

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 83100

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### OCCUPATIONAL EXPOSURE DURING SAFSTOR AND DECON

PROGRAM APPLICABILITY: 2560

#### 83100-01 INSPECTION OBJECTIVE

To determine the adequacy of the licensee's occupational radiation protection program during SAFSTOR and DECON.

#### 83100-02 INSPECTION REQUIREMENTS

02.01 Audits and Appraisals. Review the results of audits performed by or for the licensee since the last inspection and the adequacy of the licensee's commitments and corrective actions.

02.02 Changes. Review changes since the last inspection in organization, personnel, facilities, equipment, programs, and procedures that may affect occupational radiation protection.

02.03 Planning. Review the licensee's plans for performing major dismantlement and decontamination activities that require significantly greater exposure or unusual work practices. The review of the plans should focus on the means of controlling airborne and surface contamination, the need for special equipment if required, and the control of high radiation areas.

#### 02.04 External Exposure Control

- a. Determine whether personal dosimetry for external exposure meets requirements.
- b. Determine whether administrative controls of external radiation exposure meet requirements and are designed to maintain exposures ALARA.
- c. Determine whether records, reports, and notifications of external exposures meet regulatory requirements.

#### 02.05 Internal Exposure Control

- a. Determine whether assessment of individual intakes of radioactive materials meets requirements. The focus of these

assessments should address the methods used for dismantlement and decontamination.

- b. Determine whether process or other engineering controls are used to the extent practicable to limit concentrations of airborne radioactive materials. The process or controls should emphasize the airborne releases resulting from dismantlement and decontamination. The need for special equipment required to limit airborne releases resulting from cutting, grinding, etc. should be addressed.
- c. Determine whether administrative controls of internal radiation exposure meet requirements and maintain exposures ALARA.
- d. Determine whether use of respiratory protection equipment meets requirements.
- e. Determine whether records, reports, and notifications of internal exposures meet requirements.

02.06 Control of Radioactive Materials and Contamination, Surveys, and Monitoring

- a. Determine whether survey and monitoring activities are performed as required.
- b. Determine whether control of radioactive materials and contamination meets requirements.

02.07 Maintaining Occupational Exposure ALARA

- a. Workers Awareness and Involvement. Determine whether workers are aware of, and involved in, the ALARA program.
- b. ALARA Goals and Objectives. Determine whether the licensee is establishing and tracking ALARA goals and objectives.
- c. ALARA Results. Review measures of the effectiveness of the ALARA program and determine whether the program is effective.

83100-03 INSPECTION GUIDANCE

03.01 Audits and Appraisals

- a. Review reports of required audits since the last inspection. Look particularly for those audits that probe for programmatic weaknesses and assess the quality of the program. Focus upon licensee follow-up actions for identified deficiencies. Are corrective actions timely and technically acceptable?

Requirements for reviews and audits normally are contained in the Technical Specifications. Audit teams should include someone with experience or training commensurate with the scope, complexity, or special nature of the activities audited. (Regulatory Guide 1.146 and ANSI/ASME N45.2.23-1978, Section 2.2.)

- b. Review reports or other audits, appraisals, assessments, evaluations, etc., that may provide information on program quality.

03.02      Changes

- a. By observation and discussion with cognizant supervisory and management personnel, determine whether changes have adversely affected the licensee's program for control of radiation exposures. Determine whether changes are in accordance with 10 CFR 50.59.
- b. By direct observation and discussion, determine whether workers are aware of, and understand, the changes.

03.03      External Exposure Control

- a. By direct observation, discussion, and review of records, determine whether personnel dosimetry is used effectively and in accordance with requirements for monitoring external exposure.

Aspects of personal dosimetry that may be examined include:

- 1. Improper wearing or use of dosimeters.
  - 2. Exposure records and reports.
  - 3. Use of pocket dosimeters and comparison of their measurements with TLD or film badge results; procedures for investigating overexposures and lost or offscale dosimeters.
  - 4. Processing of dosimetry devices by a NVLAP accredited dosimetry processor.
  - 5. Quality assurance of personal dosimetry measurements.
  - 6. Photon, beta, and neutron exposures.
  - 7. Extremity exposures.
  - 8. Timely dissemination of current dose status.
  - 9. Review of workers' dose status by managers.
- b. By direct observation, discussion, and review of records and procedures, determine whether administrative controls are adequate.
    - 1. Practices and Procedures. Aspects of administrative controls that may be considered include:
      - (a) Planning work to maintain exposures ALARA and within limits.

