Appendix C-3
Health Physics Inspector
Technical Proficiency
Training and Qualification Journal

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Table of Contents

Introduction

With the exception of the courses identified below, do not begin the activities or complete the courses in this qualification journal until you have completed the Basic Inspector Certification Journal. You may complete the General Proficiency requirements contained in Appendix B together with the Technical Proficiency requirements outlined in this journal.

Several of the topics have both an individual study activity and an on-the-job activity. You must complete the individual study activity before beginning the corresponding on-the-job activity.

Required Health Physics Inspector Training Courses:
(These courses have the completion of Appendix A as a prerequisite)

(R-104B) - GE Technology
(R-104P) - Westinghouse Technology
(H-201) - Health Physics Technology
(H-202) - Radwaste Management

Additional Required Health Physics Inspector Training Courses:
(These courses DO NOT require the completion of Appendix A but you must meet 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

Required Post-Qualification Training Courses:
(To be completed within three years of initial qualification)

Whole Body Counting/Internal Dosimetry (H-312)

Required Refresher Training:

Health Physics Topical Review Course (H-401) - every three years

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Health Physics Inspector
Individual Study Activities

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Health Physics Inspector Individual Study Activity

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

PURPOSE: The Code of Federal Regulations (CFR) provides 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 CFRs provide the content and scope that licensees must comply with or receive NRC approval to deviate from the requirements. For this reason, it is mandatory that all radiation protection inspectors gain a general and comprehensive knowledge of the contents of relevant radiation protection requirements in the CFR. This activity will provide the inspector with detailed knowledge of the contents of the requirements and how to apply the appropriate radiation protection regulation requirements.

COMPETENCY AREA: REGULATORY FRAMEWORK

LEVEL OF EFFORT: 40 hours

REFERENCES:

40 CFR Part 190, Environmental Radiation Protection for Nuclear Power Operations
29 CFR 1910, Occupational Safety & Health Standards
49 CFR Parts 170-189, Transportation
10 CFR Part 19, Notices, Instructions, and Reports to Workers
10 CFR Part 20, Standards for Protection against Radiation
10 CFR Part 21, Reporting of Defects and Noncompliance
10 CFR Part 30, Rules of General Applicability to Domestic Licensing of Byproduct Material
10 CFR Part 31, General Domestic Licenses for Byproduct Material
10 CFR Part 34, Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations
10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities
10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions
10 CFR Part 61, Licensing Requirements for Land Disposal of Radioactive Waste
10 CFR Part 71, Packaging and Transportation of Radioactive Material
10CFR Part 74, Material Control and Accounting of Special Nuclear Material

10CFR Part 100, Reactor Site Criteria

Note: Bolded CFRs are most important

EVALUATION CRITERIA:

At the completion of this activity, and as determined by the supervisor the inspector should be able to:

1. Identify, recognize and locate specific radiation protection topics presented in the CFRs.

2. Discuss and interpret the content of radiation protection requirements identified in the CFRs.

3. Discuss and interpret the definitions of radiation protection terms identified in the CFRs.

4. Recognize and discuss the regulatory bases for the Safety Analysis Report and the Technical Specifications as found in 10 CFR 50. Relate radiation protection requirements to those and other similar documents such as the Off-Site Dose Calculation Manual. 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 CFRs related to health physics to the (ROP). Discuss how the enforcement process as described in the CFRs is reflected in the implementation of the health physics aspects of the ROP. (See NUREG-1600, General Statement of Policy and Procedures for NRC Enforcement Actions, On NRC Office of Enforcement Web site)

6. Relate the occupational and public radiation safety Performance Indicators to the requirements in the CFRs.

7. Relate the requirements of the CFRs to the inspection objectives of the occupational radiation safety inspection attachments (71121-01,02,03). Cross reference CFR requirements inspection findings.

8. Relate the requirements of the CRFs to the inspection objectives of the public radiation safety inspection attachments (71122-01,02,03). Cross reference CFR requirements to inspection findings.

TASKS:

1. Locate general and specific radiation protection activities described in the CFRs.

2. Compare and contrast the requirement contained in the health physics inspection procedure attachments to the requirements of the CFRs.

3. Review the CFR to identify the regulatory bases for the radiation protection programs at nuclear power plants.

4. Review the CFR to identify the regulatory significance of Performance Indicators.

5. Review how the health physics significance determination processes are related to the enforcement policy of the CFRs.

6. Meet with your supervisor, mentor, 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: Health Physics Proficiency Level Qualification Signature Card Item ISA-HP-1

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Health Physics Inspector Individual Study Activity

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

PURPOSE: The NRC requires that licensees maintain an Updated Final Safety Analysis Report (UFSAR), which describes the design features, systems, programs, and design basis operation of the facility. For this reason, it is vital that health physics inspectors gain a detailed knowledge of certain sections of the UFSAR. Additionally, the NRC requires that licensees operate their facilities in compliance with the Technical Specifications (TS), which are approved by the NRC; Technical Requirements Manual (TRM); Process Control Program (PCP); and the Offsite Dose Calculation Manual (ODCM). It is vital that all health physics inspectors gain a detailed knowledge of the ODCM, TRM, PCP and applicable sections of the TS. This activity will provide health physics inspectors with the detailed knowledge of the contents of the UFSAR, TS, TRM, and ODCM, where the applicable information and requirements for specific topics, and how to apply the requirements.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL OF EFFORT: 40 Hours

REFERENCES: UFSAR, TS, TRM, PCP and ODCM for a facility designated by your supervisor

EVALUATION CRITERIA: At the completion of this activity, you 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 alternative controls and radiative materials effluent section

9. Discuss the TRM purpose, legal basis, and how it can be changed.

TASKS:

1. Locate a copy of the UFSAR for the facility designated by your supervisor and review the various sections as listed in the Evaluation Criteria section.

2. Locate a copy of the TS for the facility designated by your supervisor and review the various sections as listed in the Evaluation Criteria section.

3. Locate a copy of the TRM for the facility designated by your supervisor and review the various sections as listed in the Evaluation Criteria section.

4. Locate a copy of the ODCM for the facility designated by your supervisor and review the content as listed in the Evaluation Criteria section.

5. Locate a copy of the PCP for the facility designated by your supervisor and review the content as listed in the Evaluation Criteria section

6. Meet with your supervisor or a senior health physics 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.

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Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-3) Access Controls to Radiologically Significant Areas

PURPOSE: The purpose of this activity is familiarize you with the regulatory basis and historical agency position related to access to radiologically significant areas. The information is addressed in generic correspondence, regulatory guides and regulations that pertain to access controls to radiologically significant areas. The related inspection procedure is IP 71121.01, "Access Controls to Radiologically Significant Areas"

The inspection procedure has three main objectives:

– To review and assess licensee's performance in implementing physical and administrative controls for airborne radioactivity areas, radiation areas, high radiation areas (HRAs), and worker adherence to these controls.

– To observe access controls to radiation and high radiation areas <1000 mrem/hr and areas that are subject to transient dose rates. Review the controls that have been established and confirm that workers follow established rules. Review the high radiation area incidents found in the performance indicators (PIs) and in the licensee's corrective action program during the current assessment period.

– To verify that the licensee is maintaining adequate controls over HRAs (with dose rates greater than 25 rem/h) and all very high radiation areas (VHRA).

COMPETENCY AREA: REGULATORY FRAMEWORK
TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 40 hours

REFERENCES:

1. 10CFR19.12

2. NUREG-1736, "Consolidated Guidance: 10 CFR Part 20-Standards for Protection Against Radiation" <u>read the sections that address the following</u>:
   10CFR20.1003 (Definitions of "survey", "airborne radioactivity area" and "DAC"
   10CFR20.1101
   10CFR20.1203 through 1204
   10CFR20.1501 through 1502

10CFR20.1601 through 1602
10CFR20.1701 through 1704
10CFR20.1902 through 1906

3. Regulatory Guide 8.8, “Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable” [ML003739549]

4. Regulatory Guide 8.25, “Air Sampling in the Workplace” [ML003739616]

5. Regulatory Guide 8.38, “Control of Access to High and Very High Radiation Areas of Nuclear Plants” [ML003739558]

6. IN 82-31, "Overexposure of Diver During Work in Fuel Storage Pool”

7. IN 84-61, " Overexposure of Diver in Pressurized Water Reactor(PWR) Refueling Cavity”

8. IN 88-79, “Misuse of Flashing Lights for High Radiation Area Controls”

9. IN 90-33, “Sources of Unexpected Occupational Radiation Exposures at Spent Fuel Storage Pools”

10. IN 90-47, “Unplanned Radiation Exposures to Personnel Extremities Due to Improper Handling of Potentially Highly Radioactive Materials”

11. IN 92-75, “Unplanned Intakes of Airborne Radioactive Materials By Individuals At Nuclear Power Plants”

12. IN 97-36, “Unplanned Intakes By Workers of Transuranic Airborne Radioactive Materials and External Exposure Due to Inadequate Control of Workers”

13. IN 97-68, “Loss of Control of Diver in a Spent Fuel Storage Pool”

NOTE: Independent Study Activity should be done in office prior to performing the corresponding OJT at a licensee site.

EVALUATION

CRITERIA: Upon completion of this independent study activity you 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 answers to the questions associated with each scenario given in the context of regulatory requirements without using licensee procedures.

TASKS:

1. Read each reference and discuss its application with Senior Health Physics Inspector.

2. Read the scenarios and answer the associated questions.

3. Meet with your supervisor or a qualified health physics inspector to discuss any questions you may have as a result of this training activity. 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 spent coolant volume control system (CVCS lets down primary coolant and filters and returns the coolant to the operating loops) filters into 55 gallon drums that have accumulated and been stored in the filter room for decay for the last several years.

A radiological pre-job survey was done earlier this week. The RP (Radiation Protection) tech providing job coverage will confirm survey results on entry.

