

U.S. NUCLEAR REGULATORY COMMISSION

Region I

Docket/Report: 50-309/85-20

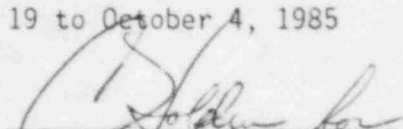
License: DPR-36

Licensee: Maine Yankee Atomic Power

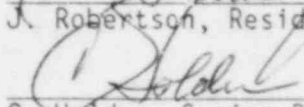
Inspection At: Wiscasset, Maine

Dates: August 19 to October 4, 1985

Submitted:

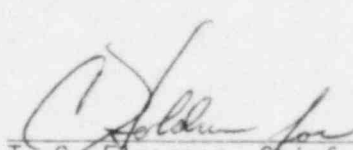
  
J. Robertson, Resident Inspector

11/14/85  
date

  
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11/14/85  
date

Approved:

  
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Reactor Projects Section 3C

11/14/85  
date

Summary: Inspection on August 19 - October 4, 1985 (Report No. 50-309/85-20)

Areas Inspected: Routine resident inspection (290 hours) of the control room, accessible parts of plant structures, plant operations, radiation protection, physical security, fire protection, plant operating records, maintenance, surveillance, open items, and reports to the NRC.

Results: The eddy current testing program for steam generator tubes was expanded beyond the scope of technical specifications and provided additional information to conclude that the horizontal section of the tubes are not being subject to circumferential cracking. Sufficient controls are in place to minimize the affect of control board modifications on the operation of the plant during refueling. Control of the major work items for the outage appears to be sufficient. No violations were identified.

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## DETAILS

### 1. Persons Contacted

Within this report period, interviews and discussions were conducted with various licensee personnel, including reactor operators, maintenance and surveillance technicians and the licensee's management staff.

### 2. Summary of Facility Activities

The plant was shutdown on August 17 for a planned 8 week refueling/maintenance outage. Major work items accomplished during this outage include; replacing the main condenser, replacing the main generator stator, human factors modifications to the main control board, replacing #2 reactor coolant pump motor, steam generator eddy current inspection and cycle 9 refueling.

During this inspection period, the licensee discovered a design problem with the reactor protection system channel A which would prevent the reactor from tripping on low generator pressure as required. As a result of this violation, the licensee developed a set of special function tests to verify the operability of the instrumentation and controls for the RPS, ESF and miscellaneous I&C systems as listed in Technical Specifications Table 4.1. An investigation of the problem was performed by the resident inspector and is documented in special inspection report 309/85-27.

The licensee's corrective actions and special function test program was reviewed by region-based and resident inspectors. The results will be documented in special inspection report 309/85-28.

### 3. Licensee Action on Previous Inspection Findings

- a. (Closed) Unresolved item (UNR 309/84-25-01) Degraded Grid Voltage. Abnormal Operating Procedure 2-12, Bus 5 and/or 6 Under Voltage has been revised to adequately address heat buildup of electrical components due to voltage cycling. A safety Evaluation Report is being prepared by a regional specialist inspector.
- b. (Closed) Unresolved Item (309/82-26-06) Adequacy of the individual off-site 115 kv power lines. The licensee has changed transformer taps settings to increase voltage 5% on the reserve station service transformer. This was done to correct a low voltage deficiency in the 115 kv incoming line supplied by Suroweic substation. This line may not have been capable of independently supplying auxiliary power during heavy load or accident conditions.

In a MYAPCo. letter to NRR dated July 18, 1985, the licensee committed to develop a test procedure to demonstrate the actual capacity of these lines. This test is to be performed with only light station service loads (approximately 3 MW) and is intended to show the

Suroweic line operability rather than capability. The system's capability will be shown using computer models for both the on-site and off-site portions of the system.

The above actions satisfy the remaining licensee commitments stated in the July 18, 1985 letter, concerning Maine Yankee off-site power supplies.

- c. (Open) Unresolved Item (309/85-20-02) On September 24, 1985, five contractor personnel were discovered by the licensee working in a respirator required area without respirator protection. The contractors were removed from the area. A dose-assessment using whole body counts was performed. No intake of radiation was found. This item is unresolved pending completion of the inspector's review of this event.

