INSPECTION PROCEDURE 84750

RADIOACTIVE WASTE TREATMENT, AND EFFLUENT AND ENVIRONMENTAL MONITORING

PROGRAM APPLICABILITY: 2515

SALP FUNCTIONAL AREA: PLANT SUPPORT (SOPLTSUP)

84750-01 INSPECTION OBJECTIVES

01.01 To ensure that radioactive waste treatment systems are maintained and operated to keep offsite doses ALARA.

01.02 To ensure that the licensee effectively controls, monitors, and quantifies releases of radioactive materials in liquid, gaseous, and particulate forms to the environment.

01.03 To ensure that radiological environmental monitoring programs are effectively implemented.

01.04 To determine whether the licensee is adequately controlling the quality of primary and secondary coolants to ensure long-term integrity of the reactor and secondary coolant pressure boundaries and minimize out-of-core radiation field buildup.

01.05 To ensure that engineered-safety-feature (ESF) atmosphere cleanup system air filtration and adsorption units are adequately tested and maintained as specified in the Technical Specifications (TSs).

84750-02 INSPECTION REQUIREMENTS

02.01 Audits and Appraisals. Review the results of audits and appraisals performed since the last inspection. Review deficiency reports (also referred to as incident reports, off-normal occurrence reports) issued for effluent and environmental monitoring equipment and program activities. Evaluate the adequacy of the licensee's corrective actions.

02.02 Changes in the Offsite Dose Calculations Manual (ODCM), Process Control Program (PCP), and Radwaste System Design and Operation. Review any significant changes made by the licensee to the ODCM, PCP, as well as to the liquid, gaseous, and solid radwaste system design and operation since the last inspection.

02.03 Process and Effluent Radiation Monitors. Ensure that radioactive waste process and effluent monitors are operational with their alarm/trip setpoints properly set, properly calibrated and that they are maintained as specified in

the ODCM or in the radiological effluent technical specifications (RETS), as appropriate.

02.04 Dose Commitments. Review quarterly and yearly dose commitments to a member of the public from radioactive materials in gaseous and liquid effluent released since the last inspection. Review projected dose commitments for the current month to assure that appropriate radwaste systems are fully utilized.

02.05 Radwaste Storage. Determine if gaseous, liquid, and solid radwaste are adequately stored in the engineered storage tanks or areas, as appropriate.

02.06 Radiological Environmental Monitoring Program. Determine whether the radiological environmental monitoring program described in the ODCM is effectively implemented.

02.07 Meteorological Monitoring Program. Determine whether the meteorological instrumentation and equipment are operable, calibrated, and maintained. Verify that the quality assurance program provides adequate controls for monitoring, processing, and analyzing data obtained for the meteorological monitoring program.

02.08 Environmental Monitoring Quality Assurance (QA) Program. Verify that the QA program provides adequate control with regard to sampling, processing, and analyzing samples, and evaluating data obtained in the radiological environmental monitoring program.

02.09 Primary Coolant Radiochemistry Monitoring and Effluent Confirmatory Measurements Programs

Note: Section b, below, of this program will be conducted every third year at each site.

a. Determine whether the licensee is implementing effective radiochemical monitoring and control programs for reactor coolant and secondary water systems.

b. Evaluate the licensee's capability for obtaining representative samples and accurately measuring radioactivity in the following liquid and gaseous samples:

   1. An actual sample from a liquid waste holdup tank.

   2. A recent stack sampler charcoal cartridge the licensee has analyzed prior to the inspection.

   3. A recent air particulate filter the licensee has analyzed prior to the inspection.

   4. A reactor primary coolant sample.

   5. A gaseous waste sample (from the offgas system for BWRs and from gaseous waste holdup tanks for PWRs).

c. Determine the adequacy of the licensee's capability to safely obtain and accurately analyze highly radioactive reactor

coolant and containment atmosphere samples under accident conditions.

02.10 Water Chemistry. This program will be conducted every third year at each site.

Determine whether the water chemistry control program is being implemented in accordance with existing procedures and controls.

02.11 Engineered-Safety-Feature Filtration and Control Room Habitability Systems. Determine acceptability of the latest test results of the engineered-safety-feature atmosphere cleanup filtration and adsorption units (used for accident consequence mitigation) if the licensee performed the tests since the last inspection.