- (b) Use of current survey and personal dosimeter data for dose control.
  - (c) Use of control/action levels.
  - (d) Radiation work permit (RWP) program.
  - (e) Controlling access to high exposure areas.
  - (f) Radiation work practices.
  - (g) Management reviews of exposure data trends and discrepancies.
2. Posting and Labeling. While touring the plant, determine by direct observation and radiation measurements of representative areas, whether posting and labeling requirements are met.
- c. 1. Review exposure summary reports to determine compliance with the regulation.
  - 2. Review exposure summary records to verify compliance with 10 CFR 20.1201 limits. Review exposure records to verify that the licensee is complying with provisions of 10 CFR 20.2104 (transient worker rule).
  - 3. Determine if minors have been permitted to work in restricted areas, and if so, review records to determine compliance with 10 CFR 20.1207.
  - 4. Review selected Forms NRC-5 to determine compliance with the regulations.
  - 5. Determine if overexposures of individuals to external radiation have been appropriately reported to NRC (10 CFR 20.2203) and to the exposed individual [10 CFR 19.13(d)].

03.04 Internal Exposure Control

- a. 1. Review calculations of committed effective dose equivalent based on specific and biochemical properties of the radionuclides taken into the body pursuant to 10 CFR 20.1204(e).
- 2. Determine whether air sampling is representative of air in zones occupied by workers. (See ANSI N13.1 Section 4.2.1.1 and Section 6.)
- 3. Review equipment, procedures, and locations of equipment to determine the adequacy of provisions for bioassays of workers.
- b. See 10 CFR 20.1701 and Regulatory Guide 8.8, Section C.2.d.
- c. Guidance on use of respiratory protection equipment is given in Regulatory Guide 8.15 and NUREG-00041.

- d. 1. Review records of the results of bioassays, including whole-body counting.
2. Determine if minors have been permitted to work in restricted areas, and if so, review records to determine compliance with the regulations.

03.05 Control of Radioactive Materials and Contamination, Surveys, and Monitoring. Aspects of surveys and monitoring that may be examined include:

- a. Adequacy of supply, maintenance, and calibration and performance checks of survey and monitoring instruments.
- b. Proper use of portal monitors and friskers.
- c. Adequacy of surveys necessary to assess personnel exposure due to skin contamination.
- d. Adequacy of survey practices, including technician awareness of limitations of the survey instruments.
- e. Timely dissemination of survey data and information on plant conditions for use in work planning and dose control.
- f. Records of surveys and review of survey results by health physics supervision/management.
- g. Review of licensee plan to characterize the source term in the plant. The plan should establish specific survey points on components and for general areas to allow determination of the decrease in radiation levels.

03.06 Maintaining Occupational Exposures ALARA

- a. Worker Awareness and Involvement. Discuss the ALARA program with several workers to determine whether they understand the program, understand their role in the program, and are actively involved in the program.
- b. ALARA Goals and Objectives. Goals and objectives may be qualitative and quantitative. Means should be provided to track progress toward the goals and to take action on the findings. Goals may be set for the facility as a whole and for different divisions or groups within the facility. Facility goals might include a total annual collective dose (person-rem) value, and a percentage reduction in preventive maintenance time in high radiation areas.
- c. ALARA Results. As a minimum, consider the total annual collective dose (person-rem) for the facility. Determine whether that collective dose is increasing or decreasing, and whether it is higher or lower than the collective dose for other facilities of the same type and generating capacity. Consider reasons for increases or higher-than-average doses and discuss licensee's plans in relation to relatively high doses or upward dose trends.

83100-04 REFERENCES

10 CFR Part 20

10 CFR Part 71

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

Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors."

Regulatory Guide 1.146, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants."

Regulatory Guide 8.2, "Administrative Practices and Radiation Monitoring."

Regulatory Guide 8.3, "Film Badge Performance Criteria."

Regulatory Guide 8.4, "Direct Reading and Indirect Reading Pocket Dosimeters."

