regulatory requirements that support Inspection Procedure 71124.04, "Occupational Dose Assessment." The objectives of this inspection procedure are to determine the accuracy and operability of personal monitoring equipment, determine the accuracy and effectiveness of the licensee's methods for determining total effective dose equivalent, and ensure that occupational dose is appropriately monitored.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE REGULATORY FRAMEWORK

LEVEL OF EFFORT: 19 hours

- REFERENCES:
1. 10 CFR 20.1003 (Definitions associated with study activity area)
 2. 10 CFR 20.1201 through 20.1208
 3. 10 CFR 20.1501(c)
 4. IP 71124.04, Section 02.04(a)
 5. Regulatory Issue Summary 2003-04, "Use of the Effective Dose Equivalent in Place of the Deep Dose Equivalent in Dose Assessments," February 13, 2003
 6. Regulatory Issue Summary 2004-01, "Method for Estimating Effective Dose Equivalent from External Radiation Sources Using Two Dosimeters," February 17, 2004
 7. Regulatory Issue Summary 2009-09, "Use of Multiple Dosimetry and Compartment Factors in Determining Effective Dose Equivalent from External Radiation Exposures," July 13, 2009
 8. Regulatory Guide 8.40, "Methods for Estimating Effective Dose Equivalent from External Exposure," July 2010, and other revisions as applicable
 9. ANSI N13.52-1999, "Personnel Neutron Dosimeters (Neutron Energies Less Than 20 MeV)," and other revisions as applicable
 10. ANSI N13.6-1999, "Practice for Occupational Radiation Exposure Records System," and other revisions as applicable
 11. ANSI N13.11-2001, "Personnel Dosimetry Performance – Criteria for Testing," and other revisions as applicable

12. ANSI N13.30-1996, "Performance Criteria for Bioassay," and other revisions as applicable
13. NUREG/CR-6581, "Considerations in the Application of the Electronic Dosimeter to Dose of Record"
14. Regulatory Guide 8.13, "Instructions Concerning Prenatal Radiation Exposure," June 1999, and other revisions as applicable
15. Regulatory Guide 8.20, "Applications of Bioassay for Radioiodine," September 2014, and other revisions as applicable
16. Regulatory Guide 8.34, "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses," July 1992, and other revisions as applicable
17. Regulatory Guide 8.7, "Instructions for Recording and Reporting Occupational Radiation Exposure Data," November 2005, and other revisions as applicable
18. NUREG/CR-4884, "Interpretation of Bioassay Measurements"
19. Regulatory Guide 8.36, "Radiation Dose to the Embryo/Fetus," July 1992, and other revisions as applicable
20. NCRP Report 128, "Radionuclide Exposure of the Embryo/Fetus," 1998
21. NUREG/CR-5631, "Contribution of Maternal Radionuclide Burdens to Prenatal Radiation Doses--Interim Recommendations"

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Describe the responsibility of a licensee for limiting, monitoring, and tracking the exposure of a declared pregnant worker. Specifically, discuss the following:
 - a. the timing of licensee actions,
 - b. the embryo/fetus exposure limits, and
 - c. the inspection considerations detailed in IP 71124.04, Section 02.05(a)
2. Describe the regulatory requirements for the accreditation of personnel dosimeters used for legal dose records.
3. Describe the NRC-approved methods for assessing effective dose equivalent.
4. Describe the NRC-approved methods for assessing internal doses described in RG 8.34.

5. Discuss TEDE, CEDE, LDE, SDE and how they are measured and where the values are recorded in NRC Forms 4 and 5.

TASKS:

1. Review RG 8.13 related to a declared pregnant worker (DPW) and discuss the technical basis for the DPW dose limit.
2. Review each underlined reference and discuss its application with a qualified inspector.
3. Read the scenarios and answer the associated questions.

Scenario A: Adequate Surveillance of Workers in High Radiation Area

A pipe fitter (Worker A) received an unintended radiation exposure while working in the reactor water cleanup (RWCU) heat exchanger room. The plant was in refueling outage RFO9 and the RWCU system was out of service for chemical decontamination. Radiation protection (RP) personnel were supporting work in the RWCU heat exchanger room which involved rotating the remaining three (of 16) spectacle flanges, which were located close to the heat exchangers, as part of the chemical decontamination process. Substantial radiation dose gradients existed in the room as a result of hot spots on the heat exchangers and associated piping. RP support personnel for this portion of the work consisted of an ALARA specialist, a lead RP technician (RPT) and a RP specialist (RPS). An Infrequently Performed Test or Evolution briefing and an ALARA briefing for the flange work were conducted. The workers were issued telemetry dosimetry (wireless remote monitoring system) to track their dose as the licensee had determined that telemetry dosimetry would be the only method for tracking worker exposure for this job. The electronic dosimeter set-points were 1000 mrem total dose and 15000 mrem/hour dose rate. Approximately 10 workers were on the telemetry dosimetry monitoring system. A television camera was located inside the RWCU room and provided visual monitoring of the workers. However, this camera was controlled by licensee personnel on the refueling floor and not by the RP staff controlling this job. The ALARA specialist and the RPT were outside of the RWCU room and the lead RPT was stationed just inside the room. One worker (A) noted to the RP staff that his telemetry screen entry was a different color than all of the other workers.

Worker A then noticed that his name was no longer on the telemetry computer screen, he informed the RPS. He was told that his name would come back later. A short time later Worker A noted to the RP staff that his name was still not on the telemetry read out. The worker was told that his name would probably show up again when he entered the RWCU room and he was told to talk to the lead RPT about the issue. The RPS did not expect Worker A to enter the RWCU room for work because he believed that the worker would notify the lead RPT inside the RWCU room that he was having a dosimetry problem and would be replaced. Worker A did not discuss his telemetry problem with the lead RPT and entered the RWCU room with the other two workers. However, the RP staff outside of the RWCU room did not realize that all three workers entered the area. Once inside, Workers A and B were in close proximity to each other but Worker A was not at his assigned flange and was unable to locate his correct work site. After some time he returned to the entrance of the room. The third worker (C) climbed a scaffold to upper elevations of the room to work on his flange. After Worker A returned to the alcove just inside the RWCU room to ask about the location of his work area, Worker B was reaching his limit of 800 mrem for the entry and all workers were told to return to the low dose waiting area just inside of the room. Worker B told Worker A where the flange was that Worker A was to work on, and Worker B left the area. Worker C asked for his dose and was told 57

mrem by the RPT who was outside of the room acting as the LHRA gate guard. Worker A also asked for his dose and was told 57 mrem, which he questioned. He was told that his reading was low and that he could return to work. Both Workers A and C returned to work. Worker C then finished his task and exited the area. The RPS, who periodically had been observing the workers on a TV monitor that had a view of the lower area, had assumed that the worker who was showing increased dose on the telemetry (Worker C) was the same person he had seen on the monitor. When the RPS noticed that a worker was still in the area with no one now in a dose field on the telemetry screen, he told the lead RPT to remove the worker from the RWCU room. When Worker A exited the room his electronic dosimeter registered 1834 mrem. Worker A was in a significant radiological gradient at his assigned work site due to hot spots on the HX and on piping close to his work area. The licensee's dose reconstruction determined that the portion of the body that was in the highest radiation field was the worker's head. However, the licensee did not place the worker's dosimetry on his head, but placed the dosimetry on the worker's chest, which was the licensee's standard practice.

Questions:

1. Did the licensee provide adequate surveillance of workers in the high radiation area?
2. Was the location of the dosimetry appropriate? Why or why not?
3. Could this be a violation of TSSs?

Scenario B

Refer to Scenario A from (ISA-HP-3), Radiological Hazard Assessment and Exposure Controls

Assume:

One of the filters is dropped, and promptly picked up by a worker wearing a properly functioning PAPR, his breathing zone air sampler results shows 8 DAC beta-gamma and 110 DAC alpha.

Questions:

1. Calculate the estimated uptake by the individual with a respirator and without a respirator.
2. What engineering controls were considered?
3. Was there a significant potential for an over exposure?

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-6.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-7) Radiation Monitoring Instrumentation

PURPOSE: The purpose of this ISA is to familiarize you with various regulatory requirements that support Inspection Procedure 71124.05, "Radiation Monitoring Instrumentation." The objective of this inspection procedure is to verify that the licensee is ensuring the accuracy and operability of radiation monitoring instruments that are used to monitor areas, materials, and workers to ensure a radiologically safe work environment. The instrumentation subject to this inspection procedure includes equipment used to monitor radiological conditions related to normal plant operations, including anticipated operational occurrences, and conditions resulting from postulated accidents.

COMPETENCY
AREA: TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL
OF EFFORT: 19 hours

- REFERENCES:
1. 10 CFR Part 50, Appendix I
 2. 10 CFR Part 50, Appendix A, Criterion 64
 3. 10 CFR Part 20, Subpart F
 4. 10 CFR Part 61
 5. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base," HPPOS-001, 088, 279, and 328
 6. NUREG-1736, "Consolidated Guidance: 10 CFR 20 - Standards for Protection Against Radiation, Section 3.20.1501"
 7. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs," July 2007, and other revisions as applicable
 8. Regulatory Guide 1.21, "Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gas from LWRs," June 2009, and other revisions as applicable
 9. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operations)," June 2013, and other revisions as applicable
 10. IE Circular 81-07, "Control of Radioactive Contaminated Material," May 14, 1981

11. Information Notice 85-92, "Surveys of Wastes Before Disposal from Nuclear Reactor Facilities," December 2, 1985
12. Information Notice 93-30, "NRC Requirements for Evaluation of Wipe Test Results; Calibration of Count Rate Survey Instruments," April 12, 1993
13. IE-Bulletin 97-001, "Potential for Erroneous Calibration, Dose Rate, or Radiation Exposure Measurements with Certain Victoreen Model 530 and 530SI Electrometer/Dose-Meters"
14. NUREG-0737, "Clarification of TMI Action Plan Requirements"
15. ANSI 42.14-1991, "Calibration and Use of Germanium Spectrometers for the Measurement of Gamma-Ray Emission Rates of Radionuclides," and other revisions as applicable
16. ANSI N323D-2002, "Installed Radiation Protection Instrumentation," and other revisions as applicable
17. Regulatory Guide 8.6, "Standard Test Procedure for Geiger-Muller Counters," May 1973, and other revisions as applicable
18. ANSI N42.17A-1989, "Performance Specifications for Health Physics Instrumentation-Portable Instrumentation for Use in Normal Environmental Conditions," and other revisions as applicable
19. ANSI N42.17B-1989, "Performance Specifications for Health Physics Instrumentation-Occupational Airborne Radioactivity Monitoring Instrumentation," and other revisions as applicable
20. ANSI N42.17C-1989, "Performance Specifications for Health Physics Instrumentation-Portable Instrumentation for Use in Extreme Environmental Conditions," and other revisions as applicable
21. ANSI N323A-1997, "Radiation Protection Instrumentation and Calibration, Portable Survey Instruments," and other revisions as applicable
22. ANSI N13.4-1971, "American National Standard for the Specification of Portable X- or Gamma-Radiation Survey Instruments," and other revisions as applicable
23. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," Questions 147 and 209
24. Regulatory Guide 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," June 2006, and other revisions as applicable

25. NUREG-1400, "Air Sampling in the Workplace"
26. IEEE-N323C-2009, "American National Standard for Radiation Protection Instrumentation Test and Calibration – Air Monitoring Instruments"
27. IEEE-N42.12-1994-R2004, "ANSI Calibration and Usage of Thallium, Activated Sodium Iodide Detector Systems for Assay of Radionuclides"
28. IEEE-42,25-1997-R2005, "ANSI Calibration and Usage of Alpha-Bea Proportional Counters"
29. IEEE-N42.22-1995, "ANSI Traceability of Radioactive Sources to NIST and Associated Instrument Quality Control"

EVALUATION
CRITERIA:

Upon completion of this ISA, the inspector should be able to:

1. Describe the effects of operating temperature and pressure on the accuracy of instruments.
2. Describe and discuss the calibration techniques used for portable radiation detection instruments including where electronic source usage is appropriate and typical calibration frequencies.
3. Describe and discuss the calibration techniques for environmental monitoring equipment e.g., air sample, environmental TLD, composite samplers, and typical calibration frequencies.
4. Describe and discuss the measurement and calibration techniques used for RP and Chemistry laboratory instruments such as proportional counter, gamma spectroscopy, and liquid scintillation counter, and typical calibration frequencies. Identify the types of sources to be used and expected MDA or LLDs.
5. Discuss laboratory analytical techniques for radionuclides and radiations such as gamma, Sr-89/90, H-3, and gross alpha/beta. Identify best methods.
6. Discuss Minimum Detectable Activity (MDA) and Lower Limits of Detection (LLDs).
7. Describe the appropriate uses for alarming dosimeters and their limitations.
8. Explain the NRC requirements associated with calibration interval.
9. Describe the guidance in place to assess the implementation of 10 CFR 20.1501(c).

10. Discuss the calibration technique for contamination monitors used to free release material (e.g., small article monitor (SAM), bag monitor, frisker) in order to conform to guidance in IE Circular 81-07 and Information Notice 85-92.

TASKS:

1. Read HPPOS-088 which pertains to calibration of air sampling equipment. (The following equation is provided to help with understanding the issue. See NUREG 1400 for further details.)

$$V_s = V_c \left(\frac{P_c}{P_s} \right) \left(\frac{T_s}{T_c} \right)$$

Gas Law Correction

Where:

- a. V_s = volume under field conditions (appropriate volume unit)
- b. V_c = volume under calibration conditions (appropriate volume unit)
- c. P_s = absolute pressure during sampling (mm Hg)
- d. P_c = absolute pressure during calibration (mm Hg)
- e. T_s = absolute temperature during sampling (Kelvin)
- f. T_c = absolute temperature during calibration (Kelvin)

Certain survey meters are subject to the same type and magnitude of errors. Typically in nuclear power situations the instrument of choice is a vented ion chamber. It will typically be calibrated at atmospheric pressure and can be used in a sub-atmospheric containment which could result in a reduced response due to lower contained air mass in the chamber. Conversely in a large dry containment the instrument could be over responding to increased pressure. The tolerance allowed on survey meters is typically large enough that most common situations do not result in correction of survey meter readings.

