

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-309/91-03

Docket No. 50-309

License No. DPR-36 Priority - Category C

Licensee: Maine Yankee Atomic Power Company

83 Edison Drive

Augusta, Maine 04336

Facility Name: Maine Yankee Nuclear Generating Station

Inspection At: Wiscasset, Maine

Inspection Conducted: January 7-10, 1991

Inspector: R. L. Nimitz
R. L. Nimitz, CHP, Senior Radiation Specialist

2/1/91
date

Approved by: W. J. Paschak
W. J. Paschak, Chief
Facilities Radiation Protection Section

2-4-91
date

Inspection Summary: The inspection was a routine, announced inspection of the Radiological Controls Program. Areas reviewed were the licensee's action on previous inspection findings, radiological controls for repair of the leaking number 1 steam generator, and licensee efforts to clean up slightly contaminated liquid in Turbine Building secondary systems resulting from the leak in the number 1 steam generator.

Results: One violation was identified (Failure to adhere to radiation protection procedure as required by Technical Specification 5.11, Details section 4). Weaknesses were identified in the personnel exposure records area. The licensee took appropriate action to clean up the secondary systems which had been contaminated following the number 1 steam generator tube leak.

DETAILS

1. Individuals Contacted

1.1 Maine Yankee

- * R. Blackmore, Plant Manager
- * R. Nelson, Manager, Technical Support
- * G. Pillsbury, Assistant Manager, Technical Support
- * S. Nichols, Manager, Nuclear Engineering and Licensing
- * D. Caristo, Section Head, Radiation Protection Operations
- * E. Heath, Section Head, Radiation Protection Programs

1.2 NRC

- C. Marschall, Senior Resident Inspector
- *R. Freudenberger, Resident Inspector

The Inspector also contacted other personnel during the course of the inspection.

* Denotes those individuals attending the exit meeting on January 10, 1991.

2.0 Purpose of Inspection

The inspection was a routine, announced inspection of the following areas:

- licensee action on previous inspection findings
- routine radiological controls for steam generator inspection and repair
- contamination controls
- internal and external exposure controls
- High Radiation Area controls
- licensee actions to clean-up the contaminated liquids on the secondary side of the station

3.0 Licensee Action on Previous Inspection

3.1 (Closed) Unresolved Item (50-309/89-15-02):

The NRC will review the circumstances and the licensee's action associated with water identified in the outdoor radwaste bunker. The inspector discussed with licensee personnel the construction of the bunker and the possibility of infiltration and exfiltration of water. The inspector's review indicated that the water had been introduced into the bunker via a leak in the roof enclosure (hatch cover). A sample of the water, analyzed on July 19, 1989, indicated that the water was slightly contaminated. This was attributed to water contacting equipment stored in the bunker. The walls and floor of the bunker were watertight. No releases to the environment occurred. The licensee removed the water for onsite processing, repaired the leak in the hatch cover, and established a weekly surveillance of the bunker to detect other occurrences of intrusion of water. No other occurrences were identified. This item is closed.

3.2 (Closed) Unresolved Item (50-309/89-15-01):

The NRC will review several apparent recurrent examples of personnel not adhering to radiation protection procedures. The examples were documented as Job Observations by the licensee's personnel. It was not apparent that appropriate actions had been taken to prevent recurrence. The inspector reviewed this matter by discussing the observations with cognizant licensee personnel and by review of the licensee's response to this observation (Reference licensee letter number MN-89-117 dated September 11, 1989).

The licensee's documentation provided limited information to enable the inspector to determine if the Job Observation was an actual example of personnel not adhering to procedures and if appropriate corrective actions had been taken. Such information was needed to allow the inspector to review examples with respect to the criteria for exercise of discretion for non-issuance of a Notice of Violation which are specified in 10 CFR 2, Appendix A. The inspector's review, after extensive discussions with licensee personnel did not identify any apparent recurrent concerns. The inspector did note during the review, that workers expressed concern regarding the inconsistency of radiological controls applied to various tasks.

The inspector's review indicated that the licensee revised procedure No. 9.1.25, Radiological Incident Reporting, to incorporate the Job Observations for tracking and corrective action purposes. If a Job Observation identifies examples of non-adherence to procedures, a poor work practice form is issued requiring appropriate corrective action by the responsible department manager. In November 1989, the Plant Manager required that a list of job observations be tracked to ensure they are closed.