There are approximately 110 old wound fiber filters that originally had dose rates of up to 40 R/hr contact and 3 of the newer type high capacity submicron cartridge filters that have dose rates up to 600 R/hr contact. The general area around where the filters are piled is about 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 ft 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 cm^2 are common. Airborne activity in the room is typically about 0.2 DAC with no activity going on and gets up to about 0.4 DAC when someone walks in there to dose rate 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:

What are the legally required postings for the room?

What are the significant radiological risks associated with the job?

What surveys are appropriate given the above scenario?

Where should air sampling be done? Why?

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) was chosen to provide an appropriate protection factor, provide cooling and reduce worker fatigue.

Questions:

Does the door blocked open with the “elephant trunk” pose a potential regulatory compliance problem?

What are the licensee options with regard to the “elephant trunk”?

Can flashing lights be used under these circumstances?

What is the protection factor allowed for a PAPR when the blower is running?

What is the protection factor allowed for a PAPR when the blower is not running?

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 airborne radioactivity area required?

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.

Question:

Calculate the estimated uptake by the individual.

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:

Does the room have to be posted airborne?

Can credit be taken for the PAPR respirators to avoid posting the room airborne radioactivity area?

Can credit be taken for the PAPR respirator when assigning DAC-Hrs 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 uptake 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:

What are the potential violations that could be identified?

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 10 year in-service inspection of 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 rate. 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.(floating plexiglass windows that eliminate the visual distortion caused by ripples on the water.) All communications with diver will be through the Dive Supervisor. The Dive Supervisor has wired 2 way communication 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 as far from the edge of the platform as the diver can reach without lifting his feet from the platform in all directions.

Chemistry will sample the water once a shift to determine nuclide content and activity. Tritium will be analyzed for 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:

What are the radiological hazards associated with this job?

What is the purpose of the dive platforms?

Does the RP organization have to post signs under water?

Does the RP organization have to post the entire cavity as a Very High Radiation Area while diving operations are in progress?

Why is the alarming dosimeter in the diver's helmet instead of on his chest?

Why is the water analyzed periodically? Is it a regulatory requirement?

Why is extremity dosimetry required?

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.

Does the RP technician performing continuous coverage from the cavity walkway meet requirements?

DOCUMENTATION: Health Physics Inspector Proficiency Level Qualification Signature Card Items ISA-HP-3.

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Health Physics Inspector Individual Study Activity

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

PURPOSE: The purpose of this activity is to familiarize you with concepts that will be important to conducting the related inspection requirements contained in IP 71121.02 “ALARA Planning and Controls”

The purpose of that procedure 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.

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 increase 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.

National Committee for Radiation Protection (NCRP) publication 116 ALARA Guidance can be summarized as follows:
Justification-The need to justify radiation dose on the basis of benefit.
Optimization-The need to ensure the benefits are maximized.
Limitation-The need to apply dose limits.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL OF EFFORT: 40 hours

REFERENCES:

1. 10 CFR 20.1101
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”

4. Regulatory Guide 8.10, “Operating Philosophy for Maintaining Occupational Radiation Exposures as Low As Is Reasonably Achievable”

5. Radiation Field Control Manual - 1997 Revision, Final Report, October, 1997, EPRI TR-107991

6. HPPOS-018, 020, 021, 022, 217, “Health Physics Positions”, NUREG/CR- 5569, Rev 1.

7. Regulatory Guide 8.13, “Instructions Concerning Prenatal Radiation Exposure”

8. Regulatory Guide 8.36, “Radiation Dose to the Embryo/fetus”

9. HPPOS-091 (Lead Shielding Safety Concerns)

10. NUREG/CR-5631 and NCRP 128, Radionuclide Exposure of Embryo/Fetus

NOTE: This Independent Study Activity should be done in office prior to performing the corresponding OJT at a licensee site.

EVALUATION CRITERIA:

Upon completion of the tasks in this independent study activity you 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 hazards, benefits of early HP and working craft involvement and coordination and how this affects station collective exposures.

17. Describe and discuss the benefits of using employee ALARA suggestions, feedback and lessons learned in the planning and evaluation process.

18. 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.

19. Identify the information that should be available during an inspection of an ALARA package.

20. Discuss the qualifications and requirements for HP technician shift coverage and its purpose.

21. Explain how ALARA planning depends on extrapolating the future from past experience where successes and failures can be identified to aid in future planning.

22. State the regulatory basis of ALARA and identify what condition must exist in order to cite a violation on basis of ALARA.

23. Describe the responsibility of a licensee for limiting, monitoring and tracking the exposure of a declared pregnant worker.
    a. Discuss the timing of licensee actions.
    b. Discuss the embryo/fetus exposure limits
    c. Discuss the inspection considerations detailed in IP 71121.02 section 02.07.

TASK:

1. Read Regulatory Guide 8.8 and complete the following:

    a. Define ALARA.

    b. Identify the factors that must be taken into account when making ALARA recommendations.

    c. Identify the types of activities typically accounting for the majority of the exposures.

    d. Identify where in the life cycle of a power plant ALARA considerations should be taken.

    e. Identify how initial material selection and subsequent chemistry control regimens to reduce reactor, feed and steam generator systems corrosion contribute to the ALARA concept.

    f. Identify the key elements of a radiation control program

    g. Determine the NRC defined dollar per rem amount to be used in these analyses for occupational exposure(if any)?

    h. 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?

i. Determine if ALARA applies equally to internal and external exposures.

j. List the 4 factors that determine the intensity of a radiation field at a given point.

k. List the 3 principles/techniques that are commonly used to reduce exposure to radioactive material.

l. List the 3 modes of entry for radioactive materials into the body.

m. Determine how the risk of worker skin contamination fits into ALARA decision making.

n. 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?

o. Identify the purpose of the ALARA briefings and how they contribute to the ALARA program.

p. List the typical contents of a radiation work permit as described in Regulatory Guide 8.8.

q. List the typical contents and considerations of an "ALARA Package."

r. Determine the purpose of having a health physics (Radiation Safety or Radiation Protection) technician assigned to each operating shift.

s. Determine the purpose of a post-operational debriefing with regard to ALARA.

2. Review the regulatory basis, including the statements of consideration, for the application of the ALARA regulations.

3. Review the listed references related to a declared pregnant worker (DPW) and discuss the technical basis for the DPW dose limit.

4. Read the scenario provided and answer the associated questions.

5. Meet with your supervisor or a qualified health physics 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.

DOCUMENTATION: Health Physics Inspector Proficiency Level Qualification Signature Card Item ISA-HP-4.

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 pump (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.

15. 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.

16. 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.

17. 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:

What are acceptable reasons for giving credit for exceeding dose projections?

What are not legitimate reasons for giving credit for exceeding dose projections??

What constitutes an ALARA finding?

How many ALARA findings can be identified in the above scenario?

When would an ALARA violation be warranted?

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-5) Radiation Monitoring Instrumentation.

PURPOSE: The purpose of this study activity is to familiarize you with various regulatory requirements that support Inspection Procedure 71121.03, Radiation Monitoring Instrumentation. The inspection procedure has two basic objectives which are (1) To determine the accuracy and operability of radiation monitoring instruments that are used for the protection of occupational workers and (2) To determine the adequacy of program to provide self-contained breathing apparatus (SCBA) for entering and working in areas of unknown radiological and/or potential immediately dangerous to life and health (IDLH) areas.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL OF EFFORT: 32 hours

REFERENCES:

1. 10 CFR 20.1703(a)
2. 10 CFR 20.1501(b)
3. HPPOS-001 “Proposed Guidance for Calibration and Surveillance Requirements to meet Item II.F.1 of NUREG 0737
4. HPPOS-088 “Corrections for Sample Conditions for Air and Gas Monitoring”
5. HPPOS-279 “ Technical Assistance Request Regarding Electronic Calibration of Survey Instruments”
6. HPPOS-328 “Proper Operation and Use of Alarm Dosimeters at Nuclear Power Plants”
7. Regulatory Guide 8.15, Rev.1 “Acceptable Programs For Respiratory Protection”
8. Information Notice 85-87 “Hazards of Inerting Atmospheres”
9. Information Notice 98-20 “Problems with Emergency Preparedness Respiratory Protection Programs”
10. HPPOS-147 “Respirator User’s Notice -Use of Unapproved Subassemblies (NIOSH warns against the use of unapproved

subassemblies (parts and components) and unauthorized modifications for / of approved respirators)"

11. 29 CFR 1910 Subpart I, "Personal Protective Equipment"

12. NUREG 1736," Consolidated Guidance:10 CFR 20 - Standards for Protection Against Radiation," Sections 3.20.1703 and 1501

13. Federal Register Notice 64 FR 54543, Part 20, Subpart H revision in 1999, Final Rule Summary, Statements of Consideration and Supplemental Information.

NOTE: This Independent Study Activity should be done in office prior to performing the corresponding OJT at a licensee site.

EVALUATION CRITERIA: Upon completion of the tasks listed below you should be able to :

1. Describe the effects of operating temperature and pressure on the accuracy of instruments.

2. Describe calibration techniques including where electronic source usage is appropriate.

3. Describe the appropriate uses for alarming dosimeters and their limitations.

4. Explain the NRC requirements associated with calibration interval.

5. Describe the guidance in place to assess the implementation of 10 CFR 20.1501(b).

6. Explain the application of the relevent portions of 10 CFR 20 which pertain to respiratory protective equipment.

7. Describe the essential elements of basic respiratory protection program that would be acceptable to the NRC.

8. Describe the characteristics of Grade D air quality, and where, when, and how air quality is tested.

9. Explain the potential consequences of not using SCBA in IDLH environments, and describe the testing, maintenance, and replacement cycles for the various SCBA cylinders.

10. Describe deficiencies that are commonly found in respiratory protection training programs for the use of SCBA and how they might impact emergency preparedness.

11. 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 HPPOS-088 which pertains to calibration of air sampling equipment. (The following equation is provided to help with understanding the issue.)