2. Read HPPOS-279. With the exception of certain high range instruments, use of an electronic calibration is generally not considered sufficient.
3. Read HPPOS-328 (Alarming Dosimeter)
4. Read Q&A 209 and 147, (Calibration frequency)
5. Read the portion of NUREG-1736 that applies to 10 CFR 20.1501(c)

Note: The NUREG predates the change to 10 CFR 20.1501 that added a new paragraph changing the existing 20.1501(b) to 20.1501(c). The intended section is titled "Instrument Calibration."

6. Review and evaluate the characteristics of radiation monitoring systems (RMS), such as gamma-scintillation detector, beta-scintillation detector, GM, and ion chamber used by the licensee. Identify capabilities and limitations
7. Review and evaluate the different measuring techniques, such as proportional counter, gamma spectroscopy, and liquid scintillation counter.
8. Review and evaluate the calibration techniques and results for the measurement of laboratory's gamma spectroscopy, proportional counter and liquid scintillation counter.
9. Review, evaluate, and understand the laboratory's analytical techniques (e.g., gamma, Sr-89/90, H-3, and gross alpha/beta.)
10. Review and evaluate the MDA and LLDs used by the licensee.
11. Discuss with a Senior Health Physics Inspector the types of instruments commonly used, their application and calibration techniques. Include both portable survey instruments (e.g., gamma and neutron, and installed equipment (e.g., area radiation monitors and portal monitors).
12. Meet with your supervisor or a qualified inspector and discuss any questions you may have as a result of this training activity. Discuss the answers to the questions and your work products listed under the Evaluation Criteria section of this study guide with your supervisor.

Scenario: Calibration Instrumentation

During a tour of the radiologically controlled area on July 18, 2001, an inspector identified a continuous air monitor in the radioactive waste truck bay with an expired calibration. The calibration due date was May 31, 2001. The licensee had identified on June 4, 2001, a survey instrument was out of calibration. The calibration due date was also May 31, 2001. The licensee had not properly marked the instruments out of calibration or removed them to the designated holding area. Radiation Protection Procedure requires that instruments be properly marked out of calibration and/or placed in a proper holding area.

Questions:

1. Is there a technical specification that requires written procedures?
2. What regulatory guide recommends procedures for area, portable, and airborne radiation monitor calibrations?

3. Would this be a violation? Why?

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-7.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-8) Radioactive Gaseous and Liquid Effluent Treatment

PURPOSE: The purpose of this ISA is to familiarize you with the regulatory bases and historical agency positions in the area of radioactive gaseous and liquid effluent treatment and provide you the technical knowledge to conduct inspections using procedure 71124.06, "Radioactive Gaseous and Liquid Effluent Treatment." The objectives of procedure 71124.06, "Radioactive Gaseous and Liquid Effluent Treatment," are:

1. To ensure that the gaseous and liquid effluent processing systems are maintained so that radiological discharges are properly mitigated, monitored, and evaluated with regard to public exposure. The principal design Criterion for these systems are found in General Design Criteria 60 and 64 of Appendix A to 10 CFR Part 50, Radiological Effluent Technical Specifications (RETS). Generic Letter 89-01, NUREG-1301, NUREG-1302, Standard Radiological Effluent Controls (SREC), and the Offsite Dose Calculation Manual (ODCM) provide acceptable methods of implementation to meet these design criteria.
2. To ensure 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.
3. To verify that the licensees' quality control program ensures that the radioactive effluent sampling and analysis requirements are satisfied so that discharges of radioactive materials are adequately quantified and evaluated.
4. To verify the adequacy of public dose calculations and projections resulting from radioactive effluent discharges.

The NRC requires that licensees' ensure adequate protection of public health and safety and the environment from exposure to radioactive materials released to the public domain. Radiation exposure to the public must be below the 10 CFR Part 20 and 40 CFR Part 190 limits. Doses below the design objectives of Appendix I to 10 CFR Part 50 and 40 CFR Part 190 dose values are considered ALARA. Radioactive effluent treatment systems are required by Criteria 60 and 64 of Appendix A to 10 CFR Part 50.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 80 HOURS

REFERENCES: 1. 40 CFR Part 190

2. 10 CFR 50.75(g)
3. 10 CFR 50.59
4. 10 CFR Part 50, Appendix A, Criterion 60
5. 10 CFR Part 50, Appendix A, Criterion 64
6. 10 CFR 50.34(a)
7. 10 CFR 72.44(d)
8. 10 CFR 72.104
9. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," February 1978, and other revisions as applicable
10. Regulatory Guide 1.112, "Calculation of Annual Releases of Radioactive Material in Gaseous and Liquid Effluents from Light Water Cooled Power Reactors," March 2007, and other revisions as applicable
11. Regulatory Guide 4.1, "Radiological Environmental Monitoring for Power Plants," June 2009, and other revisions as applicable
12. NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors"
13. NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors"
14. ANSI N42.18-2004, "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents," and other revisions as applicable
15. Plant Updated Final Safety Analysis Report
16. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base"
17. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20"
18. NUREG-1736, "Consolidated Guidance: 10 CFR Part 20- Standards for Protection Against Radiation"
19. NUREG/CR-4757, "Line-Loss Determination for Air Sampler Systems"

20. Environmental Measurement Laboratory, HASL-300 Procedures Manual U.S. Department of Energy, New York, NY
21. NCRP Report 58, "A Handbook of Radioactivity Measurements Procedures," 2nd Edition, 1984
22. Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," June 2009, and other revisions as applicable
23. Regulatory Guide 1.52, "Design, Inspection, and Maintenance Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems of Light-Water-Cooled Nuclear Power Plants," June 2001, and other revisions as applicable
24. Regulatory Guide 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," October 1977, and other revisions as applicable
25. Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," July 1977, and other revisions as applicable
26. Regulatory Guide 1.140, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Normal Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," August 2016, and other revisions as applicable
27. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) - Effluent Streams and the Environment," July 2007, and other revisions as applicable
28. ANSI N13.1-1999, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the stacks and Ducts of Nuclear Facilities," and other revisions as applicable
29. ANSI N45.2.23-1978, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plant Personnel," and other revisions as applicable
30. ANSI/ANS N55.4-1979, "Gaseous Radioactive Waste Processing Systems for Light-Water-Cooled Reactor Plants," and other revisions as applicable
31. ANSI/ANS N55.6-1979, "Liquid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants," and other revisions as applicable

32. ANSI/ASME N509-1980, "Nuclear Power Plant Air Cleaning Units and Components," and other revisions as applicable
33. ANSI/ASME N510-1980, "Testing of Nuclear Air-Cleaning Systems," and other revisions as applicable
34. IE Bulletin 80-10, "Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment," May 6, 1980
35. IE Circular No. 80-18, "10 CFR 50.59 Safety Evaluations for Changes to Radioactive Waste Treatment Systems," August 22, 1980
36. Information Notice No. 82-43, "Deficiencies in LWR Air Filtration/Ventilation Systems," November 16, 1982
37. Information Notice No. 82-49, "Correction for Sample Conditions for Air and Gas Monitoring," December 16, 1982
38. Information Notice No. 13-01, "Emergency Action Level Thresholds Outside the Range of Radiation Monitors," February 13, 2013
39. Information Notice No. 13-12, "Improperly Sloped Instrument Sensing Lines," July 13, 2013
40. Information Notice No. 13-13, "Deficiencies with Effluent Radiation Monitoring System Instrumentation," July 12, 2013
41. Generic Letter 89-01, "Implementation of Programmatic Controls for Radiological Effluent TS in the Administrative Controls Section of the TS and the Relocation of Procedural Details of RETS to the ODCM or to the PCP," January 31, 1989
42. Generic Letter 83-13, "Clarification of Surveillance Requirements for HEPA Filters and Charcoal Absorber Units in Technical Specifications on ESF Cleanup Systems," March 2, 1983

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Discuss and identify effluent sampling techniques that may be used by the licensee for sampling effluents such as radioactive waste water, air iodine, tritium and air particulate.
2. Describe and discuss the calibration techniques used for effluent monitoring instruments, alarm set points and typical calibration frequencies.

3. Discuss laboratory QA/QC Policy and its implementation, including inter-laboratory and intra-laboratory comparisons. Discuss NRC expectations in this area.
4. Discuss calculation of projected public dose calculation methodologies (all pathways) listed in Regulatory Guide 1.109 and the use of the results from the annual land use census in the dose assessment process.
5. Discuss principle of air cleaning systems, such as air capacity test, in-place testing, and laboratory test to determine the iodine collection efficiency. Discuss applicable guidance documents and acceptable values.
6. Discuss the differences between Engineered-Safety-Feature (ESF) atmosphere cleanup systems, evaluated using the guidance of RG 1.52 versus the normal atmosphere cleanup systems using the guidance of RG 1.140.
7. Review the air cleaning system section from your assigned facility's UFSAR and Technical Specification. Discuss the principal components and their use.
8. Identify the various sources of liquid and gaseous radioactive wastes at your assigned facility by review of the UFSAR. Discuss the UFSAR described waste streams, and technologies associated with liquid and gaseous radioactive waste processing for the facility.
9. Discuss considerations that would factor into collecting a "representative sample."
10. Discuss the licensee's 10 CFR Part 61 report for determining the amount of radionuclides released.

TASKS:

1. Under the direction of your mentor, select a facility for review.
2. Review and evaluate the effluent sampling techniques, such as radioactive waste water, air iodine, tritium, and air particulate.
3. Review and evaluate the laboratory's QA/QC Policy and its implementation, including inter-laboratory and intra-laboratory comparison.
4. Review and evaluate the projected public dose calculation methodologies (all pathways as available) listed in Regulatory Guide 1.109.
5. Review and evaluate principle air cleaning system tests, such as air capacity test, in-place testing, and laboratory test to determine the iodine collection efficiency. Compare with applicable regulatory limits.

6. Identify the various sources of liquid and gaseous radioactive waste, waste streams, and technologies associated with liquid and gaseous radioactive waste processing. Compare that with the descriptions presented in the UFSAR.
7. Identify the gaseous and liquid effluent monitors for your facility using the FSAR and ODCM. Locate in the ODCM the required functional tests and channel calibrations specified for these effluent radiation monitors.
8. Find the equations for the alarm set points for the effluent monitors in the ODCM.
9. Explain how accident radiation monitors are calibrated and how the calibration would differ from routine radiation monitors.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-8.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-9) Radiological Environmental Monitoring Program

PURPOSE: The purpose of this ISA is to familiarize you with the regulatory bases and historical agency positions in the areas of radiological environmental monitoring and provide you the technical knowledge to conduct inspections using procedure 71124.07, "Radiological Environmental Monitoring Program (REMP)." The objectives of procedure 71124.07, "Radiological Environmental Monitoring Program," are:

1. To verify that the REMP quantifies the impact of radioactive effluent releases to the environment and sufficiently validates the integrity of the radioactive gaseous and liquid effluent release program.
2. To verify that the REMP is implemented consistently with the licensee's TS and/or ODCM and to validate that the radioactive effluent release program meets the design objective in Appendix I to 10 CFR Part 50.
3. To ensure that the REMP (1) monitors non-effluent exposure pathways (e.g., onsite spills or leaks, exposures from direct and scattered (skyshine) radiation from plant facilities and components), (2) is based on sound principles and assumptions, and (3) validates that doses to members of the public are within the dose limits of 10 CFR 20, "Standards for Protection against Radiation," and 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations," as applicable.
4. To verify that the licensee is continuing to implement the voluntary NEI/Industry Groundwater Protection Initiative (GPI).

The NRC requires that licensee's ensure adequate protection of public health and safety from exposure to radioactive material released to the public domain as a result of routine operations. The REMP is required by Criterion 64 of Appendix A to 10 CFR Part 50. The REMP supplements the effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation in the environment are in agreement with the values calculated by the radioactive effluent monitoring program. The licensee is required to implement the REMP in accordance with its Technical Specifications and/or Offsite Dose Calculation Manual, which are based on the design objectives contained in Appendix I of 10 CFR Part 50, as required by 10 CFR 50.34a.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 30 HOURS

- REFERENCES:
1. 10 CFR 50.34 (a)
 2. 10 CFR Part 50, Appendix A, Criterion 64
 3. 40 CFR 141
 4. Plant Updated Final Safety Analysis Report and Offsite Dose Calculation Manual for the facility designated by your supervisor
 5. Regulatory Guide 1.23, "On-site Meteorological Programs for Nuclear Power Plants," March 2007, and other revisions as applicable or its predecessor Safety Guide 23, "Onsite Meteorological Programs," 1972, depending on the licensee commitments
 6. Regulatory Guide 1.111, "Methods of Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Release from Light-Water-Cooled Reactors," July 1977, and other revisions as applicable
 7. Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants," June 2009, and other revisions as applicable
 8. Regulatory Guide 4.13, "Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Application," July 1977, and other revisions as applicable
 9. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations), Effluent Streams and the Environment," July 2007, and other revisions as applicable
 10. NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors"
 11. NUREG-1302 "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors"
 12. NRC Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," November 1979
 13. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base"
 14. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20"
 15. NUREG-1736, "Consolidated Guidance: 10 CFR Part 20, Standards for Protection Against Radiation" November 1979

16. NEI-07-07, "Industry Groundwater Protection Initiative - Final Guidance Document," August 2007
17. NEI-08-08A, "Guidance for Life Cycle Minimization of Contamination – with SER (ML093220530)
18. EPRI TR-1016099, "Groundwater Protection Guidelines for Nuclear Power Plants," 2008
19. Liquid Radioactive Release Lessons Learned Task Force Final Report September 2006 (ADAMS Accession Number ML062650312)
20. TI 2515/173, "Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative"
21. TI 2515/185, "Follow up on the Industry's Groundwater Protection Initiative"
22. Environmental Measurement Laboratory, HASL-300 Procedures Manual U.S. Department of Energy, New York, NY
23. NCRP Report 47, "Tritium Measurement Techniques," 1975
24. NCRP Report 50, "Environmental Radiation Measurements," 1976
25. NCRP Report 58, "A Handbook of Radioactivity Measurements Procedures," 2nd Edition, 1984
26. NCRP Report 94, "Exposure of the Population in the United States and Canada from Natural Background Radiation (Supersedes NCRP Report 45)," 1987
27. ANSI N545-1975, "Performance, Testing, and Procedural Specification for TLD, Environmental Application," and other revisions as applicable
28. ANSI/HPS N13.37-2014, "Environmental Dosimetry – Criteria for System Design and Implementation," and other revisions as applicable
29. Regulatory Guide 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," October 1977
30. ANSI N13.1-1999, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities"

31. NUREG-0800 BTP 11-3, "Design Guidance for Solid Radioactive Waste Management Systems Installed in Light-Water-Cooled Nuclear Power Reactor Plants"

EVALUATION
CRITERIA:

Upon completion of this ISA, the inspector should be able to:

1. Discuss the specific regulatory requirements that require a licensee to have a REMP and the process for making revisions to the REMP.
2. Discuss the specific environmental sampling techniques (water, milk, air iodine, air particulate, vegetation, fish, and soil/sediment) required to be collected in accordance with the REMP and ODCM.
3. Discuss and show how to calculate standard data reduction techniques, including MDA and LLD highlighted in NRC and industry publications.
4. Discuss the NRC expectations for a licensee's QA program for REMP including the use and bases for inter-laboratory and intra-laboratory comparisons.
5. Discuss the Land Use Census. List the principle uses of land around the assigned facility.
6. Discuss the NRC requirements for a Meteorological Monitoring Program, including calibration methodology for wind direction, wind speed, and delta temperature. Compare this with that described in the licensee's ODCM.
7. Show how to determine X/Q and D/Q, and annual average data and discuss when the values of X/Q and D/Q in the ODCM should be updated.
8. Discuss the principle parts of a REMP Annual Report.
9. Discuss the contents of the licensee's ODCM and explain and compare the contents to NUREG-1301/1302 (or Branch Technical Position, November 1979).
10. Describe the man-made and natural radiation exposure pathways (fission/activated products and the source of the natural background radiation) that are present at your assigned facility.
11. Explain the Fundamentals of Laboratory QA/QC Policy and its implementation.
12. Identify the specific radiological dose limits for your assigned facility as described in the REMP and ODCM.

