

ATTACHMENT 83502.01

INSPECTABLE AREA: RADIOACTIVE GASEOUS AND LIQUID EFFLUENT
TREATMENT AND MONITORING SYSTEMS

CORNERSTONE: Public Radiation Safety

INSPECTION BASES: This inspection procedure evaluates aspects of the radioactive gaseous and liquid effluent treatment and monitoring systems for which there have been significant performance findings identified via the NRC baseline inspection program, the effluent release occurrence performance indicator, and/or Licensee Event Reports (LERs). In Public Radiation Safety, the performance indicator measures radioactive gaseous and liquid releases that were above Technical Specification or Offsite Dose Calculation Manual limits. Radiation exposure to the public is to be below the 10 CFR 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 limits 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 release of radioactive material to the environment.

LEVEL OF EFFORT: Inspection resources will be dependent on the nature of the performance findings, on the number of program areas affected by the findings, and on the level of review necessary to evaluate the findings.

83502.01-01 INSPECTION OBJECTIVES

01.01 To identify the root causes for significant findings identified during the NRC baseline inspection program, by the performance indicator, or through LERs concerning the control and monitoring of radioactive liquid and gaseous effluent releases.

01.02 To evaluate the extent of significant performance findings in this inspection area and the adequacy of the licensee's actions to correct the identified problems.

01.03 To ensure that significant findings in this inspection area do not preclude the licensee's radioactive effluent release programs and systems from maintaining radiation doses to members of the public to below the limits in 10 CFR Part 20.

83502.01-02 INSPECTION REQUIREMENTS

02.01 Inspection Planning and In-Office Inspection

- a. Review the current Radiological Effluent Release Report. Review evaluations for significant changes made to the Offsite Dose Calculation Manual (ODCM) related to the design, control, and monitoring of the radioactive effluent treatment systems.
- b. Identify radioactive effluent monitor operability problems reported in the current Radiological Effluent Release Report.
- c. Review the Final Safety Analysis Report (FSAR) description of all radioactive effluent treatment and monitoring systems.

02.02 Material Condition of Liquid and Gaseous Radioactive Waste Systems

If significant findings are identified concerning the material condition of the liquid and/or gaseous radioactive effluent treatment systems:

- a. Review records and interview operations staff concerning the availability of system components. Determine if the licensee maintains a work-around list that includes radioactive effluent treatment system material condition deficiencies. Determine if the staff is compensating for inoperable equipment by transferring liquids or gases via non-routine or abnormal pathways. For example, if a pump has a long-term, material condition deficiency and is inoperable, does the licensee routinely allow the staff to empty the effected tank into the floor drain system in order for the contents to be processed. In some cases, the use of extraordinary means to transfer radioactive waste may result in an unplanned release or an overflow of radioactive waste through other system components.
- b. Review the calibration and operability of tank level indications and alarms. Assess the administrative controls and actions required for alarm indications. Interview the staff to verify their understanding of these controls.
- c. Walk-down the radiologically controlled area (RCA) and look for unmonitored release paths (e.g., IE Bulletin No. 80-10, IE Information Notice No. 91-40, and IE Information Notice No. 91-56).

- d. Examine the condition of tanks/vessels which routinely hold radioactive liquid or gaseous wastes. Review the licensee's surveillance of those tanks/vessels to determine if corrosion and integrity problems are identified and corrected in a timely manner.

02.03 Sampling and Analysis of Radioactive Liquid and Gaseous Effluent Releases

If significant findings are identified concerning the sampling or analysis of radioactive liquids and/or gases prior to release:

- a. Review the qualification and training of individuals performing routine sampling and analysis of liquids and gases prior to release.
- b. Review the licensee's procedures to determine if adequate controls exist to ensure that representative samples are obtained (e.g., provisions for sample line flushes, vessel recirculation/mixing, and handling of sample containers). Evaluate the licensee's controls to ensure that the proper system location/vessel is sampled for the particular release path.
- c. Observe the routine sampling and analysis of several batches of radioactive wastes. Evaluate the analytical techniques and the level of understanding demonstrated by the technicians performing the analyses. If redundant, independent samples are required, verify that the samples are separate and independent. Ensure that the analyses results are reviewed by the level of supervision specified in the licensee's procedure to ensure proper identification and quantification of radionuclides.
- d. Review the administrative controls that are in place to ensure that the compensatory sampling/analysis is performed when there are inoperable effluent monitoring instrumentation. Ensure that there are administrative controls in place to prevent the inadvertent release of unmonitored radioactive liquid and gaseous effluents.

02.04 Control and Evaluation of Offsite Dose from Radioactive Effluent Releases

If significant findings are identified related to the licensee's control or evaluation of offsite doses from effluent releases:

- a. Review the training and qualification of personnel responsible for calculating the offsite doses from radioactive effluents. Review the licensee's experience (through interviews and review of maintenance records) in maintaining and using radioactive effluent systems.

- b. Verify that radioactive effluent monitor alarm setpoints are described in written procedures. Perform an independent calculation or review the licensee's calculation methodology in detail, for several alarm setpoints to verify the licensee's calculations. The basis for each setpoint should be understood by the authorized operators and technicians.
- c. Review the variables used in the licensee's offsite dose calculation to verify that they are consistent with the ODCM. Review the basis for these variables to ensure that they are consistent with the guidance contained in NRC Regulatory Guide 1.109, Revision 1, and/or NUREG-0133. Ensure that the variables are properly used in the licensee's manual calculation and/or computer software code.
- d. Perform confirmatory calculations using the NRC PC-DOSE computer software code or equivalent method (i.e., detailed review of the licensee documentation package for the verification and validation of the computer software).
- e. During planned radioactive effluent releases, observe the conduct of the control room staff. Verify that the staff is cognizant of current release parameters (i.e., meteorology, effluent flow rates, dilution flow rates, radiation monitor reading, alarm setpoints).

