

### PART 52, SOLID WASTE MANAGEMENT SYSTEM

PROGRAM APPLICABILITY: 2504

#### 84527-01 INSPECTION OBJECTIVE

01.01 To verify that the components and installation of the solid waste management system (SWMS) are built and installed as designed.

01.02 To determine that the licensee has tested the SWMS and the results of the tests verify that it operates as intended.

01.03 To verify that the licensee has management programs in place to ensure proper operation and maintenance of the SWMS.

#### 84527-02 INSPECTION REQUIREMENTS AND GUIDANCE

02.01 Regulatory Basis and Background. The SWMS handles radioactive wastes produced during normal operation. The SWMS includes design features that are necessary for collecting, handling, processing, storing, and disposal of wastes, and may rely on mobile equipment and subsystems connected to permanently installed plant systems and structures. This procedure is used to determine the readiness of the SWMS, and whether the effluents produced by the SWMS meet regulatory requirements for disposal, as defined by the Process Control Program (PCP).

The PCP and associated plant technical specifications (TS) identify all regulatory requirements, follow NRC guidance, and contain all appropriate operational elements of the SWMS. (The regulatory requirements are associated with 10 CFR Parts 61.55 and 61.56 for waste classification and characteristic, in 10 CFR Part 20.2006 on the characterizations of waste in shipping manifests; 10 CFR Part 20.2007 as it relates to other applicable Federal, State, and local regulations governing the presence of any other toxic or hazardous materials; NRC and DOT shipping regulations under 10 CFR Part 71 and 49 CFR Parts 171 - 180; and waste acceptance criteria of authorized disposal facilities or waste processors.)

The PCP describes, given specific waste processing technologies and methods, a set of process parameters which are used to process wastes. The PCP should identify surveillance requirements consistent with the plant's TS, administrative procedures, operational procedures, quality assurance and quality control, radiological controls and monitoring, information to be contained in annual radiological effluent release report, reporting requirements to NRC, instructions on the use of the NRC's uniform radioactive shipping waste manifest, and process for initiating and documenting changes to the PCP and its supporting procedures.

02.02 Definition of Solid Waste Management System. In accordance with the guidance of Regulatory Guide 1.143, the boundary of the SWMS begins at the interface from plant systems provided for the collection of process streams and radioactive wastes to the points of controlled discharge to the environment as defined in the PCP and/or Offsite Dose Calculation Manual (ODCM), at the point of recycling to primary or secondary water system storage tanks, or to within plant facilities used for the storage of radioactive wastes and mixed wastes.

02.03 Construction and Installation of the SWMS. Determine that the Solid Waste Management System is built as designed and ready to operate under normal and emergency conditions. Verify that the SWMS components, sampling and monitoring points, piping, mobile subsystems, and waste storage areas are adequately shielded for safe operations.

- a. Verify that the SWMS is constructed as designed. Review the system piping and instrumentation diagrams (P&IDs), process and effluent radiation monitoring and control instrumentation and sampling systems for process streams. Also review the process flow diagrams showing the methods of operation (including equipment design capacities), interconnections between plant subsystems (e.g., ventilation, service water, equipment drains, electrical, etc.), mobile processing equipment, alternate processing methods, principal parameters assumed in the operation of the SWMS. Evaluate the appropriate use of such information in the development of the PCP.
- b. Compare the system as built and installed with the description in the most recent FSAR and Design Certification Document (DCD). Evaluate the type, quantity and capacity of components, and subsystems including mobile and vendor supplied components and subsystems that may not be described in the FSAR. Confirm that the design, fabrication, procurement, construction, and installation of permanently installed or mobile liquid waste management systems and components are built according to the licensee's QA program, and the standards specified in Regulatory Guides 1.21, 1.33, 1.143, and 4.15, and Standard Review Plan Section 17.5 to the extent of control required by Appendix B to 10 CFR Part 50. Additional standards and technical guidance can be found in ANSI/ANS 55.1-1992, ANSI/ANS 55.6 - 1999, Standard Review Plan (SRP) Section 11.4 (includes Branch Technical Positions 11-3 and 11.4 that address design guides for SWMS and temporary waste storage facilities) and SRP Section 11.5. Any changes to the SWMS should be supported by an FSAR amendment or a 10 CFR Part 50.59 evaluation demonstrating that the change does not violate 10 CFR 50.59.
- c. Determine that the licensee's SWMS has in place adequate design solutions to meet the design criteria specified in Section B.I through V in Attachment A of SRP 11.4. These criteria apply to the processing of dry and wet wastes, assurance of complete waste stabilization, solidification (if used), dewatering, waste storage, portable solid waste systems, and other additional design features.
- d. Confirm the incorporation of special design features and operational procedures to prevent, control, and collect releases of radioactive materials due to

overflows from tanks containing liquids, sludge, spent resins, etc., and measures used to prevent the dropping of containers from cranes and forklifts. Confirm that the correct corrosion resistant materials were used for system piping and valves associated with transfer lines to storage tanks and discharge piping buried in soils and concrete. Include in this review any special design features for the early detection of leaks and spills (e.g., leak detection sumps). Verify the provisions and effectiveness of precautions taken to minimize spills and leaks, (e.g., retention curbs, level gauges and alarms, catch containment, self-sealing quick-disconnects) and measures to prevent interconnections with non-radioactive systems, see IE Bulletin No. 80-10.