13. Identify the specific environmental sample requirements for your assigned facility as described in the REMP and ODCM.
14. Discuss the sequential relationship between Radiological Effluent Control and the REMP.
15. Discuss the elements of a ground water protection program.

TASKS:

1. Locate a copy of the REMP section from the UFSAR and ODCM for your assigned facility.
2. Review the requirements of the REMP, including review of the REMP Annual Report.
3. Review NUREG-1301/1302 (or Branch Technical Position, November 1979) and bases.
4. Review the radiological measurement instrument data (proportional counter, gamma spectroscopy, liquid scintillation counter, and TLD reader).
5. Review counting statistics and data reduction, including minimum detectable activity (MDA) and lower limits of detection (LLDs).
6. Review meteorological monitoring requirements and calibration results for wind direction, wind speed, and delta temperature.
7. Review the sequential relationship between Radiological Effluent Controls and the REMP.
8. Review man-made and natural radiation exposure pathways (fission/activated products and the source of the natural background radiation).
9. Review the Fundamental of Laboratory QA/QC Policy and its implementation.
10. Locate the acceptance criteria to implement the voluntary Groundwater Protection Initiative in NEI 07-07.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-9.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-10) Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation

PURPOSE: The purpose of this ISA is to familiarize you with the regulatory bases and historical agency positions in the area of radioactive material processing and transportation and provide you the technical knowledge to conduct inspections using procedure 71124.08, "Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation." The objective of this inspection procedure is to verify the effectiveness of the licensee's programs for processing, handling, storage, and transportation of radioactive material.

The NRC requires that licensee's ensure adequate protection of public health and safety from exposure to radioactive material released to the public domain as a result of routine operations which include processing and shipment. The licensee's radioactive material processing and shipping programs are required by Criterion 60 of Appendix A to 10 CFR Part 50 and must comply with the requirements of 10 CFR Parts 20, 61, and 71 and Department of Transportation (DOT) regulations contained in 49 CFR Parts 100-189.

COMPETENCY
AREA:

TECHNICAL AREA EXPERTISE

LEVEL
OF EFFORT:

40 HOURS

REFERENCES:

1. 10 CFR Parts 20, 61, and 71
2. 10 CFR 20.1801-1802
3. 10 CFR 20.1904-1905
4. 10 CFR Part 20, Appendix G
5. 10 CFR Part 50, Appendix A, Criterion 60
6. 10 CFR 30.41
7. 10 CFR Part 37
8. 49 CFR Parts 100-189, including Part 172, Subpart H, "Training"
9. Radioactive waste system and facility description from the UFSAR for a facility designated by your supervisor
10. Plant Annual Radioactive Effluent Release Report
11. Offsite Dose Calculation Manual

12. NRC Branch Technical Position, Waste Form Technical Position, Rev. 1, January 1991 (ADAMS Accession Number ML033630746)
13. NRC Branch Technical Position, Waste Form Technical Position, Rev. 1, February 2015 (Vol. 1 - ADAMS Accession Number ML12254B065, Vol.2 - ADAMS Accession Number ML12326A611)
14. NUREG-1608, "Categorizing and Transporting Low Specific Activity Materials and Surface Contaminated Objects"
15. NUREG-1660, "U.S. - Specific Schedules of Requirements for Transport of Specified Types of Radioactive Material Consignments"
16. NUREG/BR-0204, "Instructions for Completing NRC's Uniform Low-level Radioactive Waste Manifest"
17. IE Bulletin 79-19, "Packaging of Low Level Radioactive Waste for Burial," August 10, 1979
18. Information Notice 89-13, "Alternative Waste Management Procedures in Case of Denial of Access to Low Level Waste Disposal Sites," February 8, 1989
19. Information Notice 85-92, "Surveys of Waste Before Disposal from Nuclear Reactor," December 2, 1985
20. Information Notice 86-20, "Low-Level Radioactive Waste Scaling Factors, 10 CFR Part 61," March 28, 1986
21. Information Notice 90-50, "Minimization of Methane Gas in Plant Systems and Radioactive Waste Shipping Containers," August 8, 1990
22. Information Notice 92-62, "Emergency Response Information Requirements for Radioactive Material Shipments," August 24, 1992
23. Information Notice 92-72, "Employee Training and Shipper Registration Requirements for Transporting Radioactive Materials," October 28, 1992
24. Information Notice 04-13, "Registration, Use and Quality Assurance Requirements for NRC Certified Transportation Packages," June 30, 2004
25. Generic Letter 95-09, "Monitoring and Training of Shippers and Carriers of Radioactive Materials," November 3, 1995
26. Generic Letter 81-38, "Storage of Low-Level Radioactive Wastes at Power Reactor Sites," November 10, 1981

27. IE Bulletin 80-10, "Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment," May 6, 1980
28. Regulatory Issue Summary 2008-32, "Interim Low Level Radioactive Waste Storage at Reactor Sites," December 30, 2008
29. Regulatory Issue Summary 2014-03, "Notice of 10 CFR Part 37 Implementation Deadline for NRC Licensees," March 13, 2014
30. ANSI/ANS-40.37-1993, "Mobile Radioactive Waste Processing Systems," and other revisions as applicable
31. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base"
32. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20"
33. NUREG-1736, "Consolidated Guidance: 10 CFR Part 20, Standards for Protection Against Radiation"
34. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures and Components Installed in Light Water- Cooled Nuclear Power Plants," November 2001
35. SECY-94-198, "Review of Existing Guidance Concerning the Extended Storage of Low Level Radioactive Waste," August 1, 1994

EVALUATION
CRITERIA:

Upon completion of this ISA, the inspector should be able to:

1. Discuss the station's recent radiological effluent release report and the types and amounts of radioactive waste that the licensee has disposed in the past year.
2. Discuss and highlight the key aspects of the station's solid and liquid radioactive waste processing systems, and their operation, as described in the station's process control program (PCP) and the updated final safety analysis report (UFSAR).
3. Discuss what the NRC expectations are relative to non-operational or abandoned radioactive waste processing equipment as described in NRC guidance in Bulletin 80-10, and NUREG/CR-5569.
4. Discuss the purpose and principal requirements of 10 CFR Part 61 and NRC waste classification and characterization guidance.
5. Discuss NRC guidance in the area of collection of representative samples of waste for the 10 CFR Part 61 program and how changes in waste streams should be identified for purposes of waste characterization and classification.

6. Discuss the packaging, labeling and marking requirements for various types of radioactive materials packages expected to be shipped from the facility, as presented in NUREG-1660 and 49 CFR100-189.
7. Discuss the manifesting, labeling, and placarding requirements for non-exempt types of radioactive materials packages relative to NUREG-1660 requirements.
8. Discuss the allowable radiation dose rates (e.g., contact, 1 meter) and contamination limits for shipment of packages of radioactive material specified in regulatory documents 49 CFR100-189. The limits include transport vehicle dose limits, cab limits, and package limits, as appropriate.
9. Discuss Hazmat training and emergency response program requirements relative to guidance in Information Notices 92-62, 92-72, 95-09, and 49 CFR 100-189.
10. Discuss the principal aspects of classification of low-level radioactive waste as outlined in 10 CFR Part 61.
11. Discuss Quality Assurance Requirements for a radioactive materials shipping program, as described in 10 CFR 71 including the collection of representative samples and 10 CFR 20, Appendix G.

TASKS:

1. Review and familiarize yourself with the underlined references. Specifically, identify the purpose of each document and what guidance the document provides.
2. Locate a copy of the radioactive waste section from the UFSAR of your designated facility. Review the design and operation of the radioactive waste systems. Identify the various sources of liquid and solid radioactive waste, waste streams, and technologies associated with liquid radioactive waste processing for the facility.
3. Review the requirements for the transfer and receipt of radioactive material as specified in 10 CFR 20 and 10 CFR 71, including reporting requirements for problems identified.
4. Review and highlight the key aspects and requirements for low-level radioactive waste disposal as outlined in 10 CFR 61 and 71, and the burial site license.
5. Review the contents of the licensee's process control program (PCP), use of scaling factors for hard to detect nuclides, and the waste form and characteristic requirements for disposal of solid radioactive waste.

6. Review the requirements in the area of training and emergency response as specified in 49 CFR100-189. Identify minimum training requirements and minimum emergency response requirements.
7. Discuss how one would verify that a licensee is checking to see if another licensee is authorized to receive a radioactive material shipment package.
8. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this activity. Discuss answers to the questions listed under the Evaluation Criteria section of this study guide with your supervisor.

Scenario A

On October 7, 2003, a low level radioactive waste shipment consisting of two box containers (volume of approximately 1400 cubic-foot each) was prepared by the licensee and offered to a carrier for transport to a waste processing contractor. Each of the sea-land (box) containers housed plastic bagged waste with one containing "Green is Clean" potentially contaminated dry waste and the other dry active waste (DAW). The sea-land containers were loaded back-to-back on an open, flatbed trailer with the DAW container loaded toward the rear of the vehicle. The shipment was consigned as exclusive use and categorized as class 7 (radioactive) materials, low specific activity, containing a total activity of about 67 millicuries of primarily mixed activation products. The shipment departed the site at approximately 2:00 p.m. on October 7, 2003, and arrived at the waste processing facility about 10 hours later.

On October 8, 2003, radiation measurements performed by waste processing contractor personnel on the exterior surface of the packages (the sea-land containers) identified a highly localized area of elevated radiation on the external surface of the DAW container that exceeded the Department of Transportation (DOT) limit provided in 49 CFR 173.441. Specifically, a coin-sized (one-inch diameter) spot measuring 250 millirem/hour was identified on the external surface of the sea-land container's rear door, about three and one-half feet up from the bottom of the package and one and one-half inches lateral to a vertical metal bar used to latch the container's door. Package and vehicle surveys performed by the licensee prior to the shipment's departure on October 7, 2003, documented a maximum package surface radiation level of 33 millirem/hour on the DAW filled container that was located in the same general location as the coin-sized "hot spot" identified at waste processing contractor.

Questions:

1. What two Codes of Federal Regulations apply to this condition? (NRC/DOT)
2. What is the DOT limit on external surface of containers?
3. What are the possible reasons for the licensee "missing" the hot spot on the container?

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-10.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-11) Significance Determination Process - Occupational Radiation Safety

PURPOSE: The purpose of this ISA is familiarize you with the Occupational Radiation Significance Determination Process (SDP), explain the bases of each SDP branch, provide technical and policy references, and present practical exercises/scenarios that challenge you to use the SDP. The risk significance of inspection findings are evaluated using the SDP.

COMPETENCY AREA: INSPECTION, TECHNICAL AREA EXPERTISE REGULATORY FRAMEWORK

LEVEL OF EFFORT: 36 hours

- REFERENCES:
1. IMC 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process"
 2. IMC 0308, Attachment 3, Appendix C, "Technical Basis for Occupational Radiation Safety Significance Determination Process"
 3. SDP Branch on ALARA
 - a. NRC Inspection Report (50-483-0017) (ADAMS Accession Number ML003757369), and NRC Responses to Licensee Contestation for White Findings at Callaway (EA-00-208, May, 2001) (ADAMS Accession Number ML011270225)
 - b. NUREG-0713, Latest Rev, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities"
 - c. Supplementary Information, 10 CFR 20 Final Rule, Subpart B, "Radiation Protection Programs," Federal Register Vol. 56, No. 98, pages 23366-23367, May 21, 1991 (ADAMS Accession Number ML051790366)
 4. SDP Branch on Overexposure
 - a. Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants," May 2006
 - b. Nuclear Regulatory Commission Enforcement Manual (<http://www.nrc.gov/about-nrc/regulatory/enforcement/guidance.html>)
 5. SDP Branch on Substantial Potential for Overexposure (SPFO)

- a. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base," HPPOS-232
 - b. Information Notice 88-63, "High Radiation Hazards from Irradiated In-core Detectors and Cables," August 15, 1988
 - c. Information Notice 88-63, Supplement 1, "High Radiation Hazards from Irradiated In-core Detectors and Cables," October 5, 1990
 - d. Information Notice 88-63, Supplement 2, "High Radiation Hazards from Irradiated In-core Detectors and Cables," June 25, 1991
 - e. Information Notice 02-03, "Highly Radioactive Particle Control Problems During Spent Fuel Pool Cleanout," January 10, 2002
 - f. Davis-Besse Special Inspection Reports 02-06 and 02-16 (ADAMS Accession Number ML030070606)
- 6. SDP Branch on Ability to Assess Dose
 - a. Davis-Besse Special Inspection Reports 02-06 and 02-16 (ADAMS Accession Number ML030070606)
 - 7. IMC 0612, Appendix B, "Issue Screening"
 - 8. IMC 0612, Appendix E, "Examples of Minor Issues," Section 6, "Health Physics"

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

- 1. Explain the purpose, objectives and applicability of the SDP process.
- 2. Compare and contrast an "observation" and a "finding."
- 3. Describe the process for providing feedback and recommendations to improve the SDP process.
- 4. Be aware of the SDP and Enforcement Review Panel procedures, and the process for appealing the NRC characterization of inspection process.
- 5. Describe and discuss the objective of the Occupational Radiation cornerstone.
- 6. State the technical bases for the two branches of the Occupational SDP (ALARA and Exposure Control).