The inspector selected an apparent example of non-adherence to a procedure and requested the licensee to provide the status of corrective actions. The inspector experienced difficulty in determining that corrective actions were timely and appropriate or that a procedure non-adherence concern was identified. Although no violations were identified, the observations indicated a need to further enhance documentation of concerns and corrective actions. The inspector noted that Job Observation information was sent to the QA group for tracking, trending and analysis. The licensee is currently evaluating the 1990 Job Observations for areas of generic concern. The licensee indicated efforts would be initiated to review the adequacy of documentation of corrective actions for Job Observations and initiate enhancement actions if appropriate. The licensee indicated that the Radiological Incident Reporting procedure was being evaluated for adequacy and improvement. The NRC will review the licensee's corrective actions for self-identified concerns during future inspections. This item is closed.

3.3 (Closed) Unresolved Item (50-309/90-27-01):

The licensee's exposure control program did not ensure that workers accumulated exposure would remain within station administrative limits. The licensee's dosimetry computer did not have, due to a software problem the capability to account for previous quarterly personnel exposure received offsite. The licensee implemented an interim procedure change on December 22, 1990, to provide for enhanced exposure control. The licensee also reviewed the dosimetry records of all contractors brought on site for the December 1990, steam generator outage to ensure all quarterly exposure was properly accounted. The licensee corrected the computer software problem on December 27, 1990. No personnel exposures in excess of applicable limits were identified. This item is closed.

3.4 (Closed) Unresolved Item (50-309/86-19-03):

The licensee's procedures did not reflect current practices for dealing with contaminated individuals. The licensee's action on this matter was reviewed during inspection 50-309/90-27. Preliminary inspector reviewed identified questions in the area of upper limits of contamination for determination of skin dose and allowable wait time for personnel prior to documenting a skin contamination report. The licensee had revised procedures to require a personnel contamination form if radioactive contamination in excess of 100 corrected counts per minute remained on the individual.

The inspector's review indicated confusion on the part of the radiation protection technician staff in that some technicians did not believe a skin contamination report need be documented if the contamination was attributed to short lived radionuclides. The inspector's review indicated that the licensee's procedures included precautions to consider performance of a skin dose assessment at specified personnel contamination levels (20,000 counts per minute). The licensee subsequently revised procedures to provide wait time limits, clarified actions to be taken for short-lived radionuclide contamination, and clarified the requirement that all skin contaminations be documented as specified by procedure. This item is closed.

4.0 Radiological Controls for Repair of Leaking Steam Generator

The inspector reviewed the implementation and adequacy of radiological controls provided for the inspection and repair of the leaking Number 1 steam generator. The inspector also reviewed licensee radiological controls for inspection of the remaining three steam generators.

The following matters were reviewed:

- performance of appropriate radiological surveys to support the work activities
- documentation and tracking of personnel radiation exposure received
- licensee efforts to maintain personnel radiation exposure as low as reasonably achievable during the work activities.
- internal and external exposure controls.

The reviews in this area were with respect to criteria contained in 10 CFR 20, Standards for Protection Against Radiation, applicable licensee procedures, and standard industry practices.

The following observations were made:

- The licensee performed an evaluation of the radiation fields inside the steam generator primary waterboxes. A phantom was used for dosimetry testing and positioning. Subsequent exposure controls were based on use of exposure results from the tests. Beta exposures were controlled using appropriate ratios of beta to gamma exposure dose rates. The licensee evaluated beta energies. Despite leaking fuel, radiation dose rates within the steam generator waterboxes did not show any significant increase above previous levels encountered (about 20 R/hr gamma and 32 Rad/hr beta). The inspector's review indicated good technical evaluations of the radiation environments to be potentially entered by personnel.
- The licensee used appropriately accredited dosimetry (supplied by Yankee Atomic) for personnel monitoring. The licensee normally used a Panasonic 814-AS4 personnel monitoring device which was accredited in ANSI-N13.11 testing Categories I-VII. If neutron exposures are expected, the licensee switches to a Panasonic Model 808 device accredited in testing Categories I-VII (beta, gamma, X-ray) used in conjunction with a Harshaw Model BGN device accredited in testing Category VIII (neutron). The accreditation of the dosimetry was renewed on October 1, 1990. The inspector noted that the licensee was aware of an under response of the dosimetry for use in measuring skin dose from submersion in noble gas. The licensee's program provided for performance of skin dose evaluations using data obtained from grab samples.
- The licensee did not identify any significant problem with hot particles during the steam generator inspection and repair activities.
- All personnel working on the steam generator platforms went through steam generator mock-up training. Although a mock-up was not used, at the station, for initial training prior to initial work on the number 1 steam generator, personnel had received training at the vendor facility in May 1990. The mock-up was received late at the station and was used for training personnel for activities associated with the remaining steam generators.
- The licensee's initial person-rem for the steam generator repair activity was based on using previous 1990 exposure results. The original estimate for the inspection and repair activity was 28.6 person-rem.