02.12 Training and Qualifications. Review the applicable education, experience, qualifications and training of selected new personnel, members of radwaste operators, radiochemists, water chemists, and radiological environmental monitoring specialists.

02.13 Effectiveness of Licensee Controls

a. Based on issues, events, or problems identified or addressed during the inspection, especially those reviewed pursuant to 02.01, 02.07, and 02.08, evaluate the effectiveness of the licensee's controls in identifying, resolving, and preventing problems in the area of radwaste treatment, and efffluent and environmental monitoring.

b. Determine whether there are strengths or weaknesses in the licensee's controls for the identification and resolution of the reviewed issues that could degrade plant operations or safety.

84750-03 INSPECTION GUIDANCE

General Guidance

No General Guidance is provided.

Specific Guidance

03.01 Audits and Appraisals. Look particularly for those audits that probe for programmatic weaknesses and assess the quality of the program. Focus upon licensee followup actions for identified issues. Review licensee deficiency (incident or off-normal) reports regarding effluent and environmental monitoring program issues. Are negative performance trends identified and are subsequent corrective actions timely and technically acceptable?

03.02 Changes in the ODCM, PCP and Radwaste System Design and Operation

a. Review any changes implemented since the last inspection (1) in licensee radwaste, water chemistry, radiochemistry, and radiological environmental monitoring organizations, (2) in the ODCM, (3) in the PCP, and (4) in the radwaste system

design and operations. Did the licensee perform proper 10 CFR 50.59 reviews?

b. Check the licensee's Radioactive Effluent Release Report(s) to determine that the reports were submitted as required, anomalous results and trends were evaluated, and the report format satisfied the recommendations of Regulatory Guide 1.21.

c. Check descriptions provided in the licensee's semiannual Radioactive Effluent Release Reports of major design changes to the solid radwaste processing system and changes to the Process Control Program.

03.03 Process and Effluent Radiation Monitors

a. Check that radioactive waste process and effluent monitors are operational with their alarm/trip setpoints properly set to meet the following benchmarks, as appropriate, for the particular monitor:

1. Concentration limits in 10 CFR Part 20.

2. Design Objectives in Appendix I to 10 CFR Part 50.

b. Are radioactive waste process and effluent monitors, and area radiation monitors checked, calibrated, and maintained as specified in the ODCM or in the RETS, as appropriate?

c. Were compensatory sampling and radiological analyses conducted, as appropriate, at the TS-required frequency for any effluent pathways where monitors were declared out-of-service for extended periods of time?

d. Check for potential unmonitored effluent releases by direct walkdowns of effluent pathways. As an example, open building roof vents leading to BWR turbine decks have been determined to be potential unmonitored release pathways. Has the licensee evaluated the potential significance of any identified potential unmonitored pathways?

03.04 Dose Commitments

a. The NRC PC-DOSE computer code or equivalent alternative methods, can be used to verify (within a factor of two) the licensee's offsite dose calculations for (1) gamma and beta doses at site boundary due to noble gases, and (2) whole body, thyroid, and other organ doses to nearest resident from all atmospheric pathways due to radioiodine, tritium, and particulates.

b. Check the licensee's calculation for the dose contribution (whole body, thyroid, and other organs) to the maximum exposed individual from the radionuclides in liquid effluent released to unrestricted area using NRC PC-DOSE computer code or equivalent alternative methods (within a factor of two).

c. Check projected dose commitments to a member of the public for the current month from radioactive materials in the liquid and gaseous effluent released to unrestricted areas to assure that appropriate radwaste systems are fully utilized. These systems are required to be fully utilized when the projected doses from each unit would exceed the following in 31 days:

1. Ventilation exhaust treatment system, the waste gas holdup system (PWR), and the augmented offgas system (BWR).

   To areas at or beyond the site boundary:

   - 0.2 mrad air from gamma radiation.

   - 0.4 mrad air from beta radiation.

   - 0.3 mrem to any organ of a member of the public.

2. Liquid radwaste treatment system

   To the unrestricted area:

   - 0.06 mrem to the whole body.

   - 0.2 mrem to any organ.

03.05 Radwaste Storage. Are gaseous, liquid, and solid radwaste adequately stored, monitored, and inventories maintained, as described in the safety analysis reports?