7. Define the safety significance, and give examples of Green, White, Yellow and Red findings in each of the branches of this SDP.
8. For the ALARA Branch of the SDP, you should be able to:
9. Process ALARA findings for a job through the branch, using example training scenarios.
10. Explain why a WHITE finding may not be an adequate basis for issuing a notice of violation against Part 20.1101(b).
11. Explain the basis for the “Greater than 4 Occurrences” logic gate and the rationale for issuing a WHITE finding.
12. For the Overexposure Branch of the SDP, you should be able to process exposure findings through the branch, using example training scenarios. (You may use examples from events at Palisades – ML14336A624, Perry – ML11187A121 and the examples in given in IMC 0609, Appendix C)
13. For the Substantial Potential for Overexposure (SPFO) Branch of the SDP, you should be able to:
14. Discuss and explain the SPFO enforcement policy tool, and give examples of SPFO findings.
15. Process exposure findings through the branch, using example training scenarios from NRC Information Notices and other sources.
16. Explain how findings involving shallow dose equivalents from discrete hot particle exposures are treated in this branch, and understand the bases for this position. Explain why, for very high activity particles with a significant gamma component (e.g., 100’s of mCi of Co-60), are treated differently relative to SPFO.
17. Explain why an event with a SPFO that occurs in a Very High Radiation area merits a yellow finding.
18. For the Ability to Assess Dose Branch of the SDP, you should be able to:
 - a. Discuss, and give examples of the systemic type of problems that could lead to white findings in this branch.
 - b. Process findings through the branch, using example training scenarios.

TASKS:

1. Review MC 0609 and focus on Appendix C, Section IV, “Significance Determination Process for Occupational Radiation Safety.”

2. Review the underlined references pertinent to each SDP branch.
3. Determine a facility's current three year rolling average (TYRA) and determine the median collective dose for both PWRs and BWRs from the latest official cumulative dose reported by the licensee.
4. Find all applicable Part 20 annual dose limits pertinent to the SDP.
5. List and describe areas/locations in BWR and PWR where whole body, DDE overexposures have occurred. Specifically focus on areas with the potential for rapid, high dose rate increases described in Regulatory Guide 8.38, Appendix B.
6. Develop an event scenario of a "near-miss event", where a worker received no dose, but this event could result in a SPFO finding.
7. Develop a SPFO scenario involving airborne material intake, and determine the range of significance determinations. Explain why DDE-related SPFOs are considered more risky to nuclear power plant workers.
8. Review selected Regional inspection reports selected by your mentor that resulted in Green and White finding. Process the finding through the SDP. Determine if you agree with the results in the inspection report. Discuss any differences you may have on the SDP results with a qualified Health Physics inspector.
9. Whenever possible, attend a significance determination and enforcement review panel (SERP) related to this SDP. Discuss rationale for the outcome/resolution of the panel with a qualified Health Physics inspector.
10. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this training activity. Discuss the answers to the questions and your work products listed under the Evaluation Criteria section of this study guide with your supervisor.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-11.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-12) Significance Determination Process - Public Radiation Safety: Radioactive Material Control

PURPOSE: The purpose of this ISA is to familiarize you with the Radioactive Material Control portion of the Public Radiation Safety Significance Determination Process (SDP), explain the bases of this SDP branch, provide technical and policy references, and present practical exercises/scenarios that challenge you to use the SDP. The risk significance of inspection findings are evaluated using the SDP.

COMPETENCY AREA: INSPECTION
TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK,

LEVEL OF EFFORT: 24 hours

- REFERENCES:**
1. IMC 0609, Appendix D, "Public Radiation Safety Significance Determination Process," Section III, "Radioactive Material Control Program"
 2. IMC 0308, Attachment 3, Appendix D, "Technical Basis for Public Radiation Safety Significance Determination Process"
 3. IMC 0612, Appendix B, "Issue Screening"
 4. IMC 0612, "Appendix E, "Examples of Minor Issues," Section 6, Health Physics
 5. 10 CFR Part 20, "Subpart F, Surveys and Monitoring"
 6. 10 CFR Part 20, Subpart K, "Waste Disposal"
 7. NUREG/CR-5569, Rev. 1, "Health Physics Positions Data Base," HPPOS-42, 43, 44, 45, 48, 71, 72, 73, 79, 106, 138, 171, 189, 190, 221, 250, 300
 8. IE Circular 81-07, "Control of Radioactively Contaminated Material," May 14, 1981
 9. Information Notice 83-05, "Obtaining approval for disposing of very-low-level radioactive waste - 10 CFR Section 20.302 (current 10 CFR 20.2002)," February 24, 1983
 10. Information Notice 85-92, "Survey of Wastes Before Disposal from Nuclear Reactor Facilities," December 2, 1985

11. Information Notice 86-90, "Requests to dispose of very low-level radioactive waste pursuant to 10 CFR 20.302 (current 10 CFR 20.2002)," November 3, 1986
12. Information Notice 88-22, "Disposal of Sludge from Onsite Sewage Treatment Facilities at Nuclear Power Stations," May 12, 1988
13. NRC Inspection Report (ADAMS Accession Number ML013650258) and NRC Responses to Licensee Contestation for White Findings at Comanche Peak (ADAMS Accession Number ML022900740)

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Explain the purpose, objectives and applicability of the Radioactive Material Control SDP process.
2. Define the safety significance, and give examples of Green, White, Yellow and Red findings of this SDP branch.
3. Process a finding through the SDP branch.
4. Explain the NRR "no detectable" licensed radioactive material release policy for surface contamination, volumetric contamination, and difficult to detect radionuclides.
5. Describe the different ways to assess a finding which involves a "hot particle."
6. Describe the controls the licensee must have to demonstrate that licensed radioactive material is still under their control after it left the radiation controlled area, but is still in a controlled area.
7. Describe the difference between a release limit and the "no detectable" criteria.
8. Describe the minimum detection sensitivity criteria that licensees must use for radiation surveys of potentially contaminated material.

TASKS:

1. Review IMC 0609, Appendix D, Section III, "Radioactive Material Control Program."
2. Review each of the underlined references to learn about the NRC's policies and practices for the release of radioactive materials.
3. Go to the ROP web-site and review recent Green and White findings in the area of public radiation safety.
4. For those inspection findings related to radioactive material control, process the finding through the Radioactive Material Control Branch of the Public Radiation Safety SDP. Determine if you agree with the

results in the inspection report. Discuss any differences you may have with a qualified health physics inspector.

5. Whenever possible, attend a significance determination and enforcement review panel (SERP) related to this SDP. Discuss rationale for the outcome/resolution of the panel with a qualified health physics inspector.
6. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this training activity. Discuss the answers to the questions and your work products listed under the Evaluation Criteria section of this study guide with your supervisor.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-12.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-13) Significance Determination Process Public Radiation Safety: Effluent Release Program

PURPOSE: The purpose of this ISA is to familiarize you with the Radioactive Effluent portion of the Public Radiation Safety Significance Determination Process (SDP), explain the bases of this branch, provide technical and policy references, and present practical exercises/scenarios that challenge you to use the SDP. The risk significance of inspection findings are evaluated using the SDP.

COMPETENCY AREA: INSPECTION
TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL OF EFFORT: 32 hours

- REFERENCES:**
1. IMC 0609, Appendix D, Section I, "Public Radiation Safety Significance Determination," Radioactive Effluent Release Program"
 2. IMC 0308, Attachment 3, Appendix D, "Technical Basis for Public Radiation Safety"
 3. IMC 0612, Appendix B, "Issue Screening"
 4. IMC 0612, Appendix E, "Examples of Minor issues", Section 6, Health Physics
 5. 10 CFR Part 50, Appendix A, Criteria 60, 61, 63, and 64
 6. 10 CFR Part 20 Subpart D, "Radiation Dose Limits for Individual Members of the Public"
 7. 10 CFR Part 50, Appendix I, "Numerical Guidelines for Design Objectives and Limiting Conditions for Operation to Meet the Criteria for ALARA
 8. 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Plant Operations"
 9. NUREG/CR-5569, Revision 1, "Health Physics Positions Data Base" HPPOS 4, 6, 7, 8, 40, 88, 102, 122, 170, 171, 212, 223, 229, 326
 10. NUREG-0543, "Methods for Demonstrating Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR Part 190)"
 11. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants"

12. NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors"
13. NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors"
14. Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents From Light-Water-Cooled Nuclear Power Plants," June 2009, and other revisions as applicable
15. Regulatory Guide 1.23, "On-site Meteorological Programs for Nuclear Power Plants," March 2007, and other revisions as applicable or its predecessor Safety Guide 23, "Onsite Meteorological Programs," 1972, depending on the licensee commitments
16. Regulatory Guide 1.109, "Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," October 1977, and other revisions as applicable
17. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," November 2001, and other revisions as applicable
18. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment," July 2007, and other revisions as applicable
19. Regulatory Guide 1.110, "Cost-Benefit Analysis for Radioactive Waste Systems for Light-Water-Cooled Reactors," March 1976, and other revisions as applicable
20. Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," July 1977, and other revisions as applicable
21. Regulatory Guide 1.112, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors," March 2007, and other revisions as applicable
22. Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977, and other revisions as applicable

23. IE Bulletin 80-10, "Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment," May 6, 1980
24. IE Circular 79-21, "Prevention of Unplanned releases of Radioactivity," October 19, 1979
25. Information Notice 79-21, "Transportation and Commercial Burial of Radioactive Materials," September 5, 1979
26. Information Notice 91-56, "Potential Radioactive Leakage to Tank Vented to Atmosphere," September 19, 1991
27. Generic Letter 79-03, "Offsite Dose Calculation Manual," January 18, 1979
28. Generic Letter 79-06, "Contents of the Offsite Dose Calculation Manual," February 14, 1979
29. Generic Letter 84-12, "Compliance with 10 CFR Part 61 and Implementation of Radioactive Effluent Technical Specifications and Attendant Process Control Program," April 30, 1984
30. Generic Letter 89-01, "Implementation of Programmatic and Procedural Controls for Radiological Effluent Technical Specifications," January 31, 1989

EVALUATION
CRITERIA:

Upon completion of this ISA, the inspector should be able to:

1. Explain the purpose, objectives and applicability of the Effluent Release Program SDP process.
2. Define the safety significance, and give examples of Green, White, Yellow and Red findings of this SDP branch.
3. Process a finding through the SDP branch.
4. Explain what is meant by "impaired ability to assess dose."
5. Explain the similarity and differences between Appendix I to 10 CFR Part 50 and 40 CFR Part 190.
6. Compare and contrast the dose assessment methodology in 10 CFR Part 20 to that in Appendix I of 10 CFR Part 50.
7. Explain the technical and operational differences, if any, between a licensee who still has the Radiological Effluent Technical Specifications and a licensee who implemented the guidance in Generic Letter 89-01.

TASKS:

1. Review MC 0609, Appendix D, Section I, "Radioactive Effluent Release Program."
2. Review each of the underlined references to become familiar with the accepted methodologies for the control and release of effluents.
3. Go to the ROP web-site and review recent Green and White findings in the area of public radiation safety.
4. For those inspection findings related to the effluent release program, process the finding through the Effluent Release Branch of the Public Radiation Safety SDP. Determine if you agree with the results in the inspection report. Discuss any differences you may have with a qualified health physics inspector.
5. Whenever possible, attend a significance determination and enforcement review panel (SERP) related to this SDP. Discuss rationale for the outcome/resolution of the panel with a qualified health physics inspector
6. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this training activity. Discuss the answers to the questions and your work products listed under the Evaluation Criteria section of this study guide with your supervisor.

DOCUMENTATION: Document completion on the Health Physics Inspector technical Proficiency Level Signature Card and Certification Item ISA-HP-13.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-14) Significance Determination Process - Public Radiation Safety: Environmental Monitoring Program

PURPOSE: The purpose of this ISA is familiarize you with the Environmental Monitoring Program portion of the Public Radiation Safety Significance Determination Process (SDP), explain the bases of this SDP branch, provide technical and policy references, and present practical exercises/scenarios that challenge you to use the SDP. The risk significance of inspection findings are evaluated using the SDP.

COMPETENCY AREA: INSPECTION
TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL OF EFFORT: 24 hours

- REFERENCES:
1. IMC 0609, Appendix D, "Public Radiation Safety Significance Determination Process," Section II, "Radioactive Environmental Monitoring Program."
 2. IMC 0308, Attachment 3, Appendix D, "Technical Basis for Public Radiation Safety Significance Determination Process"
 3. IMC 0612, Appendix B, "Issue Screening"
 4. 10 CFR Part 50, Appendix A, Criteria 60 and 64
 5. Generic Letter 79-65, "Radiological Environmental Monitoring Program Requirements - Enclosing Branch Technical Position, Revision 1," November 27, 1979
 6. Generic Letter 89-01, "Implementation of Programmatic and Procedural Controls for Radiological Effluent Technical Specifications," January 31, 1989
 7. NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors"
 8. NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors"
 9. Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," June 2009, and other revisions as applicable

10. Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants," June 2009, and other revisions as applicable
11. Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants," December 1975. Also, see its revision, NRC Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," November 1979, and other revisions as applicable
12. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment," July 2007, and other revisions as applicable

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Define the safety significance, and give examples of minor performance deficiencies and Green findings of this SDP branch.
2. Process a finding through the SDP branch.
3. Describe the different environmental pathways the program is designed to assess.
4. Describe the significance of the pathways monitored by the radiological environmental monitoring program.
5. Describe the minimum detection sensitivity criteria that licensees must use to analyze their environmental samples.
6. Describe the process a licensee needs to do to make changes to the scope of their radiological environmental monitoring program.