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

(See NUREG 1400 for further details)

Gas Law Correction

Where:

V_s= volume under field conditions (appropriate volume unit)
V_c=volume under calibration conditons (appropriate volume unit)
P_s=absolute pressure during sampling (mm Hg)
P_c=absolute pressure during calibration (mm Hg)
T_s=absolute temperature during sampling (Kelvin)
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 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(b)

6. Read 10 CFR 20, Subpart H portions applicable to SCBA.

7. Read Regulatory Guide 8.15 (Rev. 1), "Acceptable Programs For Respiratory Protection"

8. Read Information Notice 85-87, "Hazards of Inerting Atmospheres"

9. Read Information Notice 98-20, "Problems with Emergency Preparedness Respiratory Protection Programs" (This one is particularly important from an inspection standpoint.)

10. Read HPPOS-147, "Respirator User's Notice -Use of Unapproved Subassemblies" (This is a recurrent problem.)

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 health physics 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.

DOCUMENTATION: Health Physics Inspector Proficiency Level Qualification Signature Card Item ISA-HP-5.

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 and he so 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.

Question:

Did the licensee provide adequate surveillance of workers in high radiation area?

Was the location of the dosimetry appropriate? Why or why not?

Could this a violation of TSs?

Scenario B: Calibration Instrumentation

During a tour of the radiologically controlled area on July 18, 2001, an inspector identified a continuous air monitor in the radwaste 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:

Is there a technical specification that requires written procedures?

Why regulatory guide recommends procedures for area, portable, and airborne radiation monitor calibrations?

Would this be a violation? Why?

Scenario C Respiratory Protection Equipment

During a review of self-contained breathing apparatus maintenance and surveillance records, an inspector identified that 36 self-contained breathing apparatus air bottles were past 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

Describe the relationship of NIOSH certification to SCBA designs to NRC regulatory compliance.

Could this be a violation? Why or why not.

Other than Radiation Protection, what NRC cornerstone would also need to be evaluated?

Additional References Related to ISA-HP-5, Radiation Monitoring Instrumentation.

Instrument

10 CFR 20.1501(b)

Regulatory Guide 8.6 “Standard Test Procedure for Geiger-Muller Counters

ANSI N42.17A-1989, “Performance Specifications for Health Physics Instrumentation-Portable Instrumentation for Use in Normal Environmental Conditions”

ANSI N42.17B-1989,”Performance Specifications for Health Physics Instrumentation-Occupational Airborne Radioactivity Monitoring Instrumentation”

ANSI N42.17C-1989,”Performance Specifications for Health Physics Instrumentation-Portable Instrumentation for Use in Extreme Environmental Conditions”

ANSI N323A-1997, “Radiation Protection Instrumentation and Calibration, Portable Survey Instruments”

Q&A 147 Calibration Frequency
Q&A 209 Calibration Frequency

SCBA

10 CFR 20.1700 Subpart H- “Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas”
NUREG/CR-0041, Rev. 1 “Manual of Respiratory Protection Against Airborne Radioactive Materials”

Information Notice 83-68 “Respirator User Warning: Defective Self Contained Breathing Apparatus Air Cylinders”

Information Notice 85-48 “Respirator User Warning: Defective Self Contained Breathing Apparatus Air Cylinders”

Information Notice 86-103 “Respirator Coupling Nut Assembly Failures”

Information Notice 89-47 “ Potential Problems with Worn or Distorted Hose Clamps on Self Contained Breathing Apparatus”

Information Notice 94-35 “NIOSH Respirator User Notices,” Inadvertent Separation of the Mask Mounted Regulator (MMR) from the Facepiece of the Mine Safety Appliances (MSA) Company Self Contained Breathing Apparatus (SCBA) and Status Update”

Information Notice 95-01 “DOT Safety Advisory: High Pressure Aluminum Seamless and Aluminum Composite Hoop Wrapped Cylinders”

Q&A 91 “Clarifies the need to comply with programmatic requirements when using respirators”

Q&A 124 “Notes that this section’s requirements apply to respirators used during emergencies”

Q&A 418 “Explains that licensees need a formal program whenever a respirator is used to limit intake”

HPPOS 094, “Guidance Concerning Bearded Users of SCBA - Beards no longer allowed, but background information still pertinent and useful.

HPPOS 103, “Guidance for Medical Evaluations for Respiratory Users

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-6) Radioactive Material Processing and Transportation

PURPOSE: The purpose of this individual study activity (ISA) is to familiarize you with the regulatory bases and historical agency positions in the area of radioactive material processing and transportation. Specifically, the information provides you the necessary technical knowledge to conduct inspections using procedure 71122.02, Radioactive Material Processing and Transportation. 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. This activity will provide you with detailed knowledge of the requirements contained in regulations and position documents.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 40 HOURS

REFERENCES: Title 10, Code of Federal Regulations, Parts 20, 61, and 71

Title 10, Code of Federal Regulation, Part 30.41

Title 49, Code of Federal Regulations, Parts 100-189

Radwaste system and facility description from the UFSAR for a facility designated by your supervisor

Plant Annual Effluent Release Report

Offsite Dose Calculation Manual

Inspection Procedure 71122, "Public Radiation Safety"

NRC Branch Technical Position, Waste Form Technical Position

NRC Branch Technical Position on Concentration Averaging and Encapsulation

NUREG - 1608, Categorizing and Transporting Low Specific Activity Materials and Surface Contaminated Objects

NUREG-1660, U.S. - Specific Schedules of Requirements for Transport of Specified Types of Radioactive Material Consignments

NUREG/BR-0204, Instructions for Completing NRC's Uniform Low-level Radioactive Waste Manifest

Note: This activity must be completed before beginning the related on-the-job activity.

EVALUATION CRITERIA: At the completion of this activity, you 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 rate 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 radwaste as outlined in 10 CFR Part 61.

11. Discuss Quality Assurance Requirement for a radioactive materials shipping program, as described in 10 CFR 71.

TASKS:

1. Review and familiarize yourself with the documents listed in the reference list and in the list of other important references. Specifically, identify the purpose of each document and what guidance the document provides.

2. Locate a copy of the radwaste section from the UFSAR of your designated facility. Review the design and operation of the radwaste 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 characteristics 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. 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.

DOCUMENTATION: Health Physics Proficiency Level Signature Card Item ISA-HP-6

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, flat bed 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) material, 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

What two Code of Federal Regulations apply to this condition? (NRC/DOT)

What is the DOT limit on external surface of containers?

What are the possible reasons for the licensee "missing" the hot spot on the container?

Scenario B

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.

Question:

What Code of Federal Regulations applies?

Other Important References Related to this Topic

Information Notice 86-20, Technical Position on Concentration Averaging

Information Notice 90-50, Minimization of Methane Gas in Plant Systems and Radwaste Shipping Containers

Information Notice 92-62, Emergency Response Information Requirements for Radioactive Material Shipments

Information Notice 92-72, Employee Training and Shipper Registration Requirements for Transporting Radioactive Materials

Information Notice 95-09, Monitoring and Training of Shippers and carriers of Radioactive Materials

NRC Generic Letter 81-38, Storage of Low-Level radioactive Wastes at Power Reactor Sites

Note: The information in this Generic Letter is staff guidance (and not requirements).

NRC Bulletin 80-10, Contamination of Non-Radioactive System and Resulting Potential for Unmonitored, Uncontrolled Release to Environment

ANSI/ANS-40.37-1993, Mobile Radioactive Waste Processing Systems

NUREG/CR-5569, Rev. 1, Health Physics Positions Data Base

NUREG/CR-6204, Questions and Answers Based on Revised 10 CFR Part 20

NUREG 1736, Consolidated Guidance: 10 CFR Part 20- Standards for Protection Against Radiation

Health Physics Inspector Individual Study Guide

TOPIC: (ISA-HP-7) Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program

PURPOSE: The purpose of this individual study activity (ISA) is to familiarize you with the regulatory bases and historical agency positions in the areas of radiological environmental monitoring and radioactive material control. Specifically, the information provides you the necessary technical knowledge to conduct inspections using procedure 71122.03, Radiological Environmental Monitoring Program (REMP) and Radioactive material Control. 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 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 CFR 50.34a. The radioactive material control program verifies that the licensee maintains a program to ensure that licensed radioactive material is controlled in accordance with the requirements of 10 CFR Part 20.

This activity will provide you with detailed knowledge of the requirements contained in regulations and position documents in the area of radiological environmental monitoring and radioactive material controls.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 40 HOURS

REFERENCES:

1. Title 10, Code of Federal Regulations, Parts 20 and 50
2. Inspection Procedure 71122, "Public Radiation Safety"
3. Plant Updated Final Safety Analysis Report
4. IE Circular 81-07, Control of Radioactively Contaminated Material

5. IE Information Notice 85-92, Surveys of Wastes Before Disposal From Nuclear Reactor Facilities

6. Regulatory Guide 1.23, ”On-site Meteorological Program”

7. Regulatory Guide 1.111, “Methods of Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Release from Light-Water-Cooled Reactors”

8. Regulatory Guide 4.1, “Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants”

9. Regulatory Guide 4.13, “Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Application”

10. Regulatory Guide 4.15, “Quality Assurance for Radiological Monitoring Programs (Normal Operations) –Effluent Streams and the Environment”

11. NUREG/CR-5569, Rev. 1, Health Physics Positions Data Base

12. NUREG/CR-6204, Questions and Answers Based on Revised 10 CFR Part 20

13. NUREG 1736, Consolidated Guidance: 10 CFR Part 20-Standards for Protection Against Radiation

EVALUATION CRITERIA:

At the completion of this activity, you should be able to:

1. Discuss the specific regulatory requirements that require a licensee to have a 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 the different measuring techniques (proportional counter, gamma spectroscopy, liquid scintillation counter, and TLD reader) that may be used by the licensee and the capabilities and limitations of each.

4. Discuss and show how to calculate standard data reduction techniques, including MDA and LLD highlighted in NRC and industry publications.

5. Discuss the NRC expectations for a licensee's QA program for REMP including the use and bases for inter-laboratory and intra-laboratory comparisons.

6. Discuss the Land Use Census. List the principle uses of land around the assigned facility.

7. 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.

8. Show how to determine χ/Q and D/Q, and annual average data.

9. Discuss the principle parts of a REMP Annual Report and identify the maximum population doses.

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 with guidance in NRC Circular 81-07 and IE Information Notice 85-92.