03.06 Radiological Environmental Monitoring Program

a. Areas to consider are the licensee's Annual Environmental Monitoring Report; changes to the licensee's ODCM, with respect to environmental monitoring; and compliance with the technical specifications, license conditions, and commitments in terms of sampling locations, monitoring and measurement frequencies, land use census, interpretation, and evaluation of data.

b. Review the reports for omissions; obvious mistakes; anomalous measurements; observed biases; trends in the data; State and licensee inter- comparisons; and NRC-licensee TLD measurements.

c. Have timely and appropriate followup and corrective actions been taken for anomalous measurements results? Has the licensee conducted an evaluation of any significant differences in State and licensee inter-comparisons results, as applicable?

d. Based on visits to selected environmental sampling stations, are the stations properly maintained and all equipment operable?

03.07 Meteorological Monitoring Program. Based on direct observation and review of applicable records, is the control room and remote tower meteorological instrumentation operable, calibrated and maintained in accordance with appropriate written procedures? Procedural details should follow the guidance delineated in Regulatory Guide 1.23, "Onsite Meteorological Programs."

03.08 Environmental Monitoring Quality Assurance (QA) Program. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment," provides guidance for the content and extent of an acceptable program.

03.09 Confirmatory Measurements Program

a. Review selected records of required radiochemical determinations for reactor coolant and secondary water. Have these determinations been performed as required and are the results within limits?

b. Using the Verification Test detailed below, evaluate the licensee's analysis of the radioactivity in liquids and gases and air particulate filters and charcoal or silver zeolite cartridges compared to the results from the NRC or Radiological Environmental Sciences Laboratory's (RESL) analysis, as appropriate.

Ensure that both the NRC's and/or RESL's analysis are made on the same samples or on split samples as the licensee's. If cartridge or filter samples are not available, substitute a simulated cartridge or filter sample prepared by RESL. Analyses are to be performed by the NRC inspection staff in the mobile laboratory or at the Regional Office.

Whenever possible, observe the sampling and splitting of samples. Improper techniques may cause incorrect results regardless of the accuracy of the analysis.

The licensee should analyze NRC or split samples in a routine manner. The methodology, procedures, equipment, personnel, sample size, and counting times utilized by the NRC and/or RESL are to be the same as the licensee normally uses. Using the counting efficiencies, counting times, and other parameters, does the licensee meet the lower limit of detection (LLD) specified in the OL or the ODCM, as appropriate? If multiple detectors are used with a single counting system, make comparisons for all detectors when it is feasible to do so.

1. Verification Test

For the analyses listed below, identify all the radionuclides detected in the NRC sample. Compare the NRC measurements with the licensee's results as described below.

a. Liquids and Gases - Gamma Emitters. Identify all radionuclides detected in the NRC samples. The licensee should identify and quantify all the nuclides that are detectable with the licensee's system using normal counting times.

b. Liquids and Gases - Other Radionuclides. For radionuclides that cannot be determined by gamma-ray spectrometry (e.g., H-3, Sr-89, Sr-90, Fe-55), compare the Radiological Environmental Sciences Laboratory's (RESL) results with the licensee's results.

c. Air Particulate Filters and Charcoal/Silver Zeolite Cartridges.

2. Comparison

(a) Divide each NRC result by its associated uncertainty to obtain the resolution. (Note: For purposes of this procedure, the uncertainty is defined as the relative standard deviation, one sigma, of the NRC results as calculated from counting statistics.)

(b) Divide each licensee result by the corresponding NRC result to obtain the ratio (licensee result/NRC).

(c) The licensee's measurement is in agreement if the value of the ratio fall within the limits shown in the following table for the corresponding resolution.

3. Criteria for Accepting the Licensee's Measurements

Resolution	Ratio
<4	
4-7	0.5-2.0
8-15	0.6-1.66
16-50	0.75-1.33
51-200	0.80-1.25
>200	0.85-1.18

4. Action Taken for Measurement Not in Agreement. Perform another Verification Test, if practical, during the inspection. If analyses are still in disagreement, evaluations to resolve a disagreement may include the following:

   (a) Review licensee calibrations. For differences in gamma-emitting radionuclides, compare the licensee's current and previous calibration records. If significant differences in detector efficiencies are noted, a recalibration should be conducted.

