

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 84522

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### SOLID WASTES (PREOPERATIONAL AND SUPPLEMENTAL)

PROGRAM APPLICABILITY: 2513, 2515, and 2525

#### 84522-01 INSPECTION OBJECTIVE

Determine whether the components and installation of the solid waste systems are as described in the FSAR and whether the applicant has conducted preoperational tests of these waste systems to verify operability.

#### 84522-02 INSPECTION REQUIREMENTS

02.01 Solid Waste System Construction and Installation. Verify that the solid waste system is built and installed as described in the FSAR and that solid waste system components, piping, and waste storage areas have been adequately shielded.

02.02 Liquid Leakage, Overflow, and Spillage. Determine the adequacy of solid waste system design provisions to prevent and collect leakage, overflows, and spillage.

02.03 Sampling. Determine the adequacy of provisions for sampling waste before and after processing.

02.04 Test Program for Solid Waste System. Determine the adequacy of the test program for the solid waste system and observe the performance of preoperational tests on the system.

02.05 Test Completion for Solid Waste System. Determine whether appropriate tests of the solid waste system have been completed.

02.06 Process Monitors. Determine adequacy of installation, calibration, and testing of process monitors for the solid waste system.

02.07 Programs, Plans, and Procedures for Solid Waste System. Determine the adequacy of the applicant's documented programs (including Process Control Program), plans and procedures for the solid waste system.

02.08 Disposal of Low-Level Wastes. Verify that the licensee has established (or will establish prior to shipping radioactive wastes) procedures for proper classification and characterization of wastes, for preparation of waste manifests, marking of packages with the class of waste, and investigation of lost shipments.

03.01 Solid Waste System Construction and Installation

- a. Guidance on design is given in Standard Review Plan (SRP) Section 11.5, Branch Technical Position - ETSB 11-3, (attached to SRP Section 11.5), Appendix 11.5-A of SRP Section 11.5, and Regulatory Guide 1.143.
- b. Comparison of the system as built and installed with the description in the FSAR may include consideration of type, quantity, and capacity of components and systems; tankage and storage facility; and process system flows.
- c. Any changes should be supported by an FSAR amendment or an evaluation demonstrating that the change does not alter the technical content of the FSAR.
- d. Consider ALARA reviews per ANSI N55.1-1979.
- e. Shielding considerations may include access to operator panel(s) considering transfer and receipt of highly contaminated water or spent resins (accident conditions) for processing and storage.

03.02 Liquid Leakage, Overflow, and Spillage. Design guidance is given in Regulatory Guide 1.143.

03.03 Sampling

- a. Sampling of the waste product is needed for assurance of an acceptable end product (process control).
- b. Sampling of the waste receiving/storage tank is essential for characterization of waste properties (chemical and radioactive) for solidification.
- c. Sample collection points should be easily accessible, properly shielded, and properly ventilated both for normal operations (ALARA considerations) and accident conditions.
- d. To enhance representative sampling from tanks, provision should be made for recirculation of tank contents and purging of sample lines.

03.04 Test Program for Solid Waste System

- a. The applicant should have a detailed test program for the solid radwaste system including:
  1. Detailed test procedures.
  2. Test prerequisites (inspections, checks, and a signoff).
  3. Test records.
  4. Flushing, cleaning, wiring check, leak tightness tests.
  5. Requirements for initial calibration of instruments before system testing.
- b. The applicant should have a detailed program for review, evaluation, and approval of test results including evaluation and acceptance criteria.

- c. Witness several tests of the waste management system, if convenient. (Do not make extra inspection trips for this purpose.) Determine if tests are being performed in accordance with test program requirements.

#### 03.05 Test Completion for Solid Waste System

- a. Operational performance tests on the solid waste treatment system should include verification of:
  - 1. System design flow rates and differential pressures.
  - 2. Mechanical equipment operability.
- b. Capacity of tanks should be verified.
- c. Tests of sampling systems to demonstrate that samples are representative should include:
  - 1. Verification of sample line input and source.
  - 2. Operability of purge and recycle of sample lines.
- d. Tests of operability of system isolation features should include verification that auto-isolation fails in the closed position.
- e. Preoperational tests of the installed system should be performed to demonstrate that the system can adequately solidify and handle radioactive solid wastes as designed. The tests should verify the tolerances for the proper waste/solidification mix to set feed rate limits. These tests should be performed with nonradioactive solid wastes and demonstrate that the system equipment will operate in a safe, reliable manner.