11. Discuss the contents of the licensee's ODCM and explain and compare the contents to NUREG 1301/1302 (or Branch Technical Position, November 1979).

12. 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.

13. Explain the Fundamentals of Laboratory QA/QC Policy and its implementation.

14. Identify the specific radiological dose limits for your assigned facility as described in the REMP and ODCM.

15. Identify the specific environmental sample requirements for your assigned facility as described in the REMP and ODCM.

16. Discuss radiological analytical methodology for tritium, gamma, ambient radiation (using TLD), and gross alpha and beta.

17. Discuss and identify free release criteria for contaminated materials from RCA to the public domain.

18. Discuss the sequential relationship between Radiological Effluent Controls and the REMP.

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, SAM, and TLD reader).

5. Review counting statistics and data reduction, including minimum detectable activity (MDA) and lower limits of detection (LLDs).

6. Review radiological analytical methodology for tritium, gamma, ambient radiation (using TLD), and gross alpha and beta.

7. Review free release criteria of contaminated materials from RCA to the public domain.

8. Review meteorological monitoring requirements and calibration results for wind direction, wind speed, and delta temperature.

9. Review the sequential relationship between Radiological Effluent Controls and the REMP.

10. Review man-made and natural radiation exposure pathways (fission/activated products and the source of the natural background radiation).

11. Review the Fundamental of Laboratory QA/QC Policy and its implementation.

DOCUMENTATION: Health Physics Proficiency Level Signature Card Item ISA-HP-7

Other Important References Related to ISA-HP-7

Environmental Measurement Laboratory, HASL-300 Procedures Manual U.S. Department of Energy, New York, NY

NCRP Report No. 45, “Natural Background Radiation in the US”

NCRP Report No. 47, “Tritium measurement Techniques”

NCRP Report No. 50, “Environmental Radiation Measurements”

NCRP Report No. 58, “A Handbook of Radioactivity Measurements Procedures”

ANSI N545-1975, “Performance, Testing, and Procedural Specification for TLD, Environmental Application”

ANSI N13.1-1969, “Guide to Sampling Airborne Radioactive materials in Nuclear Facilities”

ANSI N13.4-1971, “American National Standard for the Specification of Portable X- or Gamma-Radiation Survey Instruments”

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Health Physics Inspector Individual Study Guide

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

PURPOSE: The purpose of this study activity is to familiarize you with the regulatory bases and historical agency positions in the area of radioactive gaseous and liquid effluent treatment and monitoring systems. The NRC requires that licensee's 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 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. This activity will provide you with detailed knowledge of the requirements contained in these regulations.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 45 HOURS

REFERENCES:

1. Title 10, Code of Federal Regulations, Parts 20 and 50
2. Title 40, Code of Federal Regulations, Part 190
3. Plant Updated Final Safety Analysis Report
4. Inspection Procedure 71122, "Public Radiation Safety"
5. NUREG/CR-5569, Rev. 1, Health Physics Positions Data Base
6. NUREG/CR-6204, Questions and Answers Based on Revised 10 CFR Part 20
7. NUREG 1736, Consolidated Guidance: 10 CFR Part 20-Standards for Protection Against Radiation

EVALUATION CRITERIA:

1. Discuss and identify effluent sampling techniques that may be used by the licensee for sampling effluents such as radioactive waste water, air iodine, and air particulate.
2. Discuss different measuring techniques, such as proportional counter, gamma spectroscopy, and liquid scintillation counter

that a licensee may use to analyze its samples. Compare and contrast the techniques..

3. Discuss calibration techniques for a laboratory's gamma spectroscopy, proportional counter, and liquid scintillation counter. Identify the types of source to be used an expected MDA or LLDs

4. Discuss laboratory analytical techniques for radionuclides and radiations such as gamma, Sr-89/90, H-3, and gross alpha/beta. Identify best methods.

5. Discuss laboratory QA/QC Policy and its implementation, including inter-laboratory and intra-laboratory comparisons. Discus NRC expectations in this area.

6. Discuss and calculate minimum detectable activity (MDA) and lower limits of detection (LLDs) for hypothetical samples.

7. Discuss calculation of projected public dose calculation methodologies (all pathways) listed in Regulatory Guide 1.109.

8. Discuss the characteristics of typical radiation monitoring systems (RMS), such as gamma-scintillation detector, beta-scintillation detector, GM, and ion chamber used in a power plant environment and compare and contrast their capabilities

9. Discuss principle of air cleaning systems, such as air capacity test, in-place testings, and laboratory test to determine the iodine collection efficiency. Discuss applicable guidance documents and acceptable values

10. Review the air cleaning system section from your assigned facility's UFSAR and Technical Specification. Discuss the principal components and their use.

11. Identify the various sources of liquid and gaseous radwaste at your assigned facility by review of the UFSAR. Discuss the UFSAR described waste streams, and technologies associated with liquid and gaseous radwaste processing for the facility.

TASK:

1. Review and evaluate the effluent sampling techniques, such as radioactive waste water, air iodine, and air particulate.

2. Review and evaluate the different measuring techniques, such as proportional counter, gamma spectroscopy, and liquid scintillation counter.

3. Review and evaluate the calibration techniques and results for the measurement laboratory's gamma spectroscopy, proportional counter, and liquid scintillation counter.

4. Review and evaluate understand the measurement laboratory's analytical techniques (e.g., gamma, Sr-89/90, H-3, and gross alpha/beta).

5. Review and evaluate the laboratory's QA/QC Policy and its implementation, including inter-laboratory and intra-laboratory comparison.

6. Review and evaluate the minimum detectable activity (MDA) and lower limits of detection (LLDs) used by the licensee.

7. Review and evaluate the projected public dose calculation methodologies (all pathways) listed in Regulatory Guide 1.109.

8. 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.

9. Review and evaluate principle air cleaning system tests, such as air capacity test, in-place testings, and laboratory test to determine the iodine collection efficiency. Compare with applicable regulatory limits

10. Conduct a walk down of the air cleaning systems described in the UFSAR and Technical Specification. Compare your observations to the licensee's descriptions.

11. Identify the various sources of liquid and gaseous radwaste, waste streams, and technologies associated with liquid and gaseous radwaste processing for the facility. Compare that with the descriptions presented in the UFSAR.

OTHER IMPORTANT REFERENCES RELATED TO ISA-HP-8

Environmental Measurement Laboratory, HASL-300 Procedures Manual U.S. Department of Energy, New York, NY

NCRP Report No. 58, “A Handbook of Radioactivity Measurements Procedures”

RG 1.21 "Measuring and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants"

RG 1.52 "Design, Testing, and Maintenance Criteria for Post-Accident Engineered Safety Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants" (Endorsed ANSI N509-1976 and N510-1975)

RG 1.97 "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident"

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

RG 1.111 "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors"

RG 4.15 "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment"

ANSI N13.1-1982 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities"

ANSI N45.2.23-1978 "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plant Personnel"

ANSI/ANS N55.4-1979 "Gaseous Radioactive Waste Processing Systems for Light-Water-Cooled Reactor Plants"

ANSI/ANS N55.6-1979 "Liquid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants"

ANSI/ASME N509-1980 "Nuclear Power Plant Air Cleaning Units and Components"

ANSI/ASME N510-1980 "Testing of Nuclear Air-Cleaning Systems"

IE Bulletin No. 80-10 "Contamination of Nonradioactive Systems and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to the Environment," May 6, 1980

IE Circular No. 80-18 "10 CFR50.59 Safety Evaluations for Changes to Radioactive Waste Treatment Systems," August 22, 1980

IE Information Notice No. 82-43 "Deficiencies in LWR Air Filtration/Ventilation Systems," November 16, 1982

IE Information Notice No. 82-49 "Correction for Sample Conditions for Air and Gas Monitoring," December 16, 1982

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

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Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-9) Significance Determination Process - Occupational Radiation Safety

PURPOSE: The risk significance of inspection findings are evaluated using the significance determination process (SDP). The purpose of this training is familiarize you with the Occupational Radiation 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.

COMPETENCY AREAS:
INSPECTION
TECHNICAL AREA EXPERTISE
REGULATORY FRAMEWORK

LEVEL OF EFFORT: 36 hours

REFERENCES:

1. NRC IMC 0609, “Significance Determination Process”, Appendix C.

2. SDP Branch on ALARA

   a. NRC Inspection Report (50-483-0017), and NRC Responses to Licensee Contestation for White Findings at Callaway (EA-00-208, May, 2001)

   b. NUREG-0713 (Latest Volume), Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities

   c. 10 CFR Part 20, Standards for Protection Against Radiation; Final Rule, Supplementary Information (Statements of Consideration), Section VI., Subpart B (Radiation Protection Programs), pp 23366-23367, Federal Register Notice/Vol. 56, No. 98, 5/21/91.

3. SDP Branch on Overexposure

   a. Regulatory Guide 8.38, Control of Access To High and Very High Radiation Areas in Nuclear Power Plants.

4. SDP Branch on Substantial Potential for Overexposure (SPFO)

   a. NUREG/BR-0195, “NRC ENFORCEMENT MANUAL”, Section 8.4.2.
   b. HPPOS 232, NUREG/CR-5569, Rev. 1.
   c. NRC Information Notice No. 88-63 (August 15, 1988); IN 88-63, Supplement 1 (October 5, 1990)
   d. IN 88-63, Supplement 2 (June 25, 1991) and IN 02-03 (January 10, 2002)
   e. Davis-Besse Special Inspection Reports 02-06 and 02-16, ADAMS Accession # ML030070606

5. SDP Branch on Ability to Assess Dose
   a. Davis-Besse Special Inspection Reports 02-06 and 02-16, ADAMS Accession # ML030070606

EVALUATION CRITERIA: At the completion of this activity, you 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 bases for the four branches of the Occupational SDP.

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:

   a. Process ALARA findings for a job through the branch, using example training scenarios.

b. Explain why a WHITE finding may not be an adequate basis for issuing a notice of violation against Part 20.1101(b)
c. Explain the basis for the “Greater than 4 Occurrences” logic gate and the rationale for issuing a WHITE finding.

