

DCS NO. 50-309-820715
50-309-820819
50-309-821003
50-309-821016
50-309-821021
50-309-821119
50-309-821209
50-309-821216

U. S. NUCLEAR REGULATORY COMMISSION
Region I

Report No. 82-26

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 Power Station

Inspection at: Wiscasset, Maine

Inspection conducted: November 29, 1982 - January 4, 1983

Inspectors: *P. Swetland* 1/7/83
P. Swetland, Reactor Inspector Date Signed

J. Wiggins 1/10/83
J. Wiggins, Reactor Inspector Date Signed

Approved by: *Robert M. Gallo* 1/19/83
R. Gallo, Chief, Reactor Projects Date Signed
Section No. 1A,DPRP

Inspection Summary:

Inspection on: November 29, 1982 - January 4, 1983 (Report No. 50-309/82-26)

Areas Inspected: Routine, regular and backshift inspections by resident and region-based inspectors (123 hours). Areas inspected included the control room, Turbine Building, Primary Auxiliary Building, Spray Building, Auxiliary Feed Pump Room, and the Reactor Containment Building. Activities/Records inspected included Plant Operations, Radiation Protection, Physical Security, Maintenance and Surveillance Testing, followup on TMI Action Plan Items, Followup of previous inspection findings, followup of licensee events, and followup on Confirmatory Action Letters.

Results: Of the eight areas inspected, no violations were identified in seven areas. One violation (failure to carry a radiation dose rate meter in a high radiation area, detail 3.d) was identified in the remaining area.

DETAILS

1. Persons Contacted

- R. Arsenault, Operations Department Head
- D. Boynton, Reactor Engineer
- J. Brinkler, Technical Support Department Head
- G. Cochrane, Health Physics Section Head
- R. Lawton, Director, Operational Quality Assurance
- W. Paine, Assistant to the Plant Manager
- R. Prouty, Maintenance Department Head
- R. Radasch, I & C Supervisor
- J. Temple, Security Supervisor
- E. Wood, Plant Manager

The inspectors also interviewed several plant operators, technicians and members of the engineering and administrative staffs.

2. Followup on Previous Inspection Findings

- a. (Closed) Violation (309/82-05-12) The licensee failed to station a shift technical advisor (STA) during a plant startup. The inspector observed the implementation of procedural controls during the December 1982 startup to verify that the STA was available prior to plant heat-up above 210°F. No violations were identified.
- b. (Closed) Followup Item (309/82-10-02) The licensee committed to review refueling water storage tank temperature and low pressure safety injection pump net positive suction head criteria as specified in Confirmatory Action Letter 82-20. The licensee's completion of these actions is detailed in paragraph 7a. This item is closed.

3. Review of Plant Operations - Plant Inspections

The inspector reviewed plant operation through direct observation throughout the reporting period. Except as noted below, 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

Control room process instruments were observed for correlation between channels and for conformance with Technical Specification requirements. No unacceptable conditions were identified.

b. Annunciator Alarms

The inspector observed various alarm conditions which had been received and acknowledged. These conditions were discussed with shift personnel who were knowledgeable of the alarms and actions required. Operator response was verified to be in accordance with procedure 2-100-1, Response to Panalarms, Revision 4, dated June 1979. During plant inspections, the inspector observed the condition of equipment associated with various alarms. No unacceptable conditions were identified.

c. Shift Manning

The operating shifts were observed to be staffed to meet the operating requirements of Technical Specifications, Section 5, both to the number and type of licenses. Control room and shift manning were observed to be in conformance with 10 CFR 50.54.

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, was inspected. Proper posting and control of radiation and high radiation areas was reviewed in addition to verifying requirements for wearing of appropriate personnel monitoring devices.

On December 6, 1982, the inspector observed two personnel performing reactor coolant system leak inspections inside the containment building. This job requires general access to most areas of the containment. Although the containment has several areas where radiation dose rates exceed 100 mrem/hr and is posted as a high radiation area, these personnel did not carry a continuously reading radiation dose rate monitoring device nor was their exposure being controlled by a qualified health physics (HP) technician as required by Technical Specification 5.12. The inspector left the high radiation area with these personnel and reviewed the radiation work permit (RWP) which authorized their containment entry. The RWP (#82-12-166) listed general area dose rates up to 500 mrem/hr and specified the use of a radiation survey meter to control personnel exposure. Both

personnel had signed this RWP prior to entering the containment, but neither took note of the survey meter requirement. The inspector determined from pocket-reading ionization chamber readings before and after this entry that these personnel received 40 and 20 mrem whole body exposure. The small actual exposure to these personnel was fortuitous and not the result of their bonafide concern to control their personal exposure. The failure to observe the requirements of TS 5.12 as implemented by procedure 9-1-10, Revision 12 constitutes a violation. (309/82-26-01).