Regulatory Guide 8.7, "Occupational Radiation Exposure Records Systems."

Regulatory Guide 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable."

Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program."

Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable (Nuclear Power Reactors)"

Regulatory Guide 8.12, "Criticality Accident Alarm Systems."

Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection."

Regulatory Guide 8.20, "Applications of Bioassay for I-125 and I-131."

Regulatory Guide 8.25, "Calibration and Error Limits of Air Sampling Instruments for Total Volume of Air Sampled."

Regulatory Guide 8.26, "Applications of Bioassay for Fission and Activation Products" (endorses ANSI N343-1978).

Regulatory Guide 8.28, "Audible-Alarm Dosimeters."

NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials," October 1976.

NUREG-0761, "Radiation Protection Plans for Nuclear Power Reactor Licensees," Chapter 5, "Dose Control," (Draft Report for Comment), March 1981.

NUREG-093B, "Information for Establishing Bioassay Measurements and Evaluations of Tritium Exposure," June 1983.

Task OP 713-4, Draft Regulatory Guide for Comment, "Applications of Bioassay for Tritium," June 1983.

DHHS (NIOSH), Publication No. 82.106, "Supplement to the NIOSH Certified Equipment List," October 1, 1981, and Subsequent Supplements.

ANSI N13.1-1969 (R 1982), "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities."

ANSI N13.2-1969 (R1982), "Administrative Practices in Radiation Monitoring (A Guide for Management)."

ANSI N13.5-1972, "Performance Specifications for Direct Reading and Indirect Reading Pocket Dosimeters for X- and Gamma Radiation."

ANSI N13.6-1966 (R 1972), "Practice for Occupational Records Systems."

ANSI N13.7-1983, "Photographic Film Dosimeters - Criteria for Performance."

ANSI N13.11-1983, "Criteria for Testing Personnel Dosimetry Performance."

ANSI N13.15-1981, "Performance Personnel Thermoluminescence Dosimetry Systems."

ANSI N13.27-1981, "Performance Specifications for Pocket-Sized Alarming Dosimeters/Ratemeters."

ANSI N322-1975, "Inspection and Test Specifications for Direct and Indirect Reading Quartz Fiber Pocket Dosimeters."

ANSI N323-1978, "Radiation Protection Instrumentation Test and Calibration."

ANSI N323-1978, "Radiation Protection Instrumentation Test and Calibration."

ANSI/ANS-HPSSC 6.8.1-1981, "Location and Design Criteria for Area Radiation Monitoring Systems for Light-Water-Nuclear Reactors."

ANSI/ANS 8.31979, "Criticality Accident Alarm System."

ANSI/ASME N45.2.23-1978, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants."

INPO Report 82-001-EPN-01, "High Sensitivity Portal Monitors - A Review," January 1982.



INPO Good Practice, 82-001-EPN-02, "Conduct of a Direct Reading Dosimeter Program (Quartz Fiber Pocket Dosimeters)," September 1982.

INPO Good Practice, 82-001-EPN-03, "Comparison of Dosimetry Results," September 1982.

INPO Good Practice 82-001-FDO-02, "Modular Contamination Enclosures," September 1982.

INPO OEN-01, "Strippable Decontamination Coatings", November 1981.

INPO Good Practice 82-001-OEN-10, "Monitoring Personnel for Radioactive Contamination," September 1982.

INPO Good Practice, 82-001-OEN-03, "Dosimetry Placement for Steam Generator Workers," January 1982.

INPO Good Practice, 82-001-OEN-04, "Personnel Protection from Beta Particles," January 1982.

INPO REN/FDO-01, "Respiratory Cleaning and Maintenance Packages," November 1981.

IE Bulletin No. 80-10, "Contamination of Nonradioactive Systems and Resulting Potential for Unmonitored, Uncontrolled Release to Environment," May 2, 1980.

IE Circular No. 79-21, "Prevention of Unplanned Releases of Radioactivity," October 19, 1979.

IE Circular No. 80-14, "Radioactive Contamination Plant Demineralized Water System and Resultant Internal Contamination of Personnel," June 2, 1980.

IE Circular No. 81-07, "Control of Radioactively Contaminated Material," May 8, 1981.