9. For the Overexposure Branch of the SDP, you should be able to process exposure findings through the branch, using example training scenarios.

10. For the Substantial Potential for Overexposure (SPFO) Branch of the SDP, you should be able to:

    a. Discuss and explain the SPFO enforcement policy tool, and give examples of SPFO findings.

    b. Process exposure findings through the branch, using example training scenarios from NRC Information Notices and other sources.

    c. 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 millicuries of Co-60), are treated differently relative to SPFO.

    d. Explain why an event with a SPFO that occurs in a Very High Radiation area merits a yellow finding.

11. 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. Read MC 0609 and focus on Appendix C.

2. Read the references pertinent to each SDP branch.

3. Determine a facility’s current rolling-three-year-average (RTYA) and determine the median collective dose for both PWRs and BWRs.

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 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: Health Physics Inspector Proficiency Level Qualification Signature Card, Item ISA-HP-9

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-10) Significance Determination Process - Public Radiation Safety: Radioactive Material Control

PURPOSE: The risk significance of inspection findings are evaluated using the significance determination process (SDP). The purpose of this training is familiarize you with the Radioactive Material Control portion of the Public Radiation Safety 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.

COMPETENCY AREAS:
INSPECTION
REGULATORY FRAMEWORK
TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 24 hours

REFERENCES:

1. NRC IMC 0609, “Significance Determination Process”, Appendix D, Radioactive Material Control Branch.

2. 10 CFR Part 20, Standards for Protection Against Radiation.
   a. Subpart F, Surveys and Monitoring; 20.1501(a) and 20.1501(b)
   b. Subpart K, Waste Disposal.

3. NUREG/CR-5569, Revision 1, Health Physics Positions Data Base.

4. Health Physics Position (HPPOS) numbers; 42, 43, 44, 45, 48, 71, 72, 73, 79, 106, 138, 171, 189, 190, 221, 250, 300.

5. NRC Circular 81-07, Control of radioactively contaminated material.

6. NRC Information Notice 83-05, Obtaining approval for disposing of very-low-level radioactive waste - 10 CFR Section 20.302 (current 10 CFR 20.2002).

7. NRC Information Notice 85-92, Survey of wastes before disposal from nuclear reactor facilities.

8. NRC Information Notice 86-90, Requests to dispose of very low-level radioactive waste pursuant to 10 CFR 20.302 (current 10 CFR 20.2002).

9. NRC Information Notice 88-22, Disposal of sludge from onsite sewage treatment facilities at nuclear power stations.

10. NRC Inspection Report, and NRC Responses to Licensee Contestation for White Findings at Comanche Peak

EVALUATION CRITERIA: At the completion of this activity, you 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. Read MC 0609D, Radioactive Material Control.

2. Read each of the 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 any 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.

4. 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

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: Health Physics Proficiency Level Qualification Signature Card Item ISA-HP-10

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Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-11) Significance Determination Process - Public Radiation Safety: Effluent Release Program

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

COMPETENCY AREAS:
INSPECTION
REGULATORY FRAMEWORK
TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 32 hours

REFERENCES: See list at end of this activity

EVALUATION CRITERIA: At the completion of this activity, you 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. Describe what information is contained in a licensee’s Offsite Dose Calculation Manual.
7. Compare and contrast the dose assessment methodology in 10 CFR Part 20 to that in Appendix I of 10 CFR Part 50.
8. 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. Read MC 0609D, Effluent Release Program.

2. Read each of the references to become familiar with the accepted methodologies for the control and release of effluents.

3. Go to the ROP web-site and review any 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: Health Physics Proficiency Level Qualification Signature Card Item ISA-HP-11

REFERENCES FOR ISA-HP-11

1. NRC IMC 0609, “Significance Determination Process”, Appendix D, Effluent Release Program Branch.

2. 10 CFR Part 50, Criterion 60, Control of releases of radioactive materials to the environment.

3. 10 CFR Part 50, Criterion 61, Fuel storage and handling and radioactivity control.

4. 10 CFR Part 50, Criterion 63, Monitoring fuel and waste storage.

5. 10 CFR Part 50, Criterion 64, Monitoring radioactivity releases.

6. 10 CFR Part 20, Standards for Protection Against Radiation.
   a. Subpart D - Radiation Dose Limits for Individual Members of the Public.

7. Appendix I to 10 CFR Part 50, Numerical Guides For Design Objectives And Limiting Conditions For Operation To Meet The Criterion “As Low As Is Reasonably Achievable” For Radioactive Material In Light-Water-Cooled Nuclear Power Reactor Effluents.

8. NUREG/CR-5569, Revision 1, Health Physics Positions Data Base.
   a. Health Physics Position (HPPOS) numbers; 4, 6, 7, 8, 40, 88, 102, 122, 170, 171, 212, 223, 229, 326.

9. NUREG-0543, Methods for Demonstrating Compliance With the EPA Uranium Fuel Cycle Standard (40 CFR Part 190).

10. NUREG-0133, Preparation of Radiological Effluent Technical Specifications For Nuclear Power Plants.

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

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

13. 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

14. Safety Guide 23, Onsite Meteorological Programs

15. 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

16. Regulatory Guide 1.143, Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants.

17. Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment.

18. Regulatory Guide 1.110, Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Reactors.

19. Regulatory Guide 1.111, Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors.

20. Regulatory Guide 1.112, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors.

21. Regulatory Guide 1.113, Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I.

22. NRC Information Notice 80-10, Contamination of Nonradioactive Systems and Resulting Potential for Unmonitored, Uncontrolled Release to the Environment.

23. NRC Information Notice 79-21, Prevention of Unplanned Releases of Radioactivity.

24. NRC Information Notice 91-56, Potential Radioactive Leakage to Tank Vented to Atmosphere.

25. Generic Letter 79-03 and Generic Letter 79-06, Offsite Dose Calculation Manual.

26. Generic Letter 84-12, Compliance with 10 CFR Part 61 and Implementation of Radioactive Effluent Technical Specifications and Attendant Process Control Program.

27. Generic Letter 89-01, Implementation of Programmatic and Procedural Controls for Radiological Effluent Technical Specifications.

Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-12) Significance Determination Process - Public Radiation Safety: Environmental Monitoring Program

PURPOSE: The risk significance of inspection findings are evaluated using the significance determination process (SDP). The purpose of this training is familiarize you with the Environmental Monitoring Program portion of the Public Radiation Safety 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.

COMPETENCY AREAS:
INSPECTION
REGULATORY FRAMEWORK
TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 24 hours

REFERENCES:

1. NRC IMC 0609, “Significance Determination Process”, Appendix D, Environmental Monitoring Program.
2. 10 CFR Part 50, Criterion 60, Control of releases of radioactive materials to the environment.
3. 10 CFR Part 50, Criterion 64, Monitoring radioactivity releases.
4. Generic Letter 79-65, Radiological Environmental Monitoring Program Requirements - Enclosing Branch Technical Position, Revision 1.
5. Generic Letter 89-01, Implementation of Programmatic and Procedural Controls for Radiological Effluent Technical Specifications.
6. Generic Letter 89-01, Supplement 1, NUREG-1301 and 2, Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for PWRs and BWRs.
7. NUREG-1302, Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors.
8. 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.

9. Regulatory Guide 4.1, Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants.

10. Regulatory Guide 4.8, Environmental Technical Specifications for Nuclear Power Plants. Also see its revision, Branch Technical Position, Revision 1, November 1979.

11. Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment.

EVALUATION CRITERIA:

At the completion of this activity, you should be able to:

1. Explain the purpose, objectives and applicability of the Environmental Monitoring program.

2. Be able to 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 link between the radiological effluent monitoring program and the radiological environmental monitoring program.

5. Describe the different environmental pathways the program is designed to assess.

6. Describe the significance of the pathways monitored by the radiological environmental monitoring program.

7. Describe the minimum detection sensitivity criteria that licensees must use to analyze their environmental samples.

8. Describe the process a licensee needs to do to make changes to the scope of their radiological environmental monitoring program.

TASKS:

1. Read MC 0609D, Environmental Monitoring Program.

2. Read the reference materials to become familiar with the characteristics of an acceptable environmental monitoring program.

3. Go to the ROP web-site and review any Green and White findings in the area of public radiation safety.

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. 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: Health Physics Proficiency Level Qualification Signature Card Item ISA-HP-12

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Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-13) Significance Determination Process - Public Radiation Safety: Transportation Branch

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

COMPETENCY AREAS:
INSPECTION
REGULATORY FRAMEWORK
TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 36 hours

REFERENCES:

1. IMC 0609, “Significance Determination Process”, Appendix D.
2. Transportation SDP Branch
3. NRC Inspection Report, and NRC Responses to Licensee Contestation for White Findings
4. NUREG-1600, “U.S.-Specific Schedules of Requirements for Transport of Specified Types of Radioactive Material Consignments, 11/98.
5. NUREG-1608, “Categorizing and Transporting Low Specific Activity Materials and Surface Contaminated Objects”, 7/98
6. NUREG/CR-6407, “Classification of Transportation Packing and Dry Spent Fuel Storage System Components According to Importance to Safety”, 2/96.
7. NUREG/CR-5569, “Health Physics Positions Data Base”, Section 2.17 (Transportation and Shipping), 2/94.
8. NUREG/CR-6204, “Questions and Answers Based on Revised 10 CFR Part 20, Sections 20.1904 and .1906, pp 50-51, 5/94.
9. 10 CFR Part 20, Standards for Protection Against Radiation, Appendix

10. 10 CFR Part 61, Licensing Requirements for Land Disposal of Radioactive Wastes.

11. 10 CFR Part 71, Packaging and Transportation of Radioactive Material

12. 49 CFR Parts 171-178, Subchapter C, Hazardous Material Regulations

13. Radiation Limits SDP Sub-Branch (No References Given)

14. Package Breach SDP Sub-Branch (No References Given)

15. Certificate of Compliance SDP Sub-Branch
    a. NUREG-0383, Volume 2, Rev. 23 (latest version), "Directory of Certificates of Compliance for Radioactive Materials Packages".