The inspector brought this item to the attention of the HP Section Head and the Assistant Plant Manager on December 6, 1982. The apparent lack of adequate concern for self-monitoring, displayed by the individuals involved, was emphasized.

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. The inspector observed fire brigade participation in a fire drill conducted on December 17, 1982.

During plant heatup on December 6, 1982, with reactor coolant temperature about 500 F., a two-foot section of lagging on the reactor coolant loop 3 piping began to smoulder. The lagging had been saturated with oil during maintenance on the #3 reactor coolant pump motor lubricating oil system.

Upon identification of this situation, fire brigade members were dispatched to the scene where the smouldering lagging was removed to a closed 55 gallon drum and taken outside the containment building. Airborne radioactivity surveys showed no increase in radiological hazard. The licensee reinspected the containment building to identify any other hazardous conditions. None were identified. Since the containment had already been closed and the purge system isolated for containment integrity, a noticeable concentration of smoke collected inside the building. Since the plant is currently prohibited from on-line purges this smoke could not be cleared. The licensee eventually obtained containment atmosphere samples and established a six hour administrative time limit on containment entries, based on a higher than normal carbon monoxide level.

The licensee plans to purge the containment during the next cold shutdown period or when the restrictions for on-line purging are lifted.

No violations were identified.

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. Equipment Lineups

The inspector verified during preparation for plant startup that the operability of emergency safeguards systems had been restored. Observation of control board and power supply alignments and valve lineups in the containment, auxiliary and turbine buildings were conducted to insure the operability of the safety injection, containment spray, auxiliary feedwater and emergency power systems. The inspector also observed the correct lineup of selected containment boundary isolation valves. No violations were identified.

i. Emergency Plan Exercise

On December 11, 1982, the inspector and other Region I personnel participated in the licensee's annual Emergency Plan exercise. Details of the NRC findings with regard to this exercise are included in NRC Region I Inspection Report 50-309/82-23.

4. Review of Plant Operations - Logs and Records

During the inspection period, the inspector reviewed operating logs and records covering the inspection time period against Technical Specifications and Administrative Procedure requirements. Included in the review were:

Control Room Log	- daily during control room surveillance
Jumper and Lifted Leads Log	- all active entries
Maintenance Requests and Job Orders	- all active entries
Safety Tag Log	- all active entries
Plant Recorder Traces	- daily during control room surveillance
Plant Process Computer Printed Output	- daily during control room surveillance
Night Orders	- daily during control room surveillance

The logs and records were reviewed to verify that entries are properly made and communicate equipment status/deficiencies; records are being reviewed by management; operating orders do not conflict with the Technical Specifications; logs detail no violations of Technical Specification or reporting requirements; logs and records are maintained in accordance with Technical Specification and Administrative Control Procedure requirements.

Several entries in these logs were the subject of additional review and discussion with licensee personnel. No unacceptable conditions were identified.

5. Observation of Physical Security

The resident inspector made observations, witnessed and/or verified, during regular and off-shift hours, that the selected aspects of the security plan were in accordance with regulatory requirements, physical security plans and approved procedures.

- Maine Yankee Security Plan, dated October 1979
- 15-1, Security Organization and Responsibilities, Revision 6.
- 15-2, Security Force Duties, Revision 9.
- 15-3, Plant Personnel Security, Revision 9.
- 15-7, Access Authorization and Control, Revision 2.
- 15-8, Protected Area Entry/Exit Control, Revision 2.

a. Physical Protection Security Organization

- 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 on various days was observed to be as required.

b. Physical Barriers

Selected barriers in the protected area, access controlled area, and the vital areas were observed and random monitoring of isolation zones 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
- Compensatory measures when required

No violations were identified.

6. Observation of Maintenance and Surveillance Testing

The inspector observed various maintenance and problem investigation activities. The inspector reviewed these activities to verify compliance with regulatory requirements, including those stated in the Technical Specifications; compliance with applicable codes and standards; required QA/QC involvement; proper use of safety tags; proper equipment alignment and use of jumpers; appropriate personnel qualifications; proper radiological controls for worker protection; adequate fire protection; and appropriate rctest requirements. The inspector also ascertained reportability as required by Technical Specifications.