However, because of a failure to account for multiple moves of the eddy current robot and because of problems encountered in installing steam generator nozzle covers, the exposure estimate was raised to 50.7 person-rem. The final exposure received was about 53 person-rem. The inspector noted that a special ALARA Committee meeting was held when problems were encountered in the initial work activity and that there was a high level of management attention to ALARA efforts for the work.

- The licensee as of January 9, 1991, had already drafted a lessons learned document for the steam generator work with action items to improve performance on future work activities associated with the steam generators.
- The licensee uses a form entitled Attachment A to document air sample results. The form is also used to identify personnel who were in the area where the air sample was collected. The form provides a means of matching air sample data with personnel who may have been exposed to airborne radioactivity and who may have received potential internal and external exposure.

The inspector's review of the Attachment A which was used to document air sample data during the initial removal of the manways on the number 1 steam generator for repair of the leaking tube (11:21 a.m. - 1:45 p.m. on December 19, 1990) indicated the wrong air sample was identified for purposes of calculation of personnel exposure.

A second air sample was collected between the period 1:00 p.m. - 1:45 p.m. on December 19, 1990. The second air sample indicated radioactive noble gas concentrations (Xe-133 and Xe-135) of about 10 times the initial sample activity. The licensee's use of the proper air sample data was important because the licensee does not have an approved respiratory protection program and, as discussed above, the licensee's dosimetry was not capable of accurately monitoring radioactive noble gas exposure. The licensee immediately corrected the air sample record and initiated a review of other Attachment As to ensure proper air sample results were used to calculate potential personnel exposure.

- The inspector's review of the licensee's calculation of skin exposure associated with radioactive noble gases indicated the licensee did not calculate skin exposure due to noble gas exposure (Xe-133 and Xe-135) received by personnel working on the number 1 steam generator platform during the period 11:21 a.m. - 1:45 p.m. on December 19, 1990, (six workers) and 2:40 a.m. - 4:00 a.m. on December 20, 1990 (six workers).

The licensee's Radiation Protection Procedure 9.1.19, Exposure to Noble Gases, revision 12, states in section 2 that for material designated as "Sub" in the "Isotope" column of Appendix B, Table I, Column 1, of 10 CFR 20, the concentration value specified is based upon exposure to the material as an external radiation source. Individual exposures to the materials shall be accounted for as part of the limitation on individual dose in 10 CFR 20.101. The beta component will be calculated.

The licensee's Technical Specification (TS) 5.11, Radiation Protection Program, requires that procedures for personnel radiation exposure be established consistent with the requirements of 10 CFR 20 and adhered to. The inspector noted that the radioactive material the workers were exposed to (Xe-133 and Xe-135) are designated as "Sub" in Appendix B, Table I, Column 1 of 10 CFR 20 and indicated that failure to calculate the beta component of the skin dose as required by procedure 9.1.19 was an apparent violation of TS 5.11. (50-309/91-03-01). The licensee calculated the exposures and initiated reviews to ensure other examples of this problem were corrected, as appropriate. The inspector's review indicated all noble gas sample analysis data had not been transferred to the Attachment A and as a result the licensee's dosimetry personnel did not calculate the skin dose.