16. Low Level Burial Ground SDP Sub-Branch (No References Given)

17. Notifications or Emergency Information SDP Sub-Branch
    a. NRC Information Notice 92–62: Emergency Response Information Requirements for Radioactive Material Shipments**;** August 24, 1992.

    b. NRC Information Notice 93-07: CLASSIFICATION OF TRANSPORTATION EMERGENCIES; February 1, 1993.

EVALUATION CRITERIA: At the completion of this activity, you 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.

    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 a YELLOW finding is made by the NRC when a State licensed low-level burial ground bans a power plant (will not accept shipments). Explain how the NRC issuance of this finding might be related to maintaining public confidence.

   b. Discuss and explain why waste under-classification merits a WHITE finding.

   c. 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. Read MC 0609 and focus on Appendix C.

2. Read 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 contents) that would result in only a GREEN finding.

5. Read 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. Read 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. Read 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 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 appropriate reference NUREG, sort and list six components relative to their importance to safety.

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: Health Physics Proficiency Level Signature Card Item ISA-HP-13

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Health Physics Inspector Individual Study Activity

TOPIC: (ISA-HP-14) Performance Indicator - Occupational Radiation Safety

PURPOSE: 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. This activity will provide you with a detailed knowledge of the definition of an Occupational Radiation Safety PI, the ability to identify an individual operational occurrence, and correctly classify the occurrence as a PI, or not.

COMPETENCY AREA:
INSPECTION
REGULATORY FRAMEWORK
TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 18 Hours

REFERENCES:

1. NEI 99-02 Rev. 2, Regulatory Assessment Performance Indicator Guideline, Section 2.5.

2. NEI 99-02 Rev. 0, Regulatory Assessment Performance Indicator Guideline, Frequently Asked Questions, pages 112 - 120, or

   NRC Web site for Archived Occupational FAQs: NRR/OVERSIGHT/ASSESS/archived faqs

3. Standard Technical Specification 6.12, High Radiation Area Access Control.
4.
5. Regulatory Guide 8.38, Control Of Access To High And Very High Radiation Areas In Nuclear Power Plants .

6. NUREG/CR-6204, Question and Answers Based on Revised 10 CFR 20, Q&As Nos. 49,92, 218,373,385,,423, 441,447,448,487,488, and 489 .

7. NUREG/CR-5569, Rev., 1 Health Physics Positions Data Base, Section 2.5, pages 62 to 68.

8. Manual Chapter 0608, Performance Indicator Program

9. NRR Radiation Protection Technical Readings on PIs

EVALUATION CRITERIA: At the completion of this activity, you 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 are 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. 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.

3. Review the materials in References 5 and 6.

4. Review the discussion on “accessible” areas and adequate controls for High and Very High Radiation Areas in Reference 4, above.

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: Health Physics Proficiency Level Qualification Signature Card Item ISA-HP-14

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HEALTH PHYSICS INSPECTOR
ON-THE-JOB ACTIVITIES

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Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-1) Inspecting Access Controls to Radiologically Significant Areas

PURPOSE: The purpose of this activity is to familiarize you with inspection activities in inspection procedure 71121.01 “Access Controls to Radiologically Significant Areas”. The objectives of this procedure are:

– To review and assess licensee’s performance in implementing physical and administrative controls for airborne radioactivity areas, radiation areas, high radiation areas (HRAs), and worker adherence to these controls.

– To observe access controls to radiation and high radiation areas <1000 mrem/hr and areas that are subject to transient dose rates. Review the controls that have been established and confirm that workers follow established rules. Review the high radiation area incidents found in the performance indicators (PIs) and in the licensee’s corrective action program during the current assessment period.

– To verify that the licensee is maintaining adequate controls over HRAs (with dose rates greater than 25 rem/h) and all very high radiation areas (VHRA).

COMPETENCY AREA:
TECHNICAL AREA EXPERTISE
ASSESSMENT AND ENFORCEMENT
COMMUNICATION
INSPECTION

LEVEL OF EFFORT: 32 hours

Note: Successful completion of ISA-HP-3 is a prerequisite to this activity

REFERENCES: All the references used in ISA-HP-3 are appropriate for this module. Most of the efforts in this OJT will rely on licensee procedures and related regulatory documents (Technical Specifications, FSAR, etc.). Any references used other than licensee procedures will be used to determine the regulatory stance that has been historically applied by the NRC for a given situation. References selected should support the actual inspection effort.

Licensee "Radiation Protection Plan"

Licensee "Radiological Access Control" procedure

Licensee "Radiological Postings" procedure

Licensee "Radiation Work Permit" procedure

Licensee Implementing Procedures for High and Very High Radiation Areas

Licensee "Technical Specifications"
(Administrative controls for high radiation areas)

Licensee "Final Safety Analysis Report or Updated Safety Analysis Report"

Davis-Besse Special Inspection Reports 02-06 and 02-16, ADAMS Accession # ML030070606

EVALUATION CRITERIA: Upon completion of the tasks in this OJT, you 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 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. 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.

NOTE: The following 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.

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 instrument on and check batteries, check high voltage or instrument zero if applicable, physical condition and perform a response test with appropriate source.

d. Verify that 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, locked high radiation areas. Review licensee procedures for very high radiation areas, and identify the "additional measures" implemented, as required by 10 CFR20.1602.

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. Review plant procedures for internal dose assessment. Walk the procedure through for a hypothetical uptake that involves a mixture of activation products, fission products and transuranics. (Examples could include but are not limited to: handling of dried purification filters, surface disturbing work such as grinding, or eddy current testing of a letdown heat exchanger.)

10. 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.

11. Perform a physical inspection of licensee spent fuel pool/transfer canal or moisture separator pit and determine licensee controls for high activity items stored in pool. Determine what controls are in place to prevent accidentally exposing high activity items.

    Note: some licensees do not do long-term storage of items suspended from side of pool in which case determine the controls that they would use for short term transient storage prior to disposition.

12. Review a licensee 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.

13. 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: Health Physics Inspector Proficiency Level Signature Card Item OJT-HP-1

Additional References Related to Access Control to Radiologically Significant Areas:

IE Circular 76-03, "Radiation Exposures in Reactor Cavities"

IE Bulletin 78-08, "Radiation Levels From Fuel Element Transfer Tubes"

IN 80-22, "Breakdowns in Contamination Control Programs"

IN 82-31, "Overexposure of Diver During Work in Fuel Storage Pool"

IN 84-82, "Guidance For Posting Radiation Areas"

IN 85-06, "Contamination of Breathing Air Systems"

IN 86-44, “Failure to Follow Procedures when Working in High Radiation Areas”

IN 88-63, "High Radiation Hazards from Irradiated Incore Detectors and Cables”

IN 88-79, “Misuse of Flashing Lights for High Radiation Area Controls”

IN 90-33, “Sources of Unexpected Occupational Radiation Exposures at Spent Fuel Storage Pools”

IN 90-44 “Dose-Rate Instruments Under responding to the True Radiation Fields”

IN 90-47, “Unplanned Radiation Exposures to Personnel Extremities Due to Improper Handling of Potentially Highly Radioactive Source”

IN 92-75, “Unplanned Intakes of Airborne Radioactive Material By Individuals at Nuclear Power Plants”

IN 97-36, “Unplanned Intakes by Worker of Transuranic Airborne Radioactive Materials And External Exposure Due to Inadequate Control of Work”

NUREG/CR 5569, Rev.1 Health Physics Positions (HPPOS 002, 010,014,015,016, 036,055, 066, 068, 128, 138, 180, 210, 234, 236, 237, 242, 244, 245, 323 and 328)

NUREG/CR-6204, Questions and Answers based on Revised 10 CFR 20 (Questions 27,49,52,57,92,132,373,385,423,447, 448, 487, 489)

Health Physics Inspector On-the-Job Activity

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

PURPOSE: The purpose of this activity is to familiarize you the inspection activities in inspection procedure 71121.02 "ALARA Planning and Controls". The objective of this procedure is to assess performance with respect to maintaining individual and collective radiation exposures as low as is reasonably achievable. This 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
ASSESSMENT AND ENFORCEMENT
COMMUNICATION
INSPECTION

LEVEL OF EFFORT: 36 hours

Note: Successful completion of ISA-HP-4 is a prerequisite to this activity

REFERENCES: All the references used in ISA-HP-4 are appropriate for this module. Most of the efforts in this OJT will rely on licensee procedures and related regulatory documents (Technical Specifications, FSAR, etc..). Any references used other than licensee procedures will be used to determine the regulatory stance that has been historically applied by the NRC for a given situation. References selected should support the actual inspection effort.

1. 10 CFR 20
2. Licensee dose printout of individual doses for a work group identified by qualified inspector
3. Licensee source term trending documentation/ ALARA review.
4. Licensee source term reduction program procedures
5. Completed licensee ALARA package for a significant job identified by qualified inspector.
6. Licensee historical or current outage backbone schedule that identifies significant work milestones.

7. Licensee temporary shielding procedure

8. Licensee hot spot reduction procedure

9. Licensee source term control/ reduction procedure (May be fragmented into several procedures)

10. 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.)

11. Licensee “Declared Pregnant Woman” Procedure

EVALUATION CRITERIA:

Upon completion of the tasks in this OJT, you 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 same and work assignments are comparable.

3. Describe licensee source term trending techniques.

4. Describe key elements of a source term reduction program and identify any initiatives that are being missed.

5. Describe key considerations and components of an ALARA work package.

6. Describe how RWPs capture the ALARA planning considerations.

7. Describe considerations in determining whether temporary shielding is provided at RP’s request.

8. Describe how the timing of work evolutions affects dose reduction opportunities. Discuss the things that may make the timing less than optimal.

9. Describe how the licensee ALARA program incorporates lessons learned, industry experience, historical data, and employee feedback/ recommendations.

10. Describe the process used to determine and assign fetal dose. Describe a woman's rights with respect to declaring her pregnancy.