The inspector witnessed the performance of surveillance testing of selected components to verify that the surveillance test procedure was properly approved and in use; test instrumentation required by the procedure was properly calibrated and in use; technical specifications were satisfied prior to removal of the system from service; the test was performed by qualified personnel; the procedure was adequately detailed to assure performance of a satisfactory surveillance; and, the test results satisfied the procedural acceptance criteria, or were properly dispositioned.

The following activities were reviewed:

- Repair of potential valve stem galling for Conval 2 1/2" valves (10/82)
- Hot Rod Testing (SP 3-6.2.1.19 Revision 4) conducted on 12/6-7/82
- Low Pressure Safety Injection Pump Flow Test (TP 4-58, Revision 0) conducted on 11/10/82
- Reactor Coolant System Hydrostatic Test (SP 3-17-6-3) conducted on 11/30/82 and 12/6/82

The licensee received notification, in accordance with 10 CFR 21, that seven 2 1/2" globe valves shipped to Maine Yankee from Conval Inc. may become inoperative due to valve stem galling. Licensee investigation indicated that these valves were received, but had not yet been installed in the plant. The valves were returned to the manufacturer for repair. Two of the valves have subsequently been installed in bypass lines around the main steam non-return valves. The inspector reviewed the licensee's receipt documentation and verified the operability of the installed valves. No inadequacies were identified.

7. Followup on Confirmatory Action Letters (CAL)

a. 82-20 RWST Temperature and Level/Safety Analysis Limits

On July 16, 1982, the licensee reported (LER 82-19) that the refueling water storage tank (RWST) temperature was being maintained above that assumed in the Safety Analyses which support cycle 6 operations. The 110°F, maximum assumed RWST temperature had been exceeded as a result of the site not being aware of this assumption in the analyses. This condition was identified during a study to raise RWST temperature to mitigate the possible consequences of a pressurized thermal shock event. A subsequent study on July 21, 1982 indicated that adequate net positive suction head (NPSH) may not be available for the low pressure safety injection (LPSI) pumps during the final stages of the post-LOCA injection phase if RWST temperature exceeded 86°F. As a result of this event, and another LER (82-23) which dealt with a deviation from the Main Steam Line Break analysis, NRC Region I issued CAL 82-20 to: (1) address the NPSH and RWST temperature issues, and (2) to address the recent cases of plant conditions and operating procedures not agreeing with safety analysis assumptions.

Action Item (1) in CAL 82-20 dealt with interim measures to maintain a RWST temperature and LPSI pump NPSH within analyzed operating conditions. These actions were documented in licensee letters dated July 27, 28 and 29, 1982 and were verified by NRC as documented in Region I Inspection Report 50-309/82-10.

Actions (2) and (3) confirmed the licensee's plan to reevaluate RWST level and temperature limits necessary to ensure adequate NPSH for all safeguards pumps and to describe how these limits would be implemented for the automatic or manual switchover from the RWST to the containment sump at the start of the post-LOCA recirculation phase. The licensee prepared test procedure 4-58, LPSI Pump Flow Test, Rev. 0, 11/5/82, to demonstrate adequate pump operation at the design conditions of: flow - 6000 gpm, RWST level - 38' (approx. 94,000 gal.), RWST temperature - 86°F and 120°F. To simulate the RWST temperature and level, the suction valve to the tested LPSI pump would be throttled to establish calculated pump suction pressures. The inspector reviewed the test procedure for its technical adequacy, made independent calculations of the suction pressure setpoints and reviewed the test data.

Step 4.8 of the LPSI Flow Test procedure, which involved a suction pressure reduction to simulate an RWST temperature of 120°F, was not performed. The plant shift superintendent (PSS) and the Yankee Nuclear Services Division cognizant engineer determined that Step 4.8 was not necessary because the existing RWST level after completion of

Step 4.7 already achieved this simulated condition. The step in the procedure was marked N/A and initialled by the PSS and the cognizant engineer. No other procedure change was processed. Consequently no review of this procedure modification was performed by the onsite review committee (PORC). The inspector discussed this discrepancy with plant management on November 30, 1982. It was determined that the PSS thought it was permissible to delete this step by annotating the procedure and initialling the step. This was not, however, a consistent view of all PSS's nor were the procedural controls formally established to specify the correct operator use and management review of the term "not applicable". On December 1, 1982, the licensee prepared a formal procedure change report which was reviewed and approved by PORC the same day.