03.06 Process Monitors. The installation of process monitors (radiation, differential pressure, flow rate, level indicators) that are included in the FSAR should be verified. A list of monitors typically required is included in Standard Review Plan Section 11.5, which incorporates some guidance on good design practice.

#### 03.07 Programs, Plans, and Procedures for Solid Waste System

- a. Some relevant procedures are listed in Appendix A of Regulatory Guide 1.33; these procedures are usually required by the technical specifications.
- b. Technical specifications also normally require that the solid radwaste system be used in accordance with a Process Control Program, which is reviewed by NRR. The Process Control Program consists of the processing steps and a set of established process parameters which include, but are not limited to, pH, oil content, ratio of solidification agent to chemical additive for each type of anticipated waste (filter sludges, spent resins, evaporator bottoms, boric acid solutions, sodium sulfate solutions, and filter media). The Process Control Program should be documented in the operating procedures.
- c. Procedures describing proper valve alignment and sequence for any anticipated operation should be provided for each major component and system process. Procedures should also describe corrective operator action if malfunctions occur.

- d. The applicant should have a plan/program for routine maintenance (including preventive maintenance) to ensure availability of equipment under accident conditions and to maintain releases and worker exposure ALARA.
- e. Procedures should be clear on divisions of responsibilities and lines of communications among different organizational units (e.g., radwaste operations/management and radiation protection) involved in radwaste operations.

#### 03.08 Disposal of Low-Level Wastes

- a. For supplemental inspections in this area, see IP 84850.
- b. Prior to shipping low-level wastes for disposal, the licensee must have procedures properly approved by management for:
  - 1. Classifying wastes pursuant to 10 CFR 61.55.
  - 2. Assuring that wastes meet the characteristics of 10 CFR 61.56.
  - 3. Preparation of waste manifests pursuant to 10 CFR 20.311.
  - 4. Marking packages with the class of waste pursuant to 10 CFR 20.311(d)(2).
  - 5. Investigation of lost shipments pursuant to 10 CFR 20.311(h).
- c. Determine whether the licensee has or will establish a quality assurance program to assure compliance with 10 CFR 61.55 and 61.56. Such a program must include management evaluation of audits pursuant to 10 CFR 20.311(d)(3).

03.09 Definition of Solid Radioactive Waste System. The solid radioactive waste processing system begins at the interface with the liquid radioactive waste processing system boundary, at the inlets to the spent resin, filter sludge, evaporator concentrate, and phase separator tanks. All radioactive or contaminated materials, including spent air and liquid filter elements, spent bead resins, filter sludge, spent powdered resins, evaporator and reverse osmosis concentrates, and dry radioactive wastes are processed in appropriate portions of the solid radioactive waste system. The system terminates at the point of loading the filled drums and other containers on a vehicle for shipping offsite to a licensed burial site.

#### 84522-04 REFERENCES

Standard Review Plan Section 11.5, "Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems," NUREG-0800.

Regulatory Guide 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."

Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)."

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

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

NUREG-0472, "Radiological Effluent Technical Specifications for PWRs," February 1980.

NUREG-0473, "Radiological Effluent Technical Specifications for BWRs," July 1979.

ANSI/ANS-N55.1-1979, "Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants."

EPRI NP-2734, "Solid Radwaste Radionuclide Measurements," November 1982.

EPRI NP-2900, "Low-Level Radwaste Solidification," March 1983.

IE Inspection Procedure 65051, "Low-Level Radioactive Waste Storage Facilities," January 1, 1983.

IE Inspection Procedure 84850, "Radioactive Waste Management - Inspection of Waste Generator Requirements of 10 CFR 20 and 10 CFR 61."

IE Circular No. 80-18, "10 CFR 50.59 Safety Evaluations for Changes to Radioactive Waste Treatment Systems," August 22, 1980.

IE Information Notice No. 79-09, "Spill of Radioactively Contaminated Resin," March 30, 1979.

IE Information Notice No. 83-14, "Dewatered Spent Ion Exchange Resin Susceptibility to Exothermic Chemical Reaction," March 21, 1983.

Generic Letter No. 81-38 to all holders and applicants for operating licenses and construction permits, "Storage of Low-Level Wastes at Power Reactor Sites," and enclosure, "Radiological Safety Guidance for Onsite Contingency Storage Capacity," dated November 10, 1981.

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