NOTE: The following 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

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. Note: 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, shielding, filled system vs dry. 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.

7. Review 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 Declared Pregnant Worker (or Woman) procedures. Review the exposure results and monitoring controls employed by licensee with respect to the requirements. (Program should have provisions for determining fetal dose from internal deposition as well as external radiation.)

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: Health Physics Inspector Proficiency Level Qualification Signature Card Item OJT-HP-2

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-3) Inspecting Radiation Monitoring Instrumentation

PURPOSE: The purpose of this activity is to familiarize you with the inspection activities in inspection procedure 71121.03, "Radiation Monitoring Instrumentation". The objectives of this procedure are: (1) To determine the accuracy and operability of radiation monitoring instruments that are used for the protection of occupational workers and (2) To determine the adequacy of program to provide self-contained breathing apparatus (SCBA) for entering and working in areas of unknown radiological and/or potential immediately dangerous to life and health (IDLH) areas.

COMPETENCY AREA: TECHNICAL AREA EXPERTISE
INSPECTION

LEVEL OF EFFORT: 36 hours

Note: Successful completion of ISA-HP-5 is a prerequisite to this activity

REFERENCES: All the references used in ISA-HP-5 are appropriate for this module. Most of the efforts in this OJT will rely on licensee procedures and related regulatory documents (Technical Specifications, FSAR, etc..). Any references used other than licensee procedures will be used to determine the regulatory stance that has been historically applied by the NRC for a given situation. References selected should support the actual inspection effort.

1. Licensee fixed and portable instrumentation procedures
2. Licensee SCBA training and maintenance procedures
3. Licensee whole body counting and internal dose assessment procedures.

EVALUATION CRITERIA: Upon Completion of this activity you 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 repeating inspection activities while ensuring adequate inspection coverage.

2. Describe the plant activities that have permanently installed area radiation monitors based on examination of the plants Final Safety Analysis Report (FSAR).

3. Describe the instrumentation used for high risk jobs including survey meter types and designations, remote readout area monitors and continuous air monitors.

4. Describe the fixed and portable instrumentation used for personnel release from radiologically controlled area and how it is used.

5. Describe the methodology used to calibrate instruments, verify their operability and determine if appropriate calibration sources are used. alarm set points if applicable.

6. Describe the process used to resolve situations where instruments are found to be significantly out of calibration. What is the impact on surveys done with the instrument?

7. Describe the likely consequences of having a substantially over or under responding instrument used to cover work and perform surveys. What would be the effect of significantly extending the source check frequencies of survey instruments?

8. 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.

9. If the plants have individuals with internal exposures greater than 100 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.

10. 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.

11. Describe the training program for SCBA users.

12. Describe the licensee SCBA air cylinder program for air quality testing hydro-testing, and replacement schedule.

NOTE: With the exception of the first task, the following 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

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 for 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 associated with jobs with the potential for workers to receive 100 mrem CEDE.

4. Identify types of radiation detection instruments utilized for personnel release from the radiologically controlled area.

5. Verify Calibration, Operability, and Alarm Set point (if applicable) of Types of Several 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.

8. 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.

9. Evaluate licensee internal exposures, if there are any internal exposures >100 mrem CEDE, determine whether the affected personnel were properly measured utilizing calibrated equipment, data analyzed and internal exposures properly assessed in accordance with licensee procedures.

10. 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.

11. 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.

12. Review pertinent sections of 29 CFR 1910 and 49 CFR part 173 and part 178 for additional respirator and cylinder maintenance requirements.

13. 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: Health Physics Inspector Proficiency Level Qualification Signature Card Item OJT-HP-3.

Additional references related to Radiation Monitoring Instrumentation

Instruments

10 CFR 20.1501

NUREG-1736, "Consolidated Guidance: 10 CFR 20 - Standards for Protection Against Radiation"

Regulatory Guide 8.6, "Standard Test Procedure for Geiger-Muller Counters"

IE-Bulletin 97-001, "Potential for Erroneous Calibration, Dose Rate, or Radiation Exposure Measurements with Certain Victoreen Model 530 and 53OSI Electrometer/Dose-Meters"

HPPOS-1, "Proposed Guidance for Calibration and Surveillance Requirements to Meet Item II.F.1 of NUREG-0737

HPPOS-88, "Corrections for Sample Conditions for Air and Gas Monitoring"

HPPOS-279, " Technical Assistance Request Regarding Electronic Calibration of Survey Instruments"

HPPOS-328, "Proper Operation and Use of Alarm Dosimeters at Nuclear Power Plants"

IE Notice 93-30, " NRC Requirements for Evaluation of Wipe Test Results; Calibration of Count Rate Survey Instruments"

Q&A 147, "Calibration Frequency"

Q&A 209, "Calibration Frequency"

Internal Exposure

10 CFR 20.1202 -1204(h)

10 CFR 20.1700, "Subpart H"

NUREG-1400, "Air Sampling in the Workplace"

NUREG/CR-0041, Rev. 1, "Manual of Respiratory Protection Against Airborne Radioactive Materials"
Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for Bioassay Program (Revision 1)

Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection (Revision 1)

Self Contained Breathing Apparatus (SCBA)

IE Circular 80-03, "Protection From Toxic Gas Hazards"

IE Notice 81-26, Part 4 "Personnel Entry Into Inerted Containment"

IE Notice 85-87, "Hazards of Inerting Atmospheres"

IE Notice 86-46, "Improper Cleaning and Decontamination of Respiratory Protection Equipment"

NRC Information Notice 98-20, "Problems with Emergency Preparedness Respiratory Protection Programs"

HPPOS-147, "Respirator User's Notice- Use of Unapproved Subassemblies (NIOSH warns against the use of unapproved subassemblies (parts and components) and unauthorized modification for/of approved respirators)

IE Notice 83-68, "Respirator User Warning: Defective Self-Contained Breathing Apparatus Air Cylinders"

IE Notice 85-48, "Respirator User Warning: Defective Self-Contained Breathing Apparatus Air Cylinders"

IE Notice 86-103, “Respirator Coupling Nut Assembly Failures”

Information Notice 89-47, “Potential Problems with Worn or Distorted Hose Clamps on Self-Contained Breathing Apparatus”

Information Notice 94-35, “NIOSH Respirator User Notices,”Inadvertent Separation of the Mask-Mounted Regulator (MMR) from the Facepiece of the Mine Safety Appliances (MSA) Company Self Contained Breathing Apparatus(SCBA) and Status Update”

Information Notice 95-01, “DOT Safety Advisory: High Pressure Aluminum Seamless and Aluminum Composite Hoop-Wrapped Cylinders”

Information Notice 97-66, “Failure to Provide Special Lenses for Operators Using Respirator or SCBA During Emergency Operations”

Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-4) Radioactive Material Processing 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 7112202, Radioactive Material Processing and Transportation, to allow you to independently conduct inspections in this area. 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 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 programs.

COMPETENCY AREA: INSPECTION
TECHNICAL AREA EXPERTISE

LEVEL OF EFFORT: 40 HOURS

REFERENCES: Title 10, Code of Federal Regulations, Parts 20, 61, and 71

Title 49, Code of Federal Regulations, Parts 100-189

Plant Updated Final Safety Analysis Report

Plant Annual Effluent Release Report

Offsite Dose Calculation Manual

Inspection Procedure 71122, "Public Radiation Safety"

NRC Branch Technical Position, Waste Form Technical Position

NRC Branch Technical Position on Concentration Averaging and Encapsulation

NUREG - 1608, Categorizing and Transporting Low Specific Activity Materials and Surface Contaminated Objects

NUREG-1660, U.S. - Specific Schedules of Requirements for Transport of Specified Types of radioactive material Consignments

EVALUATION CRITERIA:

Upon completion of the tasks, you 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 CFR61.55.

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 10, 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 CFR61 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 does provide.

2. Locate a copy of the radwaste section from the UFSAR. Conduct walk downs (considering ALARA and safety constraints) of as much of the station's liquid and solid radwaste processing systems during your OJT activity. Assess the licensee's conformance of the

facility with its design documents including any 10 CFR50.59 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 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 CFR20 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.

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 (preferability a non-exempt shipment). 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.

DOCUMENTATION: Health Physics Proficiency level Signature Card item OJT-HP-4

Other Important References Related to radioactive Material Processing and Transportation

Information Notice 86-20, Technical Position on Concentration Averaging

Information Notice 90-50, Minimization of Methane Gas in Plant Systems and Radwaste Shipping Containers

Information Notice 92-62, Emergency Response Information Requirements for Radioactive Material Shipments

Information Notice 92-72, Employee Training and Shipper Registration Requirements for Transporting Radioactive Materials

Information Notice 95-09, Monitoring and Training of Shippers and carriers of Radioactive Materials

NUREG/BR-0204, Instructions for Completing NRC's Uniform Low-level Radioactive Waste Manifest

NRC Generic Letter 81-38, Storage of Low-Level radioactive Wastes at Power Reactor Sites

NRC Bulletin 80-10, Contamination of Non-Radioactive System and Resulting Potential for Unmonitored, Uncontrolled Release to Environment

ANSI/ANS-40.37-1993, Mobile Radioactive Waste Processing Systems

NUREG/CR-5569, Rev. 1, Health Physics Positions Data Base

NUREG/CR-6204, Questions and Answers Based on Revised 10 CFR Part 20

NUREG 1736, Consolidated Guidance: 10 CFR Part 20- Standards for Protection Against Radiation

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Health Physics Inspector On-the-Job Activity

TOPIC: (OJT-HP-5) Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control 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 IP71122.03, Radiological Environmental Monitoring Program and Radioactive Material Control Program, to allow you to independently conduct inspections in these areas. 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 CFR 50.34a.

The radioactive material control program verifies that the licensee maintains a program to ensure that licensed radioactive material is controlled in accordance with the requirements of 10 CFR Part 20.

Upon completion of this on-the-job activity, you will be able to perform assessments of reactor licensee's Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program.