   (b) If sample geometries are identical between the licensee and NRC, switch samples and recount.

   (c) For radionuclides not detected by gamma spectroscopy, evaluate the licensee's radiochemical analysis methods.

   (d) Review results of the licensee's radiochemical laboratory quality control results for trends (biases) for the sample geometries in question.

   (e) Consider ways in which the licensee's radio-analytical methods and radioactivity measurement algorithms may contribute to disagreement.

   (f) Have RESL analyze the sample.

   (g) Have the licensee analyze a spiked sample supplied by RESL.

   (h) Consult RESL for technical advice and assistance.

   Note that some minor discrepancies may result from the use of different equipment and techniques. This should be considered in attempting to resolve disagreements.

5. Followup Actions for identified inaccuracies.

For licensee effluent measurements determined to be inaccurate as a result of improper calibrations, unsuitable radiochemical methodologies or analyses, determine the extent of the identified bias and evaluate the overall effect on licensee dose projections.

c. Has the licensee established a program for safely obtaining and accurately analyzing highly radioactive reactor coolant and containment atmosphere samples under accident conditions? An adequate program should include approved procedures, training of personnel, and routine verification of system/equipment operability. Guidance is provided in TSs and/or Section 2.B.III of NUREG 0737, Clarification of TMI Action Plant Item Requirements.

03.10 Water Chemistry

a. Based on a review of selected records of required non-radioactive chemical determinations for reactor coolant and secondary water, are the primary and secondary coolant chemistry programs effectively implemented?

b. The results of the analysis of interlaboratory cross-check samples, if available, provide information on the quality of non-radioactive chemical analyses. Some chemical cross-check samples are commercially available. The technical bases for agreement/disagreement for non-radioactive samples is to be verified.

03.11 Engineered-Safety-Feature Filtration and Control Room Habitability Systems

a. Based on records of the latest technical specifications surveillance tests of ESF filter and adsorption units, are the tests performed at the frequency required by technical specifications?

b. Was the action statement entered when ESF filter and adsorption units trains and/or components were declared inoperable?

c. Aspects of ESF filter and adsorption unit tests that may be examined include:

1. Once per [31][1] days, on a staggered test basis, upon initiation from the control room, the ESF ventilation systems are demonstrated operable with flow through the HEPA filter and charcoal adsorbers and the heaters operating for at least [10] hours. [For systems without heaters, the unit should operate for [10] minutes.] In the case of the control room such a test should demonstrate that the control room proper remains below

[1]The values in brackets are determined on a site-specific basis for inclusion into the TS. If values are presented within the brackets, they are the usual values one would expect to find,

[80°F][2] and that the temperature in various electrical equipment cabinets, e.g., reactor protection system, is maintained below [105°F][3]. The test should be conducted with the ESF ventilation system in its accident configuration. The same should be true for adjacent areas' ventilation systems. Confirm that the alignment of various dampers, fans, ventilation systems is consistent with the intended alignment for emergency (accident) conditions.

2. In-place testing using DOP and halogenated hydrocarbon, usually freon, is conducted in accordance with the test method described in TS and at the TS flow rate and meets the TS acceptance criteria of [0.05%] penetration for DOP and [0.05%] penetration for the halogenated hydrocarbon. System bypass should be less than [XXX%].

3. Laboratory test for charcoal demonstrates a penetration of no greater than:

2-inch bed w/ heaters	[1%]
2-inch bed w/o heaters	[0.7%]
4-inch bed w/ heaters	[0.2%]
4-inch bed w/o heaters	[0.14%]

Tests should be conducted using [ASTM D3803-1989] at a temperature of 30°F and at the relative humidity (RH) dictated by the TS. Usual conditions for systems with safety grade heaters is 70%. For systems without a heater the test should be conducted at a RH of 95%.

4. A system flow rate of [xxxx] cfm during system operation when tested in accordance with [ASME N510-19xx].

5. That the pressure drop across the HEPA filter and charcoal adsorber is < [x] inches water gauge when operating the system at a flow rate of [xxxx] cfm.

6. That normal system alignment and isolation occurs, e.g., normal supply and exhaust automatically shutdown, on the appropriate initiation and/or isolation signal, e.g., a Safety Injection Actuation test signal or a High Radiation test signal.