- e. Verify that the licensee's PCP correctly describes the methods used for dewatering or stabilization (i.e., removal of free standing water). That it correctly describes the types of stabilization agents used (if any), the expected waste volume increase factors, and implementation of a process control program to ensure a solid matrix and proper waste form characteristics, and/or complete dewatering of wet wastes. Further NRC guidance is given in three NRC Branch Technical positions (listed in Section 04, References) on concentration averaging (1995), and final (1983) and revised (1991) waste classifications and waste forms.
- f. Verify the types and characteristics of filtration systems, ion-exchange resins, and adsorbent media to treat liquid and wet wastes, including expected removal efficiencies and decontamination factors.
- g. Verify the description of methods used against the actual practice for volume reduction of dry solid wastes, including sorting methods, technologies (e.g., shredders, crushers, and compactors), system components and their design parameters, and expected waste volume reduction factors.
- h. For plants using offgas treatment systems relying on charcoal beds, confirm that the licensee has operational procedures by which spent charcoals will be regenerated for re-use, and facilities to store spent charcoals prior to shipment for disposal or regeneration.
- i. Confirm the adequacy of radiation shielding around waste processing equipment which is expected to exhibit elevated levels of external radiation, the placement of such equipment in shielded cubicles, and the use of temporary or permanent shielding mounted on or in the immediate vicinity of mobile equipment. Use the guidance presented in Regulatory Guides 8.8 and 8.10.
- j. Using the licensee's construction QA program, confirm that the quality group classifications of installed piping and equipment are in accordance with the guidelines of Regulatory Guide 1.143, such as expected temperatures and pressures, and materials of construction of permanently installed systems and mobile processing equipment.
- k. Verify design provisions incorporated in equipment and facility to facilitate operation and maintenance in accordance with the guidelines of Regulatory Guide 1.143 and as referenced in topical reports, and previous experience with

similar equipment and methods referenced in the SAR or other supporting documents.

- l. Confirm the installation of features that would reduce volumes of waste passed to the SWMS, that will reduce radioactivity levels in the wastes, minimize contamination of the facility and environment, facilitate eventual decommissioning, and minimize the generation of radioactive waste in accordance with 10 CFR Part 20.1406.
- m. For multi-unit stations, confirm the proper installation of equipment and components (as permanently installed systems or in combination with mobile processing equipment) normally shared between interconnected processing and treatment subsystems.
- n. Determine that the licensee's low-level waste storage areas have in place adequate design solutions to meet the criteria specified in Sections III through VI in Appendix 11.4-A of SRP Section 11.4. The criteria apply to generally accepted guidance and practices, for radioactive waste storage. Useful background information is given in Inspection Procedure 84850, and Generic Letters No. 80-009, 81-038, and 81-039.

02.04 Sampling and Monitoring. Determine the adequacy of provisions for sampling waste before and after processing, and the adequacy of installation, calibration and testing of process radiation monitors. See IP 84524 for effluent radiation monitors.

- a. (Verify that process monitors including radiation, differential pressure, flow rate, and level indicators, in the FSAR are installed in accordance with design specifications.) SRP Section 11.5 contains a list of monitors typically required. This SRP also contains guidance on good design and recognized industry practices using ANSI/ANS 55.1 and 55.6, and ANSI N42.18.
- b. Determine that the SWMS has sampling points for input and end product wastes. Verify that sample collection points are easily accessible, properly ventilated, and shielded for both normal operations and accident conditions.
- c. Determine that the licensee has the ability to take representative samples from receiving and storage tanks, including circulation of tank contents and purging of sample lines.
- d. For radioactive monitoring instrumentation providing alarm and automatic termination of process operation, confirm that sufficient pipe run length exist between the detector and isolation valve to ensure timely isolation of the process.
- e. Verify that liquid process radiation monitors include features to facilitate decontamination, flushing, and purging of piping and valves, etc. and their replacements during maintenance.

02.05 Test Program for SWMS. Determine the adequacy of the test program for the SWMS and observe the preoperational testing. Verify that the licensee performed all appropriate tests and results meet performance criteria.