COMPETENCY AREA: INSPECTION

LEVEL OF EFFORT: 40 HOURS

REFERENCES: Title 10, Code of Federal Regulations, Parts 20 and 50

Plant Updated Final Safety Analysis Report

IE Circular 81-07 and IE Information Notice 85-92

Regulatory Guide 1.23, "On-site Meteorological Program"

Regulatory Guide 1.111, "Methods of Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Release from Light-Water-Cooled Reactors"

Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants"

Regulatory Guide 4.13, "Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Application"

Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) –Effluent Streams and the Environment"

NUREG/CR-5569, Rev. 1, Health Physics Positions Data Base

NUREG/CR-6204, Questions and Answers Based on Revised 10 CFR Part 20

NUREG 1736, Consolidated Guidance: 10 CFR Part 20- Standards for Protection Against Radiation

EVALUATION CRITERIA:

Upon completion of the tasks, you 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 the different measuring techniques (proportional counter, gamma spectroscopy, liquid scintillation counter, and TLD reader) that you inspected. Compare and contrast the methods.

3. Discuss data reduction techniques used by the licensee, including MDA and LLD.

4. Discuss the Laboratory's QA Policy and QC implementation, including inter-laboratory and intra-laboratory comparisons.

5. Discuss the Land Use Census. Identify principle land uses.

6. Discuss the Meteorological Monitoring Program, including calibration methodology for wind direction, wind speed, and delta temperature.

7. Discuss the licensee's determination of χ/Q and D/Q, and annual average data.

8. Review the REMP Annual Report and discuss the soundness of the report.

9. 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 IE Information Notice 85-92.

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.

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 the radiological analytical methodology for tritium, gamma, ambient radiation (using TLD), and gross alpha and beta. Compare the licensee's technique to standard analytical techniques.

8. Review and evaluate the meteorological monitoring requirements and evaluate the adequacy of the calibration results for wind direction, wind speed, and delta temperature.

9. Conduct walk downs of as much of the REMP sampling stations as possible, including the meteorological monitoring tower and the control room. Compare this with that describe, as applicable, in the UFSAR, REMP or ODCM.

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. Review the Fundamentals of Laboratory QA/QC Policy and its implementation at the licensee's facility.

13. 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.

DOCUMENTATION: Health Physics Proficiency Level Signature Card Item OJT-HP-5

Other Important References Related to REMP and Radioactive Materials Control

Environmental Measurement Laboratory, HASL-300 Procedures Manual U.S. Department of Energy, New York, NY

NCRP Report No. 45, "Natural Background Radiation in the US"

NCRP Report No. 47, "Tritium measurement Techniques"

NCRP Report No. 50, "Environmental Radiation Measurements"

NCRP Report No. 58, "A Handbook of Radioactivity Measurements Procedures"

ANSI N545-1975, "Performance, Testing, and Procedural Specification for TLD, Environmental Application"

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

ANSI N13.4-1971, "American National Standard for the Specification of Portable X- or Gamma-Radiation Survey Instruments"

Inspection Procedure 71122,03 "Public Radiation Safety

Health Physics Inspector On-the-Job Activity

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

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 7112201, Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems, to allow you to independently conduct inspections in this area. 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: Title 10, Code of Federal Regulations, Parts 20 and 50

Title 40, Code of Federal Regulations, Part 190

Plant Updated Final Safety Analysis Report

Inspection Procedure 71122, "Public Radiation Safety"

NUREG/CR-5569, Rev. 1, Health Physics Positions Data Base

NUREG/CR-6204, Questions and Answers Based on Revised 10 CFR Part 20

NUREG 1736, Consolidated Guidance: 10 CFR Part 20- Standards for Protection Against Radiation

EVALUATION CRITERIA:

Upon completion of the tasks, you 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 different measuring techniques (proportional counter, gamma spectroscopy, and liquid scintillation counter) that you inspected and compare and contrast their capabilities and limitations.

3. Discuss the Laboratory's QA Policy and QC implementation, including inter-laboratory and intra-laboratory comparison. Compare it with NRC expectations.

4. Discuss data reduction techniques, including MDA and LLD. Verify licensee MDA and LLD calculations for each release pathway.

5. Discuss the radioactive liquid treatment systems and the effluent release pathways. Compare these to those presented in the UFSAR and ODCM

6. Discuss the radioactive gas treatment systems and the gaseous effluent release pathways. Compare these to those presented in the UFSAR and ODCM.

7. Discuss the radioactive liquid effluent radiation monitoring systems listed in the ODCM. Discuss the capabilities of the monitors and their conformance with UFSAR and ODCM descriptions.

8. Discuss the radioactive gaseous effluent radiation monitoring systems listed in the ODCM. Discuss the capabilities of the monitors and their conformance with UFSAR and ODCM descriptions.

9. Discuss the air cleaning systems and their functions (e.g., Augmented Off-Gas, Reactor Building Air Cleaning System.)

10. 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.

11. Discuss the calibration techniques for the effluent flow rate measurement devices listed in the ODCM. Identify what type of flow the sampler is seeing show if 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 facility as possible. Compare your observations with descriptions in the UFSAR

3. Identify the various sources of liquid and gaseous radwaste, waste streams, and technologies associated with liquid and gaseous radwaste 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.

5. Review and evaluate the projected public dose calculation methodologies (all pathways) listed in Regulatory Guide 1.109. (***Comment: it may take several days**.)

6. Review the licensee's projected public dose assessment technique and compare its techniques against the RG 1.109.

7. Review and evaluate the effluent radiation monitoring system channel calibration, functional test, and source check results. (**Comment: it may take several days**.)

8. Review and evaluate the air cleaning system surveillance test results. (**Comment: it may take several days**.)

9. Review and understand the calibration techniques and results for the measurement laboratory's gamma spectroscopy, proportional counter, and liquid scintillation counter. (**Comment: it may take several days**.)

10. Review and evaluate the implementation of the QA/QC in the measurement laboratory, including inter-laboratory and intra-laboratory comparisons.
11. Review and understand the measurement laboratory's analytical techniques (e.g., gamma, Sr-89/90, H-3, and gross alpha/beta).

12. Review and understand the radioactive liquid and gaseous release permits.

13. Review and understand the Annual Radioactive Effluent Release Report.

14. 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.

DOCUMENTATION: Health Physics Proficiency Level Signature Card Item OJT-HP-6

Other Important References Related to Effluent Treatment and Monitoring

Environmental Measurement Laboratory, HASL-300 Procedures Manual U.S. Department of Energy, New York, NY

NCRP Report No. 58, "A Handbook of Radioactivity Measurements Procedures"

RG 1.21 "Measuring and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants"

RG 1.52 "Design, Testing, and Maintenance Criteria for Post-Accident Engineered Safety Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants" (Endorsed ANSI N509-1976 and N510-1975)

RG 1.97 "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident"

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

RG 1.111 "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors"

RG 4.15 "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment"

ANSI N13.1-1982 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities"

ANSI N45.2.23-1978 "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plant Personnel"

ANSI/ANS N55.4-1979 "Gaseous Radioactive Waste Processing Systems for Light-Water-Cooled Reactor Plants"

ANSI/ANS N55.6-1979 "Liquid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants"

ANSI/ASME N509-1980 "Nuclear Power Plant Air Cleaning Units and Components"

ANSI/ASME N510-1980 "Testing of Nuclear Air-Cleaning Systems"

IE Bulletin No. 80-10 "Contamination of Nonradioactive Systems and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to the Environment," May 6, 1980

IE Circular No. 80-18 "10 CFR50.59 Safety Evaluations for Changes to Radioactive Waste Treatment Systems," August 22, 1980

IE Information Notice No. 82-43 "Deficiencies in LWR Air Filtration/Ventilation Systems," November 16, 1982

IE Information Notice No. 82-49 "Correction for Sample Conditions for Air and Gas Monitoring," December 16, 1982

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

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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 Technology (R-104B)		
Westinghouse Technology (R-104P)		
Health Physics Technology (H-201)		
Respiratory Protection (H-311)		
Environmental Monitoring for Radioactivity (H-111)		
Radwaste Management (H-202)		
Transportation of Radioactive Materials (H-308)		
B. Individual Study Activities		
(ISA-HP-1) Code of Federal Regulations (CFR's)		
(ISA-HP-2) Licensee Documents for Health Physics Inspectors		
(ISA-HP-3) Access Controls to Radiologically Significant Areas		
(ISA-HP-4) ALARA Planning and Controls		
(ISA-HP-5) Radiation Monitoring Instrumentation		
(ISA-HP-6) Radioactive Material Processing and Transportation		
(ISA-HP-7) Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program		
(ISA-HP-8) Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems		
(ISA-HP-9) Significance Determination Process - Occupational Radiation Safety		
(ISA-HP-10) Significance Determination Process - Public Radiation Safety: Radioactive Material Control		
(ISA-HP-11) Significance Determination Process - Public Radiation Safety: Effluent Release Program		
(ISA-HP-12) Significance Determination Process - Public Radiation Safety: Environmental Monitoring Program		
(ISA-HP-13) Significance Determination Process - Public Radiation Safety: Transportation Branch		
(ISA-HP-14) Performance Indicator - Occupational Radiation Safety		
On-the-Job Activities		

(OJT-HP-1) Inspecting Access Controls to Radiologically Significant Areas		
(OJT-HP-2) Inspecting ALARA Planning and Controls		
(OJT-HP-3) Inspecting Radiation Monitoring Instrumentation		
(OJT-HP-4) Radioactive Material Processing and Transportation		
(OJT-HP-5) Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program		
(OJT-HP-6) Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems		

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.
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(ISA-HP-7) Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program	
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C. On-the-Job Activities	
(OJT-HP-1) Inspecting Access Controls to Radiologically Significant Areas	
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(OJT-HP-3) Inspecting Radiation Monitoring Instrumentation	
(OJT-HP-4) Radioactive Material Processing and Transportation	
(OJT-HP-5) Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program	
(OJT-HP-6) Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems	

Supervisor's Recommendation:Signature / Date: _____

Division Director's Approval: Signature / Date: _____

Copies to: Inspector
HR Office
Supervisor