TASKS:

1. Review MC 0609, Appendix D, Section II, Radioactive Environmental Monitoring Program.
2. Review the underlined reference materials to become familiar with the characteristics of an acceptable environmental monitoring program.
3. Go to the ROP web-site and review recent Green findings in the area of environmental monitoring.
4. For those inspection findings related to environmental monitoring programs, process the finding through the Environmental Monitoring Program branch of the Public Radiation Safety SDP. Determine if you agree with the results in the inspection report. Discuss any differences you may have with a qualified health physics inspector.

5. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this training activity. Discuss the answers to the questions and your work products listed under the Evaluation Criteria section of this study guide with your supervisor.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-14.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-15) Significance Determination Process - Public Radiation Safety: Transportation Branch

PURPOSE: The purpose of this ISA is to familiarize you with the transportation branch of the Public Radiation Safety Significance Determination Process (SDP), explain the bases of the branch, provide technical and policy references, and present practical exercises/scenarios that will require you to use this branch of the SDP. The risk significance of inspection findings are evaluated using the SDP.

COMPETENCY AREA: INSPECTION
TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL OF EFFORT: 36 hours

- REFERENCES:**
1. IMC 0609, Appendix D, "Public Radiation Safety Significance Determination Process," Section VII, "Transportation."
 2. IMC 0308, Attachment 3, Appendix D, "Technical Basis for Public Radiation Safety Significance Determination Process"
 3. NRC Inspection Report and NRC Responses to Licensee Contestation for White Findings (VY – ML063110067, ML072340014; Prairie Island – ML090410466, ML091270080, ML100130231)
 4. NUREG-1660, "U.S.- Specific Schedules of Requirements for Transport of Specified Types of Radioactive Material Consignments"
 5. NUREG-1608, "Categorizing and Transporting Low Specific Activity Materials and Surface Contaminated Objects"
 6. NUREG/CR-6407, "Classification of Transportation Packing and Dry Spent Fuel Storage System Components According to Importance to Safety"
 7. NUREG/CR-5569, "Health Physics Positions Data Base," Section 2.17 (Transportation and Shipping)
 8. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," Sections 20.1904 and 20.1906
 9. 10 CFR Part 20, 61, and 71
 10. 49 CFR Parts 171-178, Subchapter C

11. IMC 0609, Appendix D, Section VII, "Transportation," Subsection a. "Radiation Limits Exceeded"
12. IMC 0609, Appendix D, Section VII, "Transportation," Subsection b, "Breach of Package During Transit"
13. IMC 0609, Appendix D, Section VII, "Transportation," Subsection c. "Part 61 Finding"
14. IMC 0609, Appendix D, Section VII, "Transportation," Subsection d. "Failure to Make Notifications or Provide Emergency Information"
 - a. Information Notice 92-62, "Emergency Response Information Requirements for Radioactive Material Shipments" August 24, 1992
 - b. Information Notice 93-07, "Classification of Transportation Emergencies," February 1, 1993
15. IMC 0609, Appendix D, Section VII, "Transportation," Subsection e. "Certificates of Compliance"
 - a. NUREG-0383 (latest revision), "Directory of Certificates of Compliance for Radioactive Materials Packages," Volume 2

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. State the bases for the five sub-branches of the Transportation Branch of Public Radiation Safety SDP.
2. Define the safety significance, and give examples of Green, White, Yellow and Red findings in the sub-branches of this SDP Branch.
3. For the Radiation Limit Sub-Branch of the SDP, you should be able to:
 - a. Process findings for an event through the sub-branch, using example training scenarios. (Use the examples listed in the reference section)
 - b. Explain why five times the limit for external radiation is a WHITE finding, while five times the surface contamination limit gets only a GREEN finding.
4. For the Breach of Package Sub-Branch of the SDP you should be able to:
 - a. Define "breach", "normal conditions of transport," and "Type A" and how these terms factor in when determining whether a

loss of containment of a Type A package is deemed a breach finding, for purposes of this SDP.

- b. Define “breach”, “beyond normal conditions of transport”, and “Type B” and how these terms factor in when determining whether a loss of containment of a Type B package is deemed a breach finding, for purposes of this SDP.
 - c. Process findings through the branch, using example training scenarios.
5. For the Low Level Burial Ground Access Sub-Branch of the SDP, you should be able to:
- a. Discuss and explain why waste under-classification merits a WHITE finding.
 - b. Process exposure findings through the branch, using example training scenarios.
6. For the Notifications or Emergency Information Sub-Branch of the SDP, you should be able to:
- a. For Block N1, give examples of non-compliances that result in GREEN and WHITE findings.
 - b. For Block N4, state the external radiation and surface contamination levels (five times the allowable Part 71 limits) for a typical spent fuel exclusive-use shipment that if exceeded, would result in a WHITE finding if not reported by the receiving facility.
 - c. Process findings through the branch, using example training scenarios.
7. For the Certificate of Compliance Sub-Branch of the SDP, you should be able to:
- a. Define what a Certificate of Compliance (COC) is, what it does and discuss typical COC requirements (or conditions) for a Type B shipping container.
 - b. Process findings through the branch, using example training scenarios

TASKS:

1. Review MC 0609 and focus on Appendix D, “Public Radiation Safety Significance Determination Process.”
2. Review the references pertinent to each SDP sub-branch.

3. Identify all applicable DOT radiation limits for exclusive use, Type A and B transport packages pertinent to this Sub-Branch.
4. Develop a scenario involving a breach of a Type A package (with loss of contents) that would result in only a GREEN finding.
5. Review Part 61
 - a. Identify and define Class A, B, and C wastes.
 - b. Identify the eight minimum waste Part 61 requirements/characteristics and be able to discuss the most likely problems encountered by power plant shipments.
6. Review 10 CFR 71.97 and identify four possible non-compliances that would result in GREEN findings. Develop a scenario that should result in a WHITE finding for Block N1.
7. Review 49 CFR 172.602 (Block N2), and list the minimum emergency information that must be provided by the shipper and be able to discuss why and how quickly this information must be provided to emergency responders.
8. Develop a scenario for a Type B shipment of dewatered resins that leads to a White finding in the COC sub-Branch, and a Yellow finding in the Package Breach sub-Branch. Discuss with your supervisor or qualified HP inspector which finding(s) would be documented for this one event.
9. Using an example COC for a typical Type B waste container, and using the NUREG-0383, sort and list six components relative to their importance to safety. Additional information on COCs may be found on <http://rampac.energy.gov>.
10. Review selected regional inspection reports that resulted in Green and White finding in this area. Process the finding through the appropriate branch of the SDP. Determine if you agree with the results in the inspection report. Discuss any differences you may have on the SDP results with a qualified health physics inspector.
11. Whenever possible, attend a significance determination and enforcement review panel (SERP) related to this SDP. Discuss rationale for the outcome/resolution of the panel with a qualified health physics inspector.
12. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this training activity. Discuss the answers to the questions and your work products listed under the Evaluation Criteria section of this study guide with your supervisor.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-15.

Health Physics Inspector Individual Study Activity

- TOPIC: (ISA-HP-16) Performance Indicators - Occupational Radiation Safety Cornerstone – Occupational Exposure Control Effectiveness and Public Radiation Safety Cornerstone - Radiological Effluent Technical Specifications (RETS)/Offsite Dose Calculation Manual (ODCM) Radiological Effluent Occurrences
- PURPOSE: This ISA will help the inspector to understand the definition of an Occupational Radiation Safety Cornerstone PI and a Public Radiation Safety Cornerstone PI, to gain the ability to identify an individual operational occurrence, and to correctly classify the occurrence as a PI, or not.
- One of the objectives of the Inspection program is to verify the Performance Indicators (PIs) reported by the licensee in each cornerstone area. Therefore, it is important for the inspector to be capable of determining whether an operational occurrence identified during an inspection is, or is not, reportable as a PI.
- COMPETENCY AREA: INSPECTION
TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK
- LEVEL OF EFFORT: 18 Hours
- REFERENCES:
1. NEI 99-02, (Latest Revision), "Regulatory Assessment Performance Indicator Guideline," Section 2.5
 2. NEI 99-02, (Latest Revision), "Regulatory Assessment Performance Indicator Guideline," Frequently Asked Questions, pages 112 - 120
 3. Standard Technical Specification, Section 6.12, "High Radiation Area Access Control"
 4. Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants," May 2006, and other revisions as applicable
 5. NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20," Questions Nos. 49, 92, 218, 373, 385, 423, 441, 447, 448
 6. NUREG/CR-5569, Rev.1, "Health Physics Positions Data Base," Section 2.5
 7. IMC 0608, "Performance Indicator Program"

8. IMC 0308, Attachment 1, "Technical Basis for Performance Indicators"
9. IP 71151, "Performance Indicator Verification"

**EVALUATION
CRITERIA:**

Upon completion of this ISA, the inspector should be able to:

1. Identify which attributes of a Radiation Protection Program are covered by the PI in this area.
2. Discuss the several types of operational occurrences included in the PI definition, including which non-conformance with High Radiation Area Technical Specifications is pertinent.
3. Define "unintended occupational exposure" and "radiation safety barriers".
4. Distinguish between an individual occurrence and concurrent operational occurrences.
5. Discuss the minimum significance "thresholds" of an occurrence in the PI definition.
6. Discuss the "thresholds" associated with the colored PI significance bands.
7. Identify which elements of a Chemistry Program are covered by the PI in this area.
8. Discuss the types of radiological effluent occurrences included in the PI definition.
9. Discuss how "significant" individual occurrences (i.e., those that exceed the reporting criteria in 10 CFR Parts 20.2202 or 20.2203) are handled by the Reactor Oversight Process.

TASKS:

1. Locate a copy of the TS for the facility designated by your supervisor, and compare the High Radiation Access requirements to those in the STS.
2. Review NEI 99-02 section 2.5 for Occupational Exposure Control Effectiveness and section 2.6 for RETS/ODCM Radiological Effluent Occurrences.
3. Review the materials in NUREG/CR-6204 and NURG/CR-5569 identified in the References section.
4. Review the discussion on "accessible" areas and adequate controls for High and Very High Radiation Areas in Regulatory Guide 8.38.

5. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this activity. Discuss the answers to the questions listed under the Evaluation Criteria section of this study guide with your supervisor.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item ISA-HP-16.

Health Physics Inspector On-the-Job Activities

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-1) Radiological Hazard Assessment and Exposure Controls

PURPOSE: The purpose of this activity is to familiarize you with inspection activities in inspection procedure 71124.01, "Radiological Hazard Assessment and Exposure Controls." The objectives of this procedure are:

1. To 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.
2. To verify that the licensee is properly identifying and reporting PIs for the Occupational Radiation Safety Cornerstone.
3. To identify those performance deficiencies that were reportable as a PI and which may have represented a substantial potential for overexposure of the worker.

Upon completion of this on-the-job activity, you will be able to perform assessments of reactor licensee's radiological hazard assessment and exposure controls.

**COMPETENCY
AREA:**

TECHNICAL AREA EXPERTISE
ASSESSMENT AND ENFORCEMENT
COMMUNICATION
INSPECTION

LEVEL

OF EFFORT: 64 hours

REFERENCES:

1. Licensee "Radiation Protection Plan"
2. Licensee "Radiological Access Control" procedure
3. Licensee "Radiological Postings" procedure
4. Licensee "Radiation Work Permit" procedure
5. Licensee Procedures for High and Very High Radiation Areas
6. Licensee Procedures for Controlling High Risk Jobs and Plant Evolutions
7. Licensing Procedures for Release of Materials for Unrestricted Use

8. Licensee "Radiological Survey and Analysis" procedure
9. Licensee "Technical Specifications" (Administrative controls for high radiation areas)
10. Licensee "Final Safety Analysis Report" or "Updated Safety Analysis Report"
11. Davis-Besse Special Inspection Reports 02-06 and 02-16 (ADAMS Accession Number ML030070606)
12. Licensee PIs for the Occupational Radiation Safety Cornerstone

**EVALUATION
CRITERIA:**

Upon completion of the tasks in this OJT, the inspector should be able to:

1. Describe areas that are considered risk significant and what kind of work would increase the risk significance.
2. Describe licensee controls for radiation areas, high radiation and very high radiation areas, and airborne radioactivity areas.
3. Describe the licensee's mechanism for making timely changes to controls and postings for radiation and high/very high radiation areas, as a result of changing plant conditions.
4. Describe the results of the survey you performed and the survey performed by the licensee and explain what could cause the results to be different.
5. Describe Technical Specification required controls for High Radiation Area and Very High Radiation Areas and how they compare to those in 10 CFR 20.
6. Describe the information communicated to the worker by the RWP, and the responsibilities of the radiation workers and HP staff.
7. Explain licensee policy on how electronic dosimeter alarm set points are established.
8. Explain the actions expected from workers in response to a dose or dose rate alarm and those expected in the event of an instrument malfunction.
9. Describe methods that could be employed to reduce or prevent the uptake of radioactive materials.
10. Describe expected licensee response to suspected or actual uptake of airborne radioactive material.

11. Describe controls used to protect against accidentally exposing highly activated materials stored in the spent fuel pool, transfer canal, moisture separator pit or other tank of water for the purpose of shielding.
12. Discuss how the licensee performs radiation surveys on coolant piping and components, coolant radiochemistry analysis and waste radiochemistry analysis to determine changes in radionuclide source term and radionuclide mix in various waste streams.
13. Describe the degree of documentation in the corrective action program with regards to threshold, detail, thoroughness, and timeliness and how the program should be assessed for adequacy.
14. Identify those performance deficiencies that were reportable as a PI and which may have represented a substantial potential for overexposure of the worker.
15. Describe the licensee controls to ensure that radioactive materials are not released to unrestricted areas.
16. Describe the training and qualification requirements for the RP technicians and radiation workers.