7. That the ESF filter ventilation system is automatically actuated on the appropriate initiation signal, e.g., a Safety Injection Test Signal or a High Radiation test signal.

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[2]This temperature is based upon human comfort requirements.

[3]This temperature is based upon equipment qualification requirements.

8. That the ESF filter ventilation systems which are designed to maintain certain areas at a negative pressure, e.g., [standby gas treatment system/fuel handling building] maintain envelopes served by those areas, e.g., [reactor building/fuel handling building], at a negative pressure of [0.xx] inches water with respect to all adjacent areas at a flow rate of < [xxxx] cfm.

9. That for ESF ventilation systems provided with heaters, actuation equipment (relative humidity sensors) are operable and calibrated in accordance with appropriate procedures.

d. For control rooms, aspects of the ESF filtration and control room habitability system that may be examined include:

1. That the ESF filter ventilation the system maintains the control room envelope at a positive pressure of [0.xx] inches water with respect to all adjacent areas at a flow rate of < [xxxx] cfm.

2. That if designed to be isolated in the event of a radiation incident, the control room envelope supply and exhaust systems automatically shutdown on the appropriate signal e.g., a Safety Injection Actuation test signal or a High Radiation test signal, the control room envelope is isolated, and the control room ESF ventilation system is placed in the appropriate mode (recirculation, pressurization/recirculation, isolation/recirculation) of operation.

3. That for bottled air pressurization systems, the control room contains a minimum of [xx] bottles of air each pressurized to at least [xxxx] psig and that the system will supply at least [xxx] cfm of air to maintain the control room envelope at a positive pressure of > [0.xx] inches water gauge relative to adjacent areas for at least [xx] minutes.

e. Perform a walkdown visual inspection of the ventilation system. The visual inspection should be performed in accordance with Section [5.5] of [ASME N510-1989].

03.12 Training and Qualifications. Select individuals who have joined the radwaste and chemistry groups since the last inspection. Based on direct observation and discussion with the selected individuals, do they have the minimum knowledge, of radwaste operations, chemistry, sample analyses, and radiation instrumentation?

Note: In 1988, the Commission amended its Policy Statement on Training and Qualification of Nuclear Power Plant Personnel (53 FR 46603, Nov. 18, 1988). The section of the 1985 policy statement (50 FR 11147) entitled "Enforcement Policy" was withdrawn and the Commission stated that "The NRC will conduct inspections as deemed

necessary and take appropriate enforcement action in accordance with the Commission's enforcement policy in 10 CFR Part 2, Appendix C, when regulatory requirements are not met."

03.13 Effectiveness of Licensee Controls

a. When safety issues, events, or problems are reviewed, the adequacy of the results of licensee controls may be assessed by determining how effective the licensee was in performing the following:

1. Initial identification of the problem.

2. Elevation of problems to the proper level of management for resolution (internal communications and procedures).

3. Root cause analysis.

4. Implementation of corrective actions.

5. Expansion of the scope of corrective actions to include applicable related systems, equipment, procedures, and personnel actions.

b. The determination of whether there are strengths or weaknesses in the licensee's controls will be limited to those issues, events, or problems reviewed in detail. The evaluation will not draw sweeping conclusions about the licensee's overall control programs but will be very specific in identifying any licensee strengths or weaknesses encountered with the individual items reviewed.

NOTE: For additional inspection guidance on licensee controls, refer to IP 40500, "Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems."

84750-04 INSPECTION RESOURCES

To complete this inspection procedure, it is expected to take, on average, about 75 hours of direct inspection on site for a single unit site. Multi-unit sites are expected to require an additional 30 hours of direct inspection for each additional unit. Note, however, that inspection requirements 02.09(b) and 02.10 are scheduled to be completed every third year. The 75 hours includes the time associated with inspection requirements 02.09(b) and 02.10 based upon allocating 1/3 of the inspection time associated with these requirements. In addition, the confirmatory measurements section [2.09(b)] of this inspection procedure is to be considered for use on a Regional Initiative basis for evaluating licensee measurement capability during special situations, e.g., monitoring conducted during failed fuel conditions, abnormal spills, or effluent releases. Therefore, the time allocated to this inspection procedure will vary from one year to the next.

END