- a. Review the licensee's test program for the SWMS, including flushing, cleaning, wiring check, hydraulic pressure testing, and instrumentation requirements. Determine that the program, using Regulatory Guides 1.143 and 1.68, is adequate for its intended purpose and includes test requirements and prerequisites, inspection check points, test parameters, acceptance and test criteria, test QA criteria, detailed testing procedures, inspection check and sign-off points, and record keeping of all test results.
- b. Verify that all instruments are calibrated and working properly before the testing begins.
- c. Verify that all equipment is operable, including main and remote instrumentation control panels indicating system operational parameters, local and ambient radiation levels, radioactivity levels in process and effluent streams, and audio-visual indicators.
- d. Verify that the licensee's testing process has a detailed program for test review, evaluation, and approval. Determine that all acceptance criteria are included in the testing program and are appropriate.
- e. Witness at least two tests of the SWMS. Verify that the tests are performed according to the test program described in the FSAR and/or equipment vendor specifications.
- f. Verify that the system flow and differential pressures are within testing criteria. The testing criteria should test the ranges provided by the capacity of waste storage and holding tanks, and system processing flow rates.
- g. Determine by evaluating confirmatory analyses done by the licensee that the sampling systems take representative samples and verify sample line input and source, and the proper operation of sample line purging and recirculation of tank contents. Verify the selection of the appropriate system sampling line before sample collection, and during collection of sample. Verify the adequacy of the method used in determining the necessary recirculation times to confirm that tank contents are thoroughly mixed before sampling so as to ensure representative sampling of liquid wastes.
- h. Verify that the system's automatic isolation features fail in the closed position, including provisions used for the diversion of process and effluent streams. Confirm that operational procedures for determining the appropriate alarm set-points for all installed radiation monitors are feasible.
- i. Review the process used in evaluating all test results against test acceptance criteria and NRC requirements in confirming the operability of the SWMS. Review all pre-operational testing records and determine that the SWMS can adequately solidify, handle and store waste in a safe and reliable manner. Test records should verify the tolerances for proper waste/solidification agent mixes and feed rate limits.

- j. Verify that there is a capability to sample and monitor the waste transfer system to disposal, or to shipping containers, especially those used for resin and filter sludge. Results of the sampling/monitoring are utilized to determine scaling factors to meet criteria in 10 CFR 61.

02.06 Program Management. Determine that the licensee has the necessary management program to effectively operate the SWMS, make changes to the solid waste management program, validate and verify quality objectives, and document the process.

- a. The PCP and associated plant TS are reviewed to determine whether they identify all regulatory requirements, follow NRC guidance, and contain all appropriate operational elements. The PCP should describe, given specific waste processing technologies and methods, a set of process parameters which are used to process wastes. The PCP should identify surveillance requirements consistent with the plant's TS, administrative procedures, operational procedures, quality assurance and quality control, radiological controls and monitoring, information to be contained in annual radiological effluent release report, reporting requirements to NRC, instructions on the use of the NRC's uniform radioactive shipping waste manifest, and process for initiating and documenting changes to the PCP and its supporting procedures.
- b. Confirm that the PCP and operational procedures describe, given specific waste processing technologies and methods, a set of process parameters which are used to process wastes. Among others, the parameters include pH, water content, oil content, presence of hazardous materials, content of chelating agents, and ratio of solidification agent to chemical additives by types of wastes. The types of wastes may include filter sludge, spent-resins, boric acid solutions, process concentrates, filter media, etc. The PCP should describe the bases in developing waste mixture formulas, sampling, analysis, tests, radionuclide scaling factors, encapsulation and concentration averaging, controls on radiolytic hydrogen gas generation, and methods to demonstrate that the processing of actual or simulated waste samples can be successfully accomplished and ensure compliance with NRC requirements.
- c. Review the PCP to determine if the Quality Assurance/Control measures recommended in Regulatory Guides 4.15, 4.8 1.33 and 1.21, NUREG-1301 or NUREG-1302, and NUREG-0133 are being followed.
- d. Verify that the licensee is following appropriate quality control measures specified in the PCP, the licensee's QA program, and SOPs for permanently installed systems and mobile waste processing systems.
- e. Verify that all SWMS operators and technicians have been trained on the PCP and the details of specific operating procedures and technical specifications.
- f. Confirm that the licensee has a mechanism to document and incorporate changes to the PCP.

- g. Confirm that the licensee has a plan or program for routine and preventative maintenance to ensure equipment availability under accident conditions and to maintain release and worker exposure as low as reasonably achievable using Regulatory Guides 8.8 and 8.10.
- h. If the licensee is expected to ship waste to processors for treatment and disposal on its behalf, confirm that the PCP identifies procedures in managing such transfers and in accounting for waste volumes and radioactivity levels in its material inventory program.

02.07 Low-level Waste Disposal. Verify that licensee has established procedures for proper classification and characterization of solid waste, preparation of manifests, packaging, and waste tracking and inventory to ensure compliance with NRC requirements.