The inspector's review of the airborne radioactivity exposure control program indicated that:

- The licensee's airborne radioactivity exposure control and tracking system was cumbersome and prone to error. There was limited cross checking of exposure results.
- Personnel exposure results, attributable to noble gases, were not being included in personnel exposure tracking and control documents in a timely fashion. Exposures which had occurred about 20 days earlier (as of January 8, 1991) were not incorporated into the licensee's total personnel exposure tracking system. The licensee immediately initiated action to update records.

5.0 Controls of Secondary System Radioactivity

The inspector reviewed the licensee's efforts to clean-up the residual radioactivity contained in secondary systems attributed to the leaking tube of the number 1 steam generator. The inspector's review indicated the following:

- During the period of increased leakage from the number 1 steam generator to the secondary side, no steam generator blowdown was being discharged. Blowdown was being sent to the condenser via the blowdown demineralizer.

- Because the steam generator blowdown monitor was not isolated after the increase in steam generator leakage, additional radioactivity did manage to be transported to the secondary side. Most of this radioactivity was collected in the steam generator blowdown demineralizer. The licensee has since revised procedures to require isolation of the blowdown monitor sample line.
- The water inventory contained within the leaking number 1 steam generator was processed via radwaste.
- Slightly contaminated water in the condenser hotwell was discharged via a controlled release permit.
- Slightly contaminated water in the numbers 2 and 3 steam generators was released via the test tank as controlled releases.
- Residual water in steam lines was processed via the radwaste system and discharged.
- No significant activity was found in the Turbine Building sump.
- The licensee cut out the contaminated I-6 steam generator blowdown demineralizer from the secondary system, removed it to the radiological controlled area, and removed the contaminated resins for controlled disposal. The demineralizer was reinstalled.

The inspector concluded that the licensee implemented appropriate and reasonable actions to clean-up the contaminated secondary systems. The Turbine Building was released as a radiological control area.

6.0 Plant Tours

The inspector toured the station periodically during the inspection. The following areas were reviewed:

- posting, barricading and access control to Radiation, High Radiation and Airborne Radioactive Areas, as appropriate
- radioactive and contaminated material control
- radwaste storage
- contamination control
- housekeeping
- issuance and proper use of dosimetry

Within the scope of the review, no violations were identified. Overall posting, barricading and control of radiological areas and radioactive material and contamination was good.

The following observations were brought to the licensee's attention:

- Materials (a mop handle and long handled tool) were observed extending out of and across contamination control boundaries at the 21' Primary Auxiliary Building (PAB) BW/PW pump room and the P-14A pump cubicle.
- A recent radiation survey, posted at the 36' elevation PAB Degassifier/ Evaporator cubicle indicated that a High Radiation Area posting in the cubicle was to be de-posted. The posting was observed to be in-place.
- Covers were off the 6020 A and B temperature controls for the Boric Acid Heat Trace located on the 21' elevation of the PAB. The covers were replaced.
- A step ladder was positioned next to, and chained to the Post Accident Sample Panel on the 36' elevation of the PAB. The manner of storage did not appear to be appropriate from a seismic standpoint. The licensee re-positioned the ladder and initiated a review of storage practices.
- A roll of tape, pieces of which were used to secure a radiation protection air sample holder to an air sampler, was hung on a valve arm in the 36' elevation PAB Degassifier/Evaporator cubicle and radiation protection boundary rope was attached to small diameter tubing near the containment personnel airlock. The licensee's personnel removed the tape and initiated a review of radiation protection practices that could affect plant equipment.
- An open, plastic quart container, containing about a pint of oil, was observed in the EV-2 evaporator on the -11' elevation of the PAB. The licensee initiated a review of this matter.
- There were a number of hot spots located on pipes in the PAB, particularly the -11' elevation. Although the hot spots were clearly posted, ambient radiation fields appeared to be due in part to the radiation emanating from the hot spots. Some were located at head level requiring personnel to walk under them. The licensee was reviewing the hot spots in an effort to determine the best way to remove them and thus reduce ambient background radiation levels and aggregate worker radiation exposure.

The licensee indicated the above matters would be reviewed.

7.0 Exit Meeting

The inspector met with licensee representatives, denoted in Section 1 of this report, at the conclusion of the inspection on January 10, 1991. The inspector summarized the purpose, scope and findings of the inspection. No written material was provided to the licensee.