TASKS:

1. Identify exposure significant work areas within radiation areas, high radiation areas and airborne radioactivity areas in the plant.
2. Identify appropriate licensee controls for exposure significant work areas.
3. Walk down a work area with a survey instrument and determine if licensee surveys are accurate and postings are complete. Prior to performing the survey perform the following steps:
 - a. Select an appropriate instrument. (If you are uncertain contact the qualified inspector)
 - b. Familiarize yourself with the operations of the instrument and any peculiarities/features that it may have.
 - c. Turn the instrument on and check the batteries, check the high voltage or instrument zero if applicable, check the physical condition and perform a response test with an appropriate source.
 - d. Verify that the instrument is within its calibration interval. If there is any doubt about the operability of the instrument, do not use it.
4. Review plant specific Technical Specifications high radiation area requirements to determine necessary barriers for high radiation

areas, and locked high radiation areas. Review licensee procedures for very high radiation areas, and identify the “additional measures” implemented, as required by 10 CFR 20.1602.

5. Review radiation work permits (RWP) used to access an exposure significant work area and identify what work control instructions or control barriers are specified.
6. Review licensee procedures which define how electronic dosimeter alarm set points are established.
7. Review plant policy and determine the expected actions on an electronic dosimeter integrated dose alarm, dose rate alarm and a malfunction.
8. In a power plant setting discuss the engineering controls that would be expected for an area that was expected to exceed 20 DAC (Derived Air Concentration) airborne being produced by surface-disturbing work. (A qualified inspector can identify an example physical setting and work through this with you.)
9. Whenever possible, select several work activities and follow these jobs (in radiation and high radiation areas) during the inspection. Observe workers during the pre-job briefings, work preparation activities, actual in-field work and any post-work debriefings. Discuss any observations with a qualified inspector.
10. Perform an inspection of the licensee spent fuel pool/transfer canal or moisture separator pit and determine licensee controls for high activity items stored in the pool. Determine what controls are in place to prevent accidentally exposing high activity items. Note that some licensees store high activity items suspended from the side of spent fuel pools in which case determine the controls that they would use for short term transient storage prior to disposition.
11. Review a licensee’s self-assessment or audit. Select 3 findings from the report and determine if the identified problems are documented in the corrective action program for tracking and resolution.
12. Observe control point operation to verify that personnel (radiation workers and RP technicians) are complying with the applicable guidance and training regarding survey and release of material.
13. Select three sources from the licensee inventory records. Verify the source location is correct and inspect the physical security of the source. Review leak test results, if applicable. Verify that any transactions involving Category 1 and 2 sources were reported in accordance with 10 CFR 20.2207.

14. Review the licensee's reports for dose rate alarms from electronic dosimeters in which the measured dose rate was greater than 1000 mrem/hr. Review the licensee's reports for dose alarms from electronic dosimeters in which the dose was greater than 100 mrem above the alarm dose limit. Explain how this data can be used to verify the accuracy of the reported PIs.
15. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item OJT-HP-1.

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-2) Occupational ALARA Planning and Controls

PURPOSE: The purpose of this activity is to familiarize you with the inspection activities in inspection procedure 71124.02, "Occupational ALARA Planning and Controls." The objective of this procedure is to assess performance with respect to maintaining individual and collective radiation exposures ALARA. This inspection will determine whether the licensee's ALARA program, including administrative, operational, and engineering controls, is effectively maintaining occupational exposure ALARA.

Upon completion of this on-the-job activity, you will be able to perform assessments of reactor licensee's ALARA planning and controls.

COMPETENCY
AREA:

TECHNICAL AREA EXPERTISE
ASSESSMENT AND ENFORCEMENT
COMMUNICATION
INSPECTION

LEVEL
OF EFFORT: 54 hours

- REFERENCES:
1. Licensee ALARA Program procedure
 2. Licensee dose printout of individual doses for a work group identified by qualified inspector
 3. Licensee source term trending documentation/ ALARA review
 4. Completed licensee ALARA package for a significant job identified by qualified inspector
 5. Licensee historical or current outage backbone schedule that identifies significant work milestones
 6. Licensee temporary shielding procedure
 7. Licensee hot spot reduction procedure
 8. Licensee source term control/ reduction procedure (May be fragmented into several procedures)
 9. Licensee "Strategic Primary Water Plan" section describing shutdown chemistry or other procedure describing the chemistry controls involved in shutting down the plant. (The "Strategic Water Plans" are licensee process optimization documents that are generated in response to EPRI and NEI initiatives/commitments)

EVALUATION
CRITERIA:

Upon completion of the tasks in this OJT, the inspector should be able to:

1. Explain why engineering controls are used to reduce or eliminate respiratory protection requirements.
2. Explain why there are still some variations in the amount of dose received for a population of workers even though skill levels are the same and work assignments are comparable.
3. Describe licensee source term trending techniques.
4. Describe key considerations and components of an ALARA work package.
5. Describe how RWPs capture the ALARA planning considerations.
6. Describe considerations in determining whether temporary shielding is provided at RP's request.
7. Describe how the timing of work evolutions affects dose reduction opportunities. Discuss the things that may make the timing less than optimal.
8. Describe how the licensee ALARA program incorporates lessons learned, industry experience, historical data, and employee feedback/ recommendations.

TASKS:

1. Estimate dose reductions achieved by use of engineering controls.
 - a. Reduction in TEDE (Total Effective Dose Equivalent) dose by avoiding having respiratory protection.
 - b. Reduction in TEDE dose that would have been incurred had the licensee used neither engineering controls nor respiratory protection.
2. Compare individual exposures for a selected workgroup and identify probable reasons for significant differences. Population selected should be comparable in skill level and duty assignment (i.e. do not compare a Senior RP Technician with a Junior RP Technician as duties are dissimilar.)
3. Determine source term historical trends and current status using licensee records. (Source terms include hot spots, pipe contact dose rates, coolant activity, contamination levels and airborne activity.)
4. Determine the elements of the licensee source term control strategies. Determine constraints on these elements, (i.e., hotspot reduction and shielding may not be dose-justified (more dose

received during mitigation than can reasonably be saved which can occur in some infrequently entered areas such as steam generator cubicles. Zinc injection, certain chemistry controls and alternative resins may be rejected based on fuel warranty or cost concerns or both.)

5. Review a completed licensee ALARA job package. Compare planned work (man-hours) to actual work (man-hours). Compare expected dose (mrem) with actual dose (mrem). Compare expected radiological conditions with actual for dose rate, contamination and airborne radioactivity. Identify any additional controls employed to reduce exposure such as ventilation, keeping work surfaces wet, glove bags, and shielding. Identify any in-progress reviews that are used to reevaluate expected man-hours and dose. If included, review surveys used for original estimate and compare to surveys performed while work was in progress.
6. Review the ALARA package to determine how well the RWP captured the ALARA requirements as well as any other work documentation. Review an example of the licensee's ALARA Work-in-Progress Review for an outage high dose job. If the job was expected to exceed its dose estimate, what was the estimate for the increased dose and verify that this increase in the estimated dose was approved by the Station ALARA Committee.
7. Review the RP Group shielding request with respect to dose rate reduction and assigning value. Compare the projected dose savings with the dose expended installing shielding. If net dose savings did not occur determine if radiological risk was averted such as elimination of high dose gradients.
8. Whenever possible, select several work activities and follow these jobs (in radiation and high radiation areas) during the inspection. Observe workers during the pre-job ALARA briefings, work preparation activities, actual in-field work and any post-work lesson-learned debriefings. Discuss any observations with a qualified inspector.
9. Review outage schedule to determine if jobs are scheduled to reduce exposure (e.g., Major work on reactor coolant pumps and steam generator platforms is scheduled after initial shutdown crud burst or is it done during the crud burst? Are systems worked on when they are filled with water if possible? How is shielding and scaffold erection scheduled in relation to other work?).
10. Review the most recent Outage ALARA Report. Review the recommendations and lessons learned from the report. Spot check three of the most significant from a dose and cost reduction perspective to see how the licensee plans to incorporate them into future work.

11. Meet with your supervisor or a qualified health physics inspector to discuss any questions you may have as a result of this activity and demonstrate that you can meet the evaluation criteria for this activity.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item OJT-HP-2.

Health Physics Inspector On-the-Job Activity

TOPIC:	(OJT-HP-3) In-Plant Airborne Radioactivity Control and Mitigation
PURPOSE:	<p>The purpose of this activity is to familiarize you with the inspection activities in inspection procedure 71124.03, "In-Plant Airborne Radioactivity Control and Mitigation." The objectives of this procedure are to verify that in-plant airborne concentrations are being controlled consistent with ALARA to the extent necessary to validate plant operations as reported by the PI and to verify that the practices and use of respiratory protection devices on site do not pose an undue risk to the wearer.</p> <p>Upon completion of this on-the-job activity, you will be able to perform assessments of reactor licensee's airborne radioactivity controls.</p>
COMPETENCY AREA:	TECHNICAL AREA EXPERTISE INSPECTION
LEVEL OF EFFORT:	20 hours
REFERENCES:	<ol style="list-style-type: none">1. Licensee Respiratory Protection Program procedures2. Licensee Respiratory Protection Equipment training and maintenance procedures3. Licensee procedures for use of temporary containment/confinement and ventilation to control the spread of airborne radioactive contamination4. Licensee procedures for use of systems to continuously monitor air for changing airborne concentrations in the plant and applicable alarm set points
EVALUATION CRITERIA:	<p>Upon completion of this activity, the inspector should be able to:</p> <ol style="list-style-type: none">1. Describe how the licensee uses engineering controls to minimize airborne radioactivity in the workplace.2. Describe how the licensee uses systems to monitor the air for the presence of airborne radioactivity.3. Describe the potential consequences of the licensee;<ol style="list-style-type: none">a. Providing non-NIOSH approved respirators to workers;b. Not ensuring that Grade D air is provided to supplied air respiratory protective devices;

- c. Not providing a standby rescue person while using devices that are difficult to escape;
 - d. Not properly determining if the area is considered Immediately Deleterious to Life and Health (IDLH).
4. Describe the potential consequences of a defective SCBA being used in a fire, a toxic atmosphere or an area with unknown high airborne radioactivity. Identify the section in 10 CFR 20 that requires that respirators be NIOSH approved.
 5. Describe the medical and fit test qualification and training program for respirator users.
 6. Describe the licensee SCBA air cylinder program for air quality testing, hydro-testing, and cylinder replacement schedule.

TASKS:

1. Review licensee's process and procedures for providing engineering controls (i.e., temporary tents, or other containment devices, and/or filtered ventilation) to prevent the generation and spread of airborne radioactive contamination resulting from onsite licensed activities.
2. Verify that licensees use systems to monitor and warn of changing airborne concentrations in the plant and that they have established appropriate alarm set points.
3. Verify that respiratory protective devices employed by the licensee have been certified by NIOSH or have been specifically approved for use by the NRC per the requirements of 10 CFR 20.1703.
4. Verify that air used for respiratory protection devices meets or exceeds Grade D air quality.
5. Observe condition of stored respiratory protection devices ready for use.
6. Based on FSAR, Technical Specifications and Emergency Operating Procedures requirements, review the status and surveillance records of SCBA staged and ready for use in the plant.
7. Determine if 1) control room operators and other emergency response personnel (assigned in-plant search and rescue duties or as required by EOPs or Emergency Plan) are trained and qualified in the use of SCBA (including personal bottle change out) and 2) these individuals are provided with appropriate vision correction lenses.
8. Review pertinent sections of 29 CFR 1910 and 49 CFR Part 173 and Part 178 for additional respirator and cylinder maintenance.

9. Discuss each of the program elements of an acceptable Respiratory Protection Program described in RG 8.15, "Acceptable Programs for Respiratory Protection, Rev 1.
10. Observe the licensee inspecting a SCBA, testing the regulator and testing the various alarms. Also, if possible observe a worker getting a respirator fit test.
11. Meet with your supervisor or a qualified Health Physics inspector to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item OJT-HP-3.

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-4) Occupational Dose Assessment

PURPOSE: The purpose of this activity is to familiarize you with the inspection activities in inspection procedure 71124.04, "Occupational Dose Assessment." The objective of this procedure is to determine the accuracy and operability of personal monitoring equipment, determine the accuracy and effectiveness of the licensee's methods for determining total effective dose equivalent and verify that occupational dose is appropriately monitored.

Upon completion of this on-the-job activity, you will be able to perform assessments of reactor licensee's ability to measure occupational dose.

COMPETENCY
AREA:

TECHNICAL AREA EXPERTISE
ASSESSMENT AND ENFORCEMENT
COMMUNICATION
INSPECTION

LEVEL
OF EFFORT: 20 hours

REFERENCES:

1. Licensee Declared Pregnant Worker Procedure
2. Licensee procedures that address methods for determining if an individual is internally or externally contaminated
3. Licensee Internal Dose Assessment procedures
4. Licensee Monitoring of External Dose Procedures
5. Occupational Dosimeter Performance Test and Quality Assurance
6. National Voluntary Laboratory Accreditation (NVLAP) Accreditation Certificates for Applicable Radiation Categories

EVALUATION
CRITERIA:

Upon completion of the tasks in this OJT, the inspector should be able to:

1. Discuss licensee documentation that is used to identify, report and track problems involving personnel contaminations, unexpected exposures, radiological incidents and events involving uncontrolled or unmonitored internal or external exposure of workers.
2. If the plants have individuals with internal exposures greater than 10 mrem Committed Effective Dose Equivalent (CEDE), describe the process used to properly assess the exposure. Otherwise, describe the procedural process that would be used if such an exposure were to be unexpectedly discovered.

3. Describe the licensee's methodology for monitoring external dose situations in which non-uniform fields are expected.
4. Describe the licensee's methodologies for accounting for neutron doses.
5. Describe the licensee's methodology for assessing skin doses resulting from skin contamination.
6. Describe the process used to determine and assign fetal dose. Describe a woman's rights with respect to declaring her pregnancy.

TASKS:

1. Review licensee self-assessments, audits, and Licensee Event Reports and focus on radiological incidents that involved personnel contamination monitor alarms due to personnel internal exposures and dose alarms from electronic dosimeters.
2. For any internal exposure > 100 mrem CEDE, determine whether the intake was properly evaluated using calibrated equipment and the internal exposure was properly assessed in accordance with licensee procedure. Determine how the licensee includes hard-to-detect radionuclides (e.g., scaling factors) into the internal dose assessments.
3. Verify that the licensee's personnel dosimeters that require processing are processed by a NVLAP accredited processor that is certified in the applicable Radiation Categories.
4. Review Declared Pregnant Worker (or Woman) procedures. Review the exposure results and monitoring controls employed by the licensee with respect to the requirements. (Program should have provisions for determining fetal dose from internal deposition as well as external radiation.)
5. Review the licensee's procedure for monitoring Effective Dose Equivalent for workers in radiation fields with large dose gradients. Determine if during the most recent outage, the multi-badging program and practices meet the guidance in RG 8.40 and HPS N13.41-1997.
6. Meet with your supervisor or a qualified health physics inspector to discuss any questions you may have as a result of this activity and demonstrate that you can meet the evaluation criteria for this activity.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item OJT-HP-4.