- a. Verify that NRC requirements for classifying waste and waste characteristics under 10 CFR Part 61.55 and 10 CFR Part 61.56 are incorporated into approved procedures. If the process is covered by an approved topical report, verify that the process is reflected in the PCP or implementing procedure. Any changes should be supported by a PCP amendment or a 10 CFR Part 50.59 evaluation demonstrating that the change does not introduce an unreviewed safety question and does not alter the technical and regulatory commitments.
- b. Verify that the licensee has approved procedures for preparing waste manifests, labeling of waste packages and tracking waste pursuant to 10 CFR Part 20.2006 and NUREG/BR-0204; and Part 20.2108 on records keeping.
- c. Verify that NRC regulations under 10 CFR 71, DOT regulations, under 49 CFR 171 - 180 and the waste acceptance criteria of the authorized disposal facilities or waste processors are incorporated into approved procedures.
- d. Confirm that all operators and technicians with responsibilities for preparing wastes for shipment and disposal are trained on the PCP and its implementing procedures.
- e. Review the waste disposal program and verify that the Quality Assurance/Quality Control measures recommended in 10 CFR Parts 61.55 and 61.56 are implemented in the PCP and SOPs.

#### 84527-03 RESOURCE ESTIMATES

For budgeting purposes, approximately 120 hours of direct inspection effort will be required to implement this procedure. An inspection of the SWMS will require: a lead inspector, one subject matter expert in SWMS operation, one health physicist, and one expert in low-level waste shipment manifesting, tracking, and disposal.

The hours expended during an inspection should be adjusted to reflect the specific requirements of that plant; specific design features and operational programs.

84527-04 REFERENCES

10 CFR Part 20.1406, "Minimization of Contamination."

10 CFR Part 20.2006, "Transfer for Disposal and Manifests."

10 CFR Part 20.2007, "Compliance with Environmental and Health Protection Regulations."

10 CFR Part 20.2108, "Records of Waste Disposal."

10 CFR Part 50.59, "Changes, Tests, and Experiments."

10 CFR Part 61, "Licensed Requirements for Land Disposal of Radioactive Waste."

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

49 CFR Parts 171 - 180, "Subpart C - Hazardous Materials Regulations."

ANSI/ANS 55.1 - 1992 (R2000), "Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants." Reaffirmed 2000.

ANSI/ANS 55.6 - 1993 (R1999), "Liquid Radioactive Waste Processing Systems for Light Water Reactor Plants." Reaffirmed 1999.

ANSI N42.18-2004 1980 (Reaffirmation of ANSI N42.18-1980) (Redesignation of ANSI N13.10-1974 ), "Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents."

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

NUREG-0800, Standard Review Plan, Section 11.4, "Solid Waste Management System."

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

NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants."

NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors." (With Generic Letter 89-01, Supplement 1).

NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors." (With Generic Letter 89-01, Supplement 1).

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."

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

Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants."

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

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

Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear 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."

Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable."

Branch Technical Position ETSB 11-3, "Design Guidance for Solid Radioactive Waste Management Systems Installed in Light-Water-Cooled Nuclear Power Reactor Plants," Attachment A to SRP Section 11.4.

Standard Review Plan Section 11.4, Appendix 11.4-A, "Design Guidance for Temporary Storage of Low Level Radioactive Waste," Attachment B to SRP Section 11.4.

NRC Generic Letter 80-009, "Low Level Radioactive Waste Disposal."

NRC Generic Letter 81-038, "Storage of Low Level Radioactive Waste at Power Reactor Sites."

NRC Generic Letter 81-039, "NRC Volume Reduction Policy."

NRC Inspection Procedure 84850, "Radioactive Waste Management - Inspection of Waste Generator Requirements of 10 CFR Part 20 and 10 CFR Part 61," June 6, 2002.

NRC, "Issuance of Final Branch Technical Position on Concentration Averaging and Encapsulation," January 17, 1995.

NRC, "Final Waste Classification and Waste Form Technical Position Papers," May 11, 1983.

NRC, "Revised Staff Technical Position on Waste Form (SP-91-13)," January 30, 1991.

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

84527-05    PROCEDURE COMPLETION

This Procedure is complete when sufficient data to allow analysis under the ROP has been amassed and the geographical Region has accepted the results so that inspection and monitoring under the ROP can be initiated.

END

Attachment 1: Revision History for IP 84527

Attachment 1

Revision History Sheet for  
IP 84527  
Solid Waste Management System

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
NA	07/01/08 CN 08-019	Initial issue to support inspections of operational programs described in IMC 2504, NON-ITACC INSPECTIONS.  Completed review of CNs for previous 4 years and no commitments were found.	None	Not Applicable	ML072851246