#### 4. Review of Plant and Refueling Operations

The inspector reviewed plant operation through direct observation throughout the reporting period. Portions of the following refueling activities were witnessed: core unloading and loading, spent fuel pool operations, CEA unlatching, and upper guide structure removal and installation. Conditions were found to be in compliance with the following licensee documents:

- Maine Yankee Technical Specifications
- Maine Yankee Technical Data Book
- Maine Yankee Fire Protection Program
- Maine Yankee Radiation Protection Program
- Maine Yankee Tagging Rules
- Administrative and Operating Procedures

##### a. Instrumentation

During the outage, in addition to the normal refueling activities, a major modification was made to the main control board in order to comply with human factors requirements. These modifications required the temporary rearrangement of critical indications and control circuits and the testing of the new arrangement. The task was both labor intensive and noisy. The licensee recognized the potential problems associated with this modification and studied ways to manage the project. As a result, a number of measures were employed to control the modification including the use of plexiglass scaffolding to minimize the obstruction to the operators view of the control board, moving noisy equipment from behind the control board to an adjacent room to minimize the noise level, and the use of an access control area in the control room to minimize the number of people allowed into the control room. The combination of these controls were successful in minimizing the impact of this modification on plant operations. The inspector had no further comments.

b. Annunciator Alarms

During this outage the ECCS valve status light boxes in the control room have been modified to provide better valve status information to the operators. The lights have been reorganized and color coded to indicate proper valve positions in various operational modes at a glance. Valves out of their required positions (for normal operation or an ECCS signal) will be flagged to the operator by a flashing light. New valve status lights have been added on the ESF panel. These changes were made in response to Human Engineering discrepancies identified during the control room review.

The ECCS light box modification (EDCR #85-25) experienced problems during installation. Stray voltage was found at the light box which was later identified as an induced voltage from the long wire runs for individual valve position indication. Grounding the system eliminated this problem. Additionally, problems were experienced in the software for the light box. Special Functional Tests were developed for testing the light box. The inspector witnessed portions of these Special Functional Tests.

The inspectors also reviewed the annunciator alarms for plant conditions during daily walkdowns of the control room. No unacceptable conditions were identified.

c. Shift Manning

The inspector reviewed the requirements for refueling operations. Technical Specifications Section 5.2.2 requires that core alterations be directly supervised by a senior reactor licensee individual who has no other concurrent duties. The two persons on each shift that possess a senior reactor operators license are the Shift Operating Supervisor (SOS) and the Plant Shift Supervisor (PSS). The SOS becomes the Fire Brigade Team Leader in the event of a fire. The PSS has overall responsibility for the site at all times. Since fuel movement stops during an emergency situation (such as a fire), the SOS has no concurrent responsibilities and was assigned to supervise fuel movement during the refueling. The inspector held discussions with licensee management on this topic and all concerns were satisfactorily resolved.

d. Radiation Protection Controls

Radiation Protection control areas were inspected. Radiation Work Permits in use were reviewed, and compliance with those documents, as to protective clothing and required monitoring instruments, were inspected. Proper posting and control of radiation and high radiation areas was reviewed in addition to verifying requirements for the wearing of appropriate personnel monitoring devices. There were no unacceptable conditions identified.

e. Plant Housekeeping Controls

Storage of material and components was observed with respect to prevention of fire and safety hazards. Plant housekeeping was evaluated with respect to controlling the spread of surface and airborne contamination. There were no unacceptable conditions identified.

f. Fire Protection Prevention

The inspector examined the condition of selected pieces of fire fighting equipment. Combustible materials were being controlled and were not found near vital areas. Selected cable penetrations were examined and fire barriers were found intact. Cable trays were clear of debris. No abnormal conditions were identified.

During the refueling outage, numerous jobs involving cutting, welding and grinding were conducted. The majority of these jobs were conducted by contractor personnel. The licensee's procedures control the conduct of these jobs. The inspector reviewed a variety of job sites for proper posting of welding permits, a proper fire watch stationed, fire extinguishers available, and cleanliness of the area. Several minor discrepancies were identified and resolved. In general, the contractors were adhering to Maine Yankee procedures.

g. Control of Equipment

During plant inspections, selected equipment under safety tag control was examined. Equipment conditions were consistent with information in plant control logs.

h. Plant Operations Review Committee (PORC)

The inspector attended the Plant Operations Review Committee (PORC) meeting on September 11, 1985. Technical Specification 5.5 requirements for required member attendance were verified. The major topic discussed was the ammonia flushing of the steam generators to chemically remove copper plated on the tubes. Although all members of the PORC had not reviewed the procedure prior to the meeting, it was reviewed in detail at the meeting. The following aspects were discussed by the committee:

1. Protective lineups and status of the steam generator and adjacent systems.
2. Administrative controls for temporary equipment installation and removal.
3. Responsibilities for actions prescribed by the procedure.



4. Specific lineup for system restoration.
5. Interference with other scheduled work on a Main Steam System valve.
6. Requirements for release of waste generated by this operation.
7. Personnel safety hazards.