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-5) Radiation Monitoring Instrumentation

PURPOSE: The purpose of this activity is to familiarize you with the inspection activities in inspection procedure 71124.05, "Radiation Monitoring Instrumentation." The objective of this procedure is to verify that the licensee is ensuring the accuracy and operability of radiation monitoring instruments that are used to monitor areas, materials, and workers to ensure a radiologically safe work environment. The instrumentation subject to this review includes equipment used to monitor radiological conditions incident to normal plant operations, including anticipated operational occurrences, and conditions resulting from postulated accidents.

Upon completion of this on-the-job activity, you will be able to perform assessments of reactor licensee's radiation monitoring instrumentation activities.

COMPETENCY
AREA:

TECHNICAL AREA EXPERTISE
ASSESSMENT AND ENFORCEMENT
COMMUNICATION
INSPECTION

LEVEL
OF EFFORT:

40 hours

REFERENCES:

1. Licensee fixed and portable instrumentation procedures
2. Licensee air sampling equipment procedures
3. Licensee post-accident monitoring equipment procedures
4. Licensee counting room instrumentation procedures
5. Licensee personnel contamination monitor and small article monitor procedures.
6. Licensee whole body equipment procedure

EVALUATION
CRITERIA:

Upon completion of the tasks in this OJT, the inspector should be able to:

1. Describe the extent that emergency planning and maintenance rule inspections (in your region) address radiological instruments well enough to preclude redundant inspection activities while ensuring adequate inspection coverage.

2. Describe the plant activities and areas that have permanently installed area radiation monitors based on examination of the plant's Final Safety Analysis Report (FSAR).
3. Discuss data analysis techniques, including MDA and LLD. Verify licensee MDA and LLD calculations for each release pathway.
4. Describe the instrumentation used for high risk jobs including survey meter types and designations, remote readout area monitors and continuous air monitors.
5. Describe the fixed and portable instrumentation used for personnel release from radiologically controlled area and how it is used.
6. Discuss the calibration technique for radiation instruments used to screen and clear potentially contaminated materials/articles (e.g., a small article monitor (SAM) and a bag monitor) based on IE Circular 81-07 and Information Notice 85-92.
7. Describe the methodology used to calibrate instruments, verify their operability, determine if appropriate calibration sources are used, and determine, when applicable, if alarm set points have been properly set. Describe the channel operability testing frequency.
8. Describe the process used to resolve situations where instruments are found to be significantly out of calibrations. State the impact on surveys done with the instrument?
9. Describe the likely consequences of having a substantially over or under responding instrument used to cover work and perform surveys. State the effect of significantly extending the source check frequencies of survey instruments.

TASKS:

1. Determine what radiological instrumentation is inspected in your region under NRC emergency planning or maintenance rule inspections if any. (This will require discussion with Maintenance Rule and Emergency Planning Inspectors normally prior to leaving the licensee site.)
2. Review the plant FSAR to identify applicable radiation monitors associated with transient high and very high radiation areas including those used in remote emergency assessment.
3. Identify the types of portable radiation detection instrumentation used for job coverage of high radiation area work, other temporary area radiation monitors currently used in the plant, and continuous air monitors.
4. Identify types of radiation detection instruments utilized for unconditional release of personnel and equipment from the radiologically controlled area.

5. Verify calibration, operability, frequency and alarm set point (if applicable) of several types of instruments and equipment.
6. Determine what actions are taken when, during calibration or source checks, an instrument is found significantly out of calibration (>50%).
7. Determine possible consequences of instrument use since last successful calibration or source check for those out of calibration or that have failed a source check.
8. Review and understand the calibration techniques and results of the measurements made with counting room instruments.
9. Review and understand the measurement laboratory's analytical techniques (e.g., gamma, Sr-89/90, H-3, and gross alpha/beta).
10. Review and evaluate the calibration of the Whole Body Counter.
11. Review and evaluate the calibration of Post-Accident Monitoring Instrumentation.
12. Meet with your supervisor or a qualified health physics inspector to discuss any questions you may have as a result of this activity and demonstrate that you can meet the evaluation criteria for this activity.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item OJT-HP-5.

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-6) Radioactive Gaseous and Liquid Effluent Treatment

PURPOSE: The purpose of this on-the-job activity is to provide tasks and information that will familiarize you with the inspection requirements contained in procedure IP 71124.06, "Radioactive Gaseous and Liquid Effluent Treatment," to allow you to independently conduct inspections in this area. The objectives of this procedure are:

1. To ensure that the gaseous and liquid effluent processing systems are maintained so that radiological discharges are properly mitigated, monitored, and evaluated with regard to public exposure. The principal design Criterion for these systems are found in General Design Criteria 60 and 64 of Appendix A to 10 CFR Part 50, Radiological Effluent Technical Specifications (RETS). Generic Letter 89-01, NUREG-1301, NUREG-1302, Standard Radiological Effluent Controls (SREC), and the Offsite Dose Calculation Manual (ODCM) provide acceptable methods of implementation to meet these design criteria.
2. To ensure 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.
3. To verify that the licensees' quality control program ensures that the radioactive effluent sampling and analysis requirements are satisfied so that discharges of radioactive materials are adequately quantified and evaluated.
4. To verify the adequacy of public dose calculations and projections resulting from radioactive effluent discharges.

This inspection activity verifies aspects of the Public Radiation Safety cornerstone not measured by performance indicators. In Public Radiation Safety, the effluent release occurrence performance indicator measures radioactive gaseous and liquid releases that were above Technical Specification and/or Offsite Dose Calculation Manual limits. Radiation exposure to the public is to be below the 10 CFR Part 20 and 40 CFR Part 190 limits. Doses below the design objectives of Appendix I to 10 CFR Part 50 and 40 CFR Part 190 dose values are considered ALARA. Radioactive effluent treatment systems and monitors are required by Criteria 60 and 64 of Appendix A to 10 CFR Part 50. Proper operation of the system and monitors, as described in the licensee's Radioactive Effluent Control Program, will ensure an adequate defense-in-depth against an unmonitored, unanticipated, and unplanned release of radioactive material to the environment.

Upon completion of this on-the-job activity, you will be able to conduct assessments of a reactor licensee's radioactive gaseous and liquid effluent treatment and monitoring systems.

COMPETENCY
AREA:

INSPECTION

LEVEL
OF EFFORT:

90 HOURS

REFERENCES:

1. Plant Updated Final Safety Analysis Report
2. Licensee Procedures for Effluent Monitor Calibration and Effluent Sampling
3. Licensee Offsite Dose Calculation Manual
4. Licensee Radiological Effluent Tech Specs (RETS)
5. Most recent copy of the Licensee's Annual Radioactive Effluent Release Report
6. Licensee PIs for the Public Radiation Safety Cornerstone
7. Licensee Radiation Monitor System Health Report and Maintenance Rule 10 CFR 50.65 (a)1, Action Plans for Effluent and Accident Monitors

EVALUATION
CRITERIA:

Upon completion of the tasks, the inspector should be able to:

1. Discuss the effluent sampling techniques (water, air iodine, and air particulate) that you inspected. Compare and contrast the capabilities and limitations of each method.
2. Discuss the Laboratory's QA Policy and QC implementation, including inter-laboratory and intra-laboratory comparison. Compare it with NRC expectations.
3. Discuss the radioactive liquid treatment systems and the effluent release pathways. Compare these to those presented in the UFSAR and ODCM.
4. Discuss the radioactive gas treatment systems and the gaseous effluent release pathways. Compare these to those presented in the UFSAR and ODCM.
5. Discuss the radioactive liquid and gaseous effluent radiation monitoring systems listed in the ODCM. Discuss the capabilities of the monitors and their conformance with UFSAR and ODCM descriptions.

6. Discuss the calibration techniques for the effluent radiation monitoring systems, including energy responses to various detectors, primary and secondary calibrations, and establishing the operating high voltage.
7. Discuss the air cleaning systems, their functions and required periodic testing (e.g., Augmented Off-Gas, Reactor Building Air Cleaning System.).
8. Discuss the calibration techniques for the effluent flow rate measurement devices listed in the ODCM. Identify what type of flow the sampler is seeing and if there is isokinetic sampling and how to determine whether or not there is isokinetic sampling.

TASKS:

1. Review and become familiar with the documents listed in the reference list.
2. Locate a copy of the air cleaning system section from the UFSAR and Technical Specification. Conduct walk downs of as much of the system as possible. Compare your observations with descriptions in the UFSAR.
3. Identify the various sources of liquid and gaseous radioactive waste, waste streams, and technologies associated with liquid and gaseous radioactive waste processing for the facility. Compare your observations with descriptions in the UFSAR.
4. Review the licensee's ODCM and identify the radioactive gaseous and liquid effluent pathways. Conduct walk downs of gaseous and liquid monitoring systems and look for deficiencies similar to those discussed in IN 13-13 and IN 13-12.
5. Review and evaluate the projected public dose calculation methodologies (all pathways) listed in Regulatory Guide 1.109.
6. Review and evaluate the air cleaning system surveillance test results.
7. Review and evaluate the effluent radiation monitoring system channel calibration, functional test, and source check results.
8. Review and evaluate the implementation of the QA/QC in the measurement laboratory, including inter-laboratory and intra-laboratory comparisons.
9. Review and understand the radioactive liquid and gaseous release permits.
10. Review and understand the Annual Radioactive Effluent Release Report.

11. Review the Tech Specs and ODCM requirements for the ISFSI and High Level Waste Facility if applicable. Perform a walk down of these facilities and observe how these requirements are being met.
12. Review the licensee's ODCM and determine for each of the Gaseous and Liquid Effluent Monitors, what the Limiting Conditions for Operations, Surveillance Requirements and Actions are. Review the licensee's procedures for sampling the various effluent release points.
13. Review corrective action reports in the area of radioactive gaseous and liquid effluent and monitoring systems to identify problems in this area and to understand the licensee's corrective action process.
14. Meet with your supervisor or a qualified Health Physics inspector to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item OJT-HP-6.

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-7) Radiological Environmental Monitoring Program

PURPOSE: The purpose of this on-the-job-activity is to provide you with tasks and information that will familiarize you with the inspection requirements contained in procedure IP71124.07, "Radiological Environmental Monitoring Program," to allow you to independently conduct inspections in these areas. The objectives of the procedure are:

1. To verify that the REMP quantifies the impact of radioactive effluent releases to the environment and sufficiently validates the integrity of the radioactive gaseous and liquid effluent release monitoring program.
2. To verify that the REMP is implemented consistently with the licensee's TS and/or ODCM and to validate that the radioactive effluent release program meets the design objective in Appendix I to 10 CFR Part 50.
3. To ensure that the REMP (1) monitors non effluent exposure pathways (e.g., onsite spills or leaks, exposures from direct and scattered (sky shine) radiation from plant facilities and components), (2) is based on sound principles and assumptions, and (3) validates that doses to members of the public are within the dose limits of 10 CFR 20, "Standards for Protection against Radiation," and 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations," as applicable.
4. To verify that the licensee is continuing to implement the voluntary NEI/Industry Groundwater Protection Initiative (GPI).

The NRC requires that licensees ensure adequate protection of public health and safety from exposure to radioactive material released to the public domain as a result of routine operations. The REMP is required by Criterion 64 of Appendix A to 10 CFR Part 50 and supplements the effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation in the environment are in agreement with the values predicted by the radioactive effluent monitoring program. The licensee is required to implement the REMP in accordance with its Technical Specifications and/or Offsite Dose Calculation Manual, which are based on the design objectives contained in Appendix I of 10 CFR Part 50, as required by 10 FR 50.34a.

Upon completion of this on-the-job activity, you will be able to perform assessments of reactor licensee's radiological environmental monitoring activities.

COMPETENCY
AREA:

INSPECTION

LEVEL
OF EFFORT: 37 HOURS

- REFERENCES:
1. Plant Updated Final Safety Analysis Report
 2. Licensee's Land Use Census
 3. Licensee or vendor procedures for sampling and analysis of environmental samples
 4. Licensee Meteorological Tower procedures
 5. Most recent copy of licensee's Annual Radiological Environmental Operating Report
 6. Licensee's Offsite Dose Calculation Manual

EVALUATION
CRITERIA:

Upon completion of the tasks, the inspector should be able to:

1. Discuss the environmental sampling techniques (water, milk, air iodine, air particulate, vegetation, fish, and soil/sediment) that you inspected.
2. Discuss data analysis techniques used by the licensee, including MDA and LLD.
3. Discuss the Laboratory's QA Policy and QC implementation, including inter-laboratory and intra-laboratory comparisons.
4. Discuss the Land Use Census. Identify principle land water uses by members of the public including any onsite activities.
5. Discuss the Meteorological Monitoring Program, including calibration methodology for wind direction, wind speed, and delta temperature.
6. Discuss the licensee's determination of χ/Q and D/Q , and annual average data.
7. Review the REMP Annual Report and discuss the soundness of the report.
8. Discuss the licensee's continued implementation of the Ground Water Protection Initiative.

- TASKS:
1. Review and become familiar with the documents listed in the reference list.