02.05 Maintenance and Calibration of Radioactive Effluent Monitoring Instrumentation

If significant findings are identified concerning the maintenance or calibrations of liquid or gaseous monitoring instrumentation:

- a. Observe remote and local process and radioactive effluent monitor indications to determine operability. During effluent releases, verify that the monitor indications are stable and that the indicated values are within the licensee's expected range.
- b. Interview cognizant licensee personnel and review the maintenance and operability histories of the effluent monitoring instrumentation. Evaluate the licensee's monitoring of system performance (i.e., does the licensee track and trend failures for each instrument and for common types of instruments). If instruments are inoperable for extended periods of time (e.g., 30 or more consecutive days), review the licensee's actions to restore operability and implementation of necessary compensatory sampling/analysis, as required by the ODCM or TS. If the licensee has instruments that have demonstrated long-term or chronic operability problems (e.g., inoperable for 3 or more consecutive months or having an unavailability of 30 or more percent), determine if the licensee has a long term corrective action plan to ensure that the effluent pathway is

adequately monitored and to prevent the inadvertent release of unmonitored radioactive effluents.

- c. Determine if the licensee has identified common cause failures for instrumentation and has entered the failures into the corrective action system. If the instruments have demonstrated a poor maintenance history, evaluate the preventive maintenance provisions the licensee has implemented to improve performance.
- d. Review the licensee's instrument calibration program. Determine if the program is consistent with the regulatory guidance contained in NRC Regulatory Guides 1.21 and 4.15, ANSI Standard N13.10-1974, and HPPOS-040 and HPPOS-229. Verify that the licensee performs calibrations using sources which are traceable to the National Institute of Standards and Technology (NIST). Evaluate if the licensee calibrates and source tests its instruments with radionuclides that adequately represent the expected mixtures during routine and postulated accident releases. Ensure that the licensee is testing and calibrating its instruments at or near the alarm setpoint or action level. If periodic re-calibrations of monitoring instruments indicate instability in the instrument, evaluate the actions taken by the licensee to ensure that the transfer calibration remains valid.
- e. Observe the calibrations of several effluent monitoring instruments. Determine if individuals are knowledgeable of the instrumentation and procedural controls. In many cases, calibrations require the coordination of two or more plant disciplines (e.g., Chemistry, Radiation Protection, and Instrument and Controls staffs). Evaluate the coordination of these staffs to ensure that the calibrations are properly performed and evaluated.
- f. Determine if the licensee routinely compares grab samples to monitor indications. Review the results of these analysis to determine if the monitor is adequately indicating the activity of normal effluent mixtures of radionuclides.

02.06 Radiation Measurement Instrumentation (Counting Room Laboratory)

If significant findings are identified concerning the adequacy of the radiation measurement instrument calibrations or quality control activities:

- a. Confirmatory Measurements. Using the Verification Test described below, evaluate the licensee's radiochemical measurement capabilities by comparing the licensee's measurements with NRC measurements or the measurements of an equivalent independent laboratory. Ensure that both measurements are made on the same samples or on split samples. If cartridge or filter samples are not available,

substitute a simulated cartridge or filter sample prepared for the NRC. The licensee should analyze NRC or split samples in a routine manner. The methodology, procedures, equipment, personnel, sample size, and counting times should be the same as the licensee normally uses. Analyses should also be performed by the NRC inspection staff in the mobile laboratory or at a Regional Office.

NOTE: Because of the extensive resources required to perform this evaluation, the implementation of this section will require approval from NRC Regional management.

Verification Test:

1. Analyses

- (a) Liquids and Gases - Gamma Emitters. Identify all radionuclides detected in the NRC sample. The licensee should identify and quantify all the nuclides that are detectable with the licensee's system using normal counting times. Compare results as described below.
- (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 an independent laboratory's results with the licensee's as described below.
- (c) Air Particulate Filters and Charcoal Silver/Zeolite Cartridges
 - (1) Identify all radionuclides detected in the NRC sample.
 - (2) Compare the NRC measurements with the licensee's as described below.

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 result 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 falls within the limits shown in the following table for the corresponding resolution.

3. Criteria for Accepting the Licensee's Measurements

<u>Resolution</u>	<u>Ratio</u>
<4	0.4 - 2.5
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 Measurements Not in Agreement. Perform another Verification Test, if practical, during the inspection. If measurements are still in disagreement, remedial actions should be taken. Remedial action to resolve a disagreement may include the following:

- (a) A review of calibrations and/or recalibration by the licensee.
- (b) Consideration of ways in which the licensee's radioanalytical methods and radioactivity measurement algorithms may contribute to disagreement.
- (c) Licensee analysis of a spiked sample supplied by an independent laboratory for the NRC.
- (d) Reanalysis of the sample by an independent laboratory.

Note that some discrepancies may result from the use of different equipment and techniques. This should be factored into acceptance criteria.

- b. Verify by calculation: Using the counting efficiencies, counting times, and other parameters, verify that the

licensee can meet the lower level of detection (LLD) specified in the ODCM.

85302.01-03 RESOURCE ESTIMATE

The estimated resources to complete this attachment is 15-50 hours.

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