The discussion and the resultant procedural changes prescribed by PORC increased the procedure's clarity by defining responsibilities and adding more prescriptive administrative controls. The inspector had no further comments.

i. "B" Train Recirculation Actuation Signal Energized

On August 31, 1985, the "B" train Recirculation Actuation Signal (RAS) was inadvertently energized causing motor-operated valves to realign the containment spray pump suction from the RWST to the containment sump. The cause of this event was determined by the licensee to be due to de-energizing Safety Injection Actuation Signal (SIAS) "B" train for safeguard relay cleaning, thereby clearing the blocks on the Containment Spray Actuation Signal (CSAS) and RAS. No CSAS actuation occurred because containment pressure was well below the automatic setpoint. However, because of the valve realignment, water was transferred from the refueling cavity to the containment sump via LPSI pump vents left open from an ECCS flow test performed on August 27, 1985.

The inspector discussed the reportability of this event under 10 CFR 50.72 with the licensee. The licensee's position that the RAS is not considered an ECCS actuation was compared to Technical Specifications requirements and the FSAR, and determined to be acceptable.

A Procedure Change Request has been written to correct both the Safeguard Relay Cleaning Procedure (to de-energize CSAS and RAS before SIAS) and the ECCS Flow Test procedure (to include LPSI pump vents in restoration lineup). The inspector discussed other minor discrepancies in the ECCS Flow Test with the licensee. These items were satisfactorily resolved. No other concerns were identified.

j. Degraded Support Hanger on Suction Line

On September 6, 1985 the licensee identified a degraded support hanger on the suction line to an AFW pump (P-25A). This suction line also cross-connects to the other motor driven AFW pump (P-25C). The hanger studs go through the concrete floor of the auxiliary feed pump room where they are secured with nuts. These studs and nuts were evaluated as a tripping hazard and were cut off even with the floor.

The discrepancy report (DR) which authorized the work was signed by the SOS who did not recognize the safety significance. A review of the DR indicates the description of discrepancy was inadequate and the originator failed to properly identify the affected system.

The licensee is presently reviewing DRs performed for personnel safety reasons for potential problems. No other concerns were identified. The inspector will continue to follow this item (IFI 50-309/85-20-01).

5. Observations of Physical Security

The resident inspector made observations and witnessed and/or verified, during regular and backshift hours, that selected aspects of the security plan were in accordance with the regulatory requirements, the physical security plan, and approved procedures, as noted below.

a. Physical Security Plan

Observations and personnel interviews indicated that a full time member of the security organization, with authority to direct physical security actions, was present as required.

Manning of all three shifts was observed to be as required.

b. Physical Barriers

Selected barriers in the protected area, the access controlled area, and the vital areas were observed and random monitoring of the isolation zone was performed. Observations of truck and car searches were made.

c. Access Control

Observations of the following items were made:

- Identification, authorization and badging
- Access control searches
- Escorting
- Communications

d. Outage Related Security Compensatory Measures

During the outage, the security force was required to provide compensatory measures for systems removed from service. The inspector reviewed the compensatory measures and found them satisfactory.

No violations were identified.

## 6. Surveillance Testing

The inspector observed portions of Type B & C Local Leak Rate tests, and the calibrations of the thermal margin/low pressure instrument, pressurizer pressure instrument and wide range nuclear instrumentation to assess performance in accordance with approved procedures and LCOs. Test results, removal and restoration of equipment, and deficiency review and resolution were also reviewed. In addition, numerous calibration tests were reviewed and witnessed during special functional testing reported in Inspection Report 85-28.

### a. ECCS Operational Pump Flow and Check Valve Testing

The purpose of this test is to ensure that the ECCS systems can attain flow values used in the safety analysis. Header Stop Valves are tested to verify stroke times are within acceptable limits under full flow conditions.

A portion of the ECCS Operational Pump Flow and Check Valve Testing (Procedure No. 3.1.15.3) was witnessed. This included independently verifying selected initial conditions, discussions with test personnel, and reviewing data and test results.

One initial condition required flow and pressure indicators to be calibrated within 90 days. The "A" and "B" HPSI pressure indicators had calibration stickers dated 8 months prior. The RO controlling the test stated that the instruments had been recently calibrated. A review of the calibration sheets maintained by the I&C department indicated that they had been calibrated within 90 days as required. The I&C department replaced the calibration stickers with ones indicating the correct date of calibration.

The test procedure did not contain acceptance criteria for the valve stroke time tests. The test did however require a Plant Engineering Department review per procedure 3.17.8.4 which does require a comparison of valve stroke times with established acceptance criteria. The inspector compared the data against the acceptance criteria and found no discrepancies. As part of the licensee's engineering review, a recommendation was made to incorporate the acceptance criteria into the procedure. Test personnel appeared knowledgeable and adherence to the procedure was maintained. No other concerns were identified.