2. Locate a copy of the REMP section from the UFSAR and ODCM. Identify the location and sampling frequency for each of the required environmental sampling media and environmental TLDs.
3. Review the requirements of the REMP, including review of the REMP Annual Report.
4. Review the contents of the licensee's ODCM and compare the contents against NUREG 1301/1302 (or Branch Technical Position, November 1979).
5. Review the radiological measurement instrument data (proportional counter, gamma spectroscopy, liquid scintillation counter, and TLD reader).
6. Review the counting statistics used by the licensee, including MDA and LLD.
7. Review and evaluate calibration records and maintenance records for ambient radiation measurements (using TLDs).
8. Review and evaluate the meteorological monitoring requirements and evaluate the adequacy of the calibration results for wind direction, wind speed, and delta temperature. Conduct a walk down of the primary meteorological tower. Record results of wind direction, wind speed and delta temperature. Compare results to the corresponding control room readings.
9. Conduct walk downs of as much of the REMP sampling stations as possible, including the meteorological monitoring tower and the control room as well as on-site monitoring wells and liquid discharge composite samplers. Compare the findings with what is described in the applicable documents.
10. Review the sequential relationship between Radiological Effluent Controls and the licensee's REMP.
11. Review the man-made and natural radiation exposure pathways (fission/activated products and the source of the natural background radiation). Evaluate how the licensee takes these into consideration when analyzing its samples.
12. Select three to five structure systems, or components (SSCs) that involve or could reasonably involve licensed material for which there is a credible mechanism for license material to reach ground water, and verify that the licensee has implemented a sampling and monitoring program sufficient to detect leakage of these SSCs to ground water.
13. Review the Fundamentals of Laboratory QA/QC Policy and its implementation at the licensee's facility.

14. Review corrective action reports in the area of radiological environmental monitoring and radioactive material controls to identify problems in this area and understand the licensee's corrective action process.
15. Review reported ground water monitoring results, and changes to the licensee's written program for identifying and controlling contaminated spills/leaks to ground water.
16. Review identified leakage or spill events and entries made into the 10 CFR 50.75 (g) records. Review evaluations of leaks or spills, and review any remediation actions taken for effectiveness. Review onsite contamination events involving contamination of ground water. Assess whether the source of the leak or spill was identified and mitigated, and verify that applicable notification to offsite agencies was made and that a source/evaluation was performed to include consideration of hard-to-detect radionuclides.
17. Meet with your supervisor or a qualified Health Physics inspector to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item OJT-HP-7.

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-8) Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation

PURPOSE: The purpose of this on-the job activity is to provide you tasks and information that will familiarize you with the inspection requirements contained in procedure IP 71124.08, "Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation," to allow you to independently conduct inspections in this area. The objective of this procedure is to verify the effectiveness of the licensee's programs for processing, handling, storage, and transportation of radioactive material.

This inspection activity verifies aspects of the Public Radiation Safety cornerstone for which there are no performance indicators for unplanned public exposure during transportation of radioactive material. The licensee's radioactive material processing and shipping programs are required by Criterion 60 of Appendix A to 10 CFR 50, Parts 20, 61, and 71, and Department of Transportation regulations contained in 49 CFR Parts 100-189.

Upon completion of this on-the job activity, you will be able to perform assessments of a reactor licensee's radioactive materials processing, storage, handling, and transportation activities.

COMPETENCY AREA: INSPECTION
TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 40 HOURS

REFERENCES:

1. Plant Updated Final Safety Analysis Report
2. Plant Annual Radioactive Effluent Release Report
3. Licensee procedures covering all aspects of the radioactive waste program
4. Licensee Process Control Program (PCP)

EVALUATION CRITERIA: Upon completion of the tasks, the inspector should be able to:

1. Discuss the station's recent radiological effluent release report and the types and amounts of radioactive waste that the licensee has disposed in the past year. Specifically, you should be able to identify the types of waste, quantities, and the principal radionuclides contained in the various types of waste. You should also identify those types of waste that would require more stringent

packaging and identify where in the ODCM such reports are required.

2. Discuss the conformance of the station's solid and liquid radioactive waste processing systems, and their operation, with that described in the station's process control program (PCP) and the updated final safety analysis report (UFSAR). You should be able to compare and contrast the licensee's processing of its waste with NRC positions outlined in branch technical positions and 10 CFR 61.
3. Discuss the licensee's administrative and physical controls established to ensure that non-operational or abandoned radioactive waste processing equipment will not contribute to an unmonitored release path and/or affect operating systems or be a source of unnecessary personnel exposure. You should compare and contrast the controls with that identified in NRC guidance in Bulletin 80-10, and NUREG/CR-5569.
4. Discuss your review of recent changes to radioactive waste processing systems and if the changes were in accordance with 10 CFR 50.59. Discuss the licensee's estimates of doses to members of the public for these changes.
5. Identify and discuss the licensee's 10 CFR Part 61 waste stream analysis program and the various waste streams present and compare those identified with that reported by the licensee in its annual report.
6. Discuss how the licensee ensures collection of representative samples of waste for the 10 CFR Part 61 program and how it monitors for changes in its waste streams for purposes of waste characterization and classification. Identify how the licensee ensures meeting branch technical positions and is aware of guidance in Information Notice 86-20.
7. Show and discuss how the licensee uses the 10 CFR Part 61 waste stream analysis data, and any scaling factors and calculations, 1) to account for difficult-to-measure radionuclides, and 2) to determine curie content for waste to be shipped including concentration averaging. Specifically, identify how the licensee quantifies Table 1 and Table 2 radionuclides in 10 CFR 61.55.
8. Discuss the packaging, labeling, and marking requirements for various types of radioactive materials packages expected to be shipped from the facility. Identify in NUREG-1660 and Title 49 the specific labeling and placarding requirements.
9. Discuss the manifesting and placarding requirements for various types of radioactive materials packages you inspected. Show in NUREG 1660 the specific requirements. Discuss conformance with NUREG/BR-0204.

10. For the same shipments identified in item 9, identify the allowable radiation and contamination dose limits specified in regulatory documents 49 CFR100-189, and compare and contrast them with the values the licensee identified.
11. Discuss the Hazmat training and emergency response program used by the licensee to meet regulatory requirements. Discuss this information relative to guidance in Information Notices 92-62, 92-72, 95-09, and 49 CFR.
12. Discuss the characterization and classification of non-exempt low-level radioactive waste shipments reviewed in accordance with 10 CFR Part 61. Specifically, identify how the shipments met 10 CFR 61 and branch technical positions.
13. Discuss how the licensee maintains its regulatory documents, for its radioactive material processing and transportation program, up-to-date.
14. Discuss the licensee's corrective action program in the area of radioactive material processing, handling, storage, and shipping. Discuss the applicability of 10 CFR 50, Appendix B.

TASKS:

1. Review and familiarize yourself with the documents listed in the reference list. Specifically identify the purpose of each document and what guidance the document provides.
2. Locate a copy of the radioactive waste section from the UFSAR. Conduct walk downs (considering ALARA and safety constraints) of as much of the station's liquid and solid radioactive waste processing systems during your OJT activity. Assess the licensee's conformance of the facility with its design documents including any 10 CFR 50.59 changes to the systems.
3. Identify the various sources of liquid and solid radioactive waste, waste streams, and technologies associated with liquid radioactive waste processing for the facility. Compare them with that reported by the licensee in its Part 61 analysis.
4. Review the contents of the licensee's process control program (PCP), use of scaling factors for hard to detect nuclides, and the waste form and characteristics requirements for disposal of solid radioactive waste. Identify how the licensee quantifies those radionuclides listed in 10 CFR 61 Tables 1 and 2.
5. Review the requirements for the transfer of radioactive material contained in licensee procedures and compare that with requirements contained in 10 CFR 20 and 10 CFR 71.

6. Review the burial license requirements for a low-level radioactive waste disposal facility used by the licensee and discuss the specific requirements, in the area of waste characteristics, for burial of the waste.
7. Review the requirements for receipt of radioactive material by the licensee relative to criteria contained in 10 CFR 20 including reporting requirements for problems identified.
8. Review the licensee's implementation of the regulations in the area of training and emergency response as specified in 49 CFR 172 Subparts G and H.
9. Select at least five non-exempt radioactive materials shipments and review for compliance with all appropriate regulatory requirements including conformance with the cask certificate of compliance for the shipping casks used.
10. Observe the packaging, surveying, labeling, marking, vehicle checks, emergency instruction, disposal manifests, shipping papers, and loading of a radioactive waste shipment (a non-exempt shipment preferable). Inter-compare your findings with applicable regulatory requirements.
11. Review corrective action reports in the area of radioactive waste processing, handling, storage, and transportation to identify problems in this area and to understand the licensee's corrective action process.
12. Meet with your supervisor or a qualified Health Physics inspector to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

DOCUMENTATION: Document completion on the Health Physics Inspector Technical Proficiency Level Signature Card and Certification Item OJT-HP-8.

Health Physics Inspector Technical Proficiency Level Signature Card and Certification

Inspector Name: _____	Employee Initials / Date	Supervisor's Signature / Date
A. Training Courses		
Power Plant Engineering (self-study of selected chapters)		
GE BWR Systems Overview (R-104B)		
Westinghouse Systems Overview (R-104P)		
Advanced Health Physics (H-201)		
Respiratory Protection (H-311)		
Environmental Monitoring for Radioactivity (H-111)		
Radioactive Waste Management (H-202S Self-Study)		
Transportation of Radioactive Materials (H-308)		
B. Individual Study Activities		
(ISA-HP-1) Code of Federal Regulations (CFR)		
(ISA-HP-2) Licensee Documents for Health Physics Inspectors		
(ISA-HP-3) Radiological Hazard Assessment and Exposure Controls		
(ISA-HP-4) Occupational ALARA Planning and Controls		
(ISA-HP-5) In-Plant Airborne Radioactivity Control and Mitigation		
(ISA-HP-6) Occupational Dose Assessment		
(ISA-HP-7) Radiation Monitoring Instrumentation		
(ISA-HP-8) Radioactive Gaseous and Liquid Effluent Treatment		
(ISA-HP-9) Radiological Environmental Monitoring Program		
(ISA-HP-10) Radioactive Solid Waste Processing and Radioactive Material Handling, Storage and Transportation		
(ISA-HP-11) Significance Determination Process - Occupational Radiation Safety		
(ISA-HP-12) Significance Determination Process - Public Radiation Safety: Radioactive Material Control		
(ISA-HP-13) Significance Determination Process - Public Radiation Safety: Radioactive Effluent Release Program		
(ISA-HP-14) Significance Determination Process - Public Radiation Safety: Environmental Monitoring Program		

(ISA-HP-15) Significance Determination Process – Public Radiation Safety: Transportation Branch		
(ISA-HP-16) Performance Indicator - Occupational Radiation Safety		
On-the-Job Activities		
(OJT-HP-1) Radiological Hazard Assessment and Exposure Controls		
(OJT-HP-2) Occupational ALARA Planning and Controls		
(OJT-HP-3) In-Plant Airborne Radioactivity Control and Mitigation		
(OJT-HP-4) Occupational Dose Assessment		
(OJT-HP-5) Radiation Monitoring Instrumentation		
(OJT-HP-6) Radioactive Gaseous and Liquid Effluent Treatment		
(OJT-HP-7) Radiological Environmental Monitoring Program		
(OJT-HP-8) Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation		

Supervisor's signature indicates successful completion of all required courses and activities listed in this journal and readiness to appear before the Oral Board.

Supervisor's Signature: _____ Date: _____

This signature card and certification must be accompanied by Form 1, Health Physics Inspector Technical Proficiency Level Equivalency Justification, if applicable.

Copies: Inspector
 HR Office
 Supervisor

Form 1: Health Physics Inspector Technical Proficiency Level Equivalency Justification	
Inspector Name: _____	Identify equivalent training and experience for which the inspector is to be given credit.
A. Training Courses	
Power Plant Engineering (self-study of selected chapters)	
GE BWR Systems Overview (R-104B)	
Westinghouse Systems Overview (R-104P)	
Advanced Health Physics (H-201)	
Respiratory Protection (H-311)	
Environmental Monitoring for Radioactivity (H-111)	
Radioactive Waste Management (H-202S self-study)	
Transportation of Radioactive Materials (H-308)	
B. Individual Study Activities	
(ISA-HP-1) Code of Federal Regulations (CFR)	
(ISA-HP-2) Licensee Documents for Health Physics Inspectors	
(ISA-HP-3) Radiological Hazard Assessment and Exposure Controls	

(ISA-HP-4) Occupational ALARA Planning and Controls	
(ISA-HP-5) In-Plant Airborne Radioactivity Control and Mitigation	
(ISA-HP-6) Occupational Dose Assessment	
(ISA-HP-7) Radiation Monitoring and Instrumentation	
(ISA-HP-8) Radioactive Gaseous and Liquid Effluent Treatment	
(ISA-HP-9) Radiological Environmental Monitoring Program	
(ISA-HP-10) Radioactive Solid Waste Processing and Radioactive Material Handling, Storage and Transportation	
(ISA-HP-11) Significance Determination Process - Occupational Radiation Safety	
(ISA-HP-12) Significance Determination Process - Public Radiation Safety: Radioactive Material Control	
(ISA-HP-13) Significance Determination Process - Public Radiation Safety: Radioactive Effluent Release Program	
(ISA-HP-14) Significance Determination Process - Public Radiation Safety: Environmental Monitoring Program	
(ISA-HP-15) Significance Determination Process - Public Radiation Safety: Transportation Branch	
(ISA-HP-16) Performance Indicator - Occupational Radiation Safety	

C. On-the-Job Activities	
(OJT-HP-1) Radiological Assessment and Exposure Controls	
(OJT-HP-2) Occupational ALARA Planning and Controls	
(OJT-HP-3) In-Plant airborne Radioactivity Control and Mitigation	
(OJT-HP-4) Occupational Dose Assessment	
(OJT-HP-5) Radiation Monitoring Instrumentation	
(OJT-HP-6) Radioactive Gaseous and Liquid Effluent Treatment	
(OJT-HP-7) Radiological Environmental Monitoring Program	
(OJT-HP-8) Radioactive Solid Waste Processing and Material Handling, Storage, and Transportation	

Supervisor's Recommendation: Signature / Date: _____

Division Director's Approval: Signature / Date: _____

Copies to: Inspector
 HR Office
 Supervisor

Revision History Table

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Forms Accession Number (Pre-Decisional, Non-Public)
N/A	10/16/06 CN 06-027	This IMC has been revised to incorporate comments from the Commission in which the term public confidence has been change to openness	N/A	N/A
N/A	07/08/09 CN-09-017	This revision moves post-qualification and refresher training requirements out of the appendix and into Appendix D-1.	N/A	ML091590710
N/A	ML15323A464 02/20/17 CN 17-004	This revision incorporates changes to reflect the transition from 6 baseline HP inspections to 8.	N/A	ML15324A264 ML16265A576