IE Information Notice No. 80-22, "Breakdown in Contamination Control Programs," May 22, 1980.

IE Information Notice No. 82-26, Part 2, "Placement of Personnel Monitoring Devices for External Radiation Exposure," August 2, 1981 and Supplement 1, July 19, 1982.

IE Information Notice No. 82-18, "Assessment of Intakes of Radioactive Material by Workers," June 11, 1982.

IE Information Notice No. 82-32, "Contamination of Reactor Coolant System by Organic Cleaning Solvents," August 19, 1982.

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

IE Information Notice No. 83-05, "Obtaining Approval for Disposing of Very-Low-Level Radioactive Waste - 10 CFR 20.302," February 24, 1980.

IE Information Notice No. 83-59, "Dose Assignment for Workers in Non-Uniform Radiation Fields," September 15, 1983.

IE Information Notice No. 84-19, "Two Events Involving Unauthorized Entries Into PWR Reactor Cavities."

IE Information Notice No. 84-24, "Physical Qualification of Individuals to Use Respiratory Protective Devices."

IE Information Notice No. 84-34, "Respirator User Warning: Defective Self-Contained Breathing Apparatus Air Cylinders."

IE Information Notice No. 84-40, "Emergency Worker Doses."

IE Information Notice No. 84-59, "Deliberate Circumventing of Station Health Physics Procedures."

IE Information Notice No. 84-60, "Failure of Air Purifying Respirator Filters to meet Efficiency Requirements."

IE Information Notice No. 84-61, "Overexposure of Diver in PWR Refueling Cavity."

IE Information Notice No. 84-75, "Calibration Problems - Eberline Instrument Model 6112 B Anoloy Teletectors."

IE Information Notice No. 84-82, "Guidance for Posting Radiation Areas."

IE Information Notice No. 84-94, "Reconcentration of Radionuclides Involving Discharges Into The Sanitary Sewage System Permitted."

IE Information Notice No. 85-006, "Contamination of Breathing Air Systems."

IE Information Notice 85-043, "Radiography Events at Power Reactors."

IE Information Notice No. 85-046, "Clarification of Several Aspects of Removable Radioactive Surface Contamination Limits."

IE Information Notice No. 85-060, "Defective Negative-Pressure Air-Purifying, Full Facepiece Respirators."

IE Information Notice No. 072, "Uncontrolled Leakage of Reactor Coolant Outside Containment."

IE Information Notice No. 85-081, "Problems Resulting in Erroneously High Reading w/Panosonic 800 Series TLDs."

IE Information Notice No. 8-5-087, "Hazards of Inerting Atmospheres."

IE Information Notice No. 85-092, "Surveys of Wastes Before Disposal From Nuclear Reactor Facilities."

IE Information Notice No. 85-022, "Underresponse of Radiation Survey Instrument to High Radiation Fields."

IE Information Notice 86-024, "Respirator Users Notice: Increased Insp. Frequency for Certain Self-Contained Breathing."

IE Information Notice No. 86-023, "Excessive Skin Exposures Due to Contamination w/Hot Particles."

IE Information Notice No. 86-041, "Evaluation of Questionable Exposure Readings of Licensee Personnel Dosimeters."

IE Information Notice No. 86-042, "Improper Maintenance of Radiation Monitor SYS."

IE Information Notice No. 86-044, "Failure to Follow Procedures When Working in High Radiation Areas."

IE Information Notice No. 86-046, "Improper Cleaning and Decontamination of Respiratory Protection Equipment."

IE Information Notice No. 86-103, "Respirator Coupling Nut Assembly Failures."

IE Information Notice No. 87-013, "Potential for High Radiation Fields Following Loss of Water From Spent Fuel Pool."

IE Information Notice No. 87-039, "Control of Hot Particle Contamination at Nuclear Power Plants."

NRCP Report No. 57, "Instrumentation and Monitoring Methods for Radiation Protection," May 1, 1978.

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NRCP Report No. 91, "Recommendations on Limits for Exposure to Ionizing Radiation," 1987.

HASL-312, "Guidance for Air Sampling At Nuclear Facilities," A. J. Breslin, November 1978.

LA-4558-MS, "Surface Contamination: Decision Levels," J. W. Healy, September 1971.

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