### b. Cold RTD Response Time Testing

The licensee has implemented a periodic test program to verify the response characteristics of RTDs. This testing is not a license requirement but is used to determine sensor degradation. Cold testing is done to detect any irregularities in the RTDs prior to plant heatup. Hot response time testing is performed at normal operating temperature.



The method used to test RTDs, both hot and cold, causes the RTD to generate heat. Because there are two RTDs in a well (each associated with a different RPS channel) the heat generated by one RTD effects another RPS channel. A safety evaluation was performed by the licensee and a 5 degree temperature increase in the RTD in the same well as one being tested was found to be within the bounds of the safety analysis. Adequate controls are contained in the test procedure to ensure that the 5 degree increase is not exceeded without protective action. The inspector had no further concerns.

#### 7. Maintenance

Numerous maintenance jobs were worked during the outage including preventive maintenance and repairs to auxiliary feed pumps, limitorque motor operators, and various service water and main steam valves.

During this outage the #2 RCP Motor is being replaced with a spare motor. This replacement is part of a preventative maintenance program. The motor will be refurbished and used to replace another RCP motor during the next outage.

The inspector observed the movement of the RCP motor from the foundation to the loading platform. The control and coordination of the movement was good. The HP technician took appropriate actions to ensure RWP requirements were met.

The procedure was reviewed and found to contain adequate precautions to prevent movement of the heavy load over the reactor vessel.

#### 8. Steam Generator Eddy Current Inspection

During the refueling outage the licensee conducted an eddy current inspection of number 2 steam generator as a part of the routine technical specification required testing. An initial sample size of 514 tubes was selected for inspection. Additionally, 510 tubes in the steam blanket area of the generator were selected for inspection since pitting corrosion was suspected in this area based on the industry results of eddy current inspections. Based on the results of the initial inspection, the scope of the eddy current program was expanded to encompass additional tubes in #2 steam generator as well as a sampling of tubes in generators 1 and 3.

Of the initial sample of 514 tubes in #2 steam generator, two tubes were found to meet the plugging criteria. The sample size was doubled in accordance with Technical Specifications and 1028 tubes were inspected. Seven tubes in this sample were identified as requiring plugging. The sample size was again doubled in accordance with T.S. to 2056 tubes. Of this sample, seven tubes required plugging. Eddy current inspection at this point had satisfied the T.S. requirements.

The licensee determined that additional testing was warranted to determine the extent of tube degradation in the other steam generators. The licensee discussed their plans to expand the eddy current inspection program with the NRC Region I office and the resident inspector. The plan was to continue sampling #2 steam generator as time allowed and to sample approximately 1000 tubes in generators 1 and 3. Based on the results of these inspections, the licensee would consider expanding the testing program.

As a result of this inspection program, 1816 tubes were inspected in #1 steam generator, 4960 tubes were inspected in #2 steam generator and 2063 tubes were inspected in #3 steam generator. A total of 23 tubes were required to be plugged because of pitting in the tubes. An additional 8 tubes were required to be plugged in the vertical strap region.

The defects found in the vertical strap region were initially thought to be a vibration induced circumferential cracking of the tube. This type of indication was considered serious since it indicated a new defect phenomena and had the potential for catastrophic failure of the tubes. Additional examinations using a different probe and evaluation technique were conducted. The results of these inspections revealed that the failure mechanism was not a circumferential crack. Instead, the eddy current test revealed that the tubes in question appeared to be wearing at the scallop support bar in the long horizontal run tubing. The wearing occurred where the upper part of the tube rubbed against the underside of the scallop support bar. Wearing of this type is not believed to cause catastrophic tube failure. The licensee intends to continue monitoring this area during subsequent eddy current inspections.

No violations were noted.

9. TMI Action Plan Items (NUREG-0737)

- a. II.E.1.1.1. (update) Short term system modifications to the auxiliary feedwater system. This item required the licensee to implement the changes required to provide redundant level instrumentation and low level alarms for the Auxiliary Feed Water primary water source. The demineralized water storage tank (DWST) is a stable reserve of emergency feedwater. It has level indication and alarms in the control room and local indication on the tank. The licensee maintains that DWST instrumentation and alarm in the control room are not required to prevent or mitigate an accident, and therefore the redundancy of instrumentation and alarms is not warranted. This item is presently under review by NRR.

- b. II.F.1.4,5&6 (closed) Accident monitoring for containment pressure, water level and hydrogen concentration. A safety evaluation report dated June 17, 1983 concluded that the licensee has met all the requirements for these three items, and the design for these items is acceptable. A review was made to verify that installed instrumentation is consistent with that described by the S.R. No concerns were identified.

10. Exit Interview

Meetings were periodically held with senior facility management to discuss inspection scope and findings.