The inspector stated that although subsequent review of this procedural modification has shown that adequate performance of this test was achieved (including the desired result from step 4.8), it was not clear that in another situation the same level of quality would be achieved, because no uniform method for controlling such a change is formalized. The licensee committed to review his procedural controls in this area and to implement corrective action by March 31, 1982. The inspector will review the completion of this action in a subsequent inspection. (309/82-26-02).

The LPSI Pump Flow Test Report dated November 30, 1982, concluded that pump flow characteristics were achieved which meet or exceed the worst case accident analysis conditions, including RWST temperature $\leq 120^{\circ}\text{F}$. The licensee is currently evaluating this report but has maintained procedural control of RWST temperature to less than 86°F pending the results of this evaluation. The technical details of this test report were reviewed by NRC Region I. No further questions were identified.

Action (4) of the CAL confirmed the licensee's commitment to identify and resolve any differences between plant operating parameters and the plant safety analysis assumptions. As of 12/2/82, the limiting safety system setpoints (LSSS) in Section 2 of the technical specifications had been verified. The licensee's program is expected to take about six months to complete. This program and its results will be followed in subsequent inspections. (309/82-26-03).

b. 82-27 Equipment Tampering Event

On November 18, 1982, the licensee reported the occurrence of malicious tampering with the lube oil reservoir for the No. 1 Reactor Coolant Pump (RCP) Motor. Metal chips which were not associated with ongoing maintenance at this location were found in this reservoir in which the upper RCP Motor bearings are housed. Upon notification of this event, NRC Region I followed the licensee's event response including certain actions documented in CAL 82-27. The CAL confirmed the licensee's planned or completed actions designed to determine the scope of other

possible tampering and to ensure the operability of critical plant components and systems. These actions included: (1) re-verification of the operability of safety-related systems required by Technical Specification while in the refueling mode; (2) visual examination of systems which were opened or in which work was performed during the 5 days preceding the event; (3) verification, prior to startup, of the operability of those safety significant systems required for operations; and (4) increased surveillance of plant areas in which the equipment discussed in (3) above is located.

Since November 18, the inspectors have followed the progress of both the licensee's and NRC's investigation efforts. Additionally, the inspectors have verified licensee conformance to the individual actions in CAL 82-27.

Regarding Action (1), the licensee verified the operability of the residual heat removal system and its supporting systems. The inspectors reviewed the method used for this verification and assessed the adequacy of the tests performed. No inadequacies were identified.

For Action (2), the licensee prepared a list of those applicable maintenance actions performed during November 13-18. For those systems closed during the 5 day period, the licensee took credit for routine responsible engineer or QC pre-closure inspections. On December 1, the inspector questioned the adequacy of these inspections because it was unclear whether system closure was effected immediately after these inspections. On December 2, the licensee indicated that, for those systems in question, either flow had been satisfactorily established or the specific valves involved had been satisfactorily cycled after the time of closure. For those systems opened during November 13-18 and closed after November 18, the licensee stated that a Maine Yankee employee had been assigned to perform the required inspections and to remain on station to witness system closure. No further indications of tampering were identified.

For Action (3), the licensee prepared a memorandum listing those systems requiring testing. The list included those critical systems described in the CAL action items with the exception of the reactor protection system. Operability checks were successfully completed on those systems listed prior to December 1. The RPS will be checked as part of the licensee's pre-startup check procedures. Further, the electrical power supply and control cabinets for these systems were visually examined for evidence of tampering. No further inadequacies were identified.

For Action (4), the inspectors reviewed the licensee's security surveillance program instituted following the tampering event and examined patrol team composition and patrol frequency. As a result

of this review additional measures were implemented to increase the effectiveness of the surveillance program. No further inadequacies were identified.

During the plant startup in December 1982, all equipment operated properly and no further instances of tampering were identified. On December 15 and 21, 1982 the licensee submitted reports on the status of his preliminary review of this event and his plan for a detailed evaluation and recommendations for measures to prevent and respond to further events of this nature. This evaluation is to be completed by July 31, 1983. The results of the licensee study will be reviewed by NRC Region I. (309/82-26-04).

8. Followup on TMI Action Plan Items

a. II.E.1.2.2.C.2 Auxiliary Feedwater (AFW) Flow Indication

As a result of modifications performed during the cycle 6/7 refueling outage, the inspector determined that the auxiliary feed pump room has been isolated from postulated harsh environmental conditions in the pipe tunnel below it. The AFW flow indication equipment is now adequately qualified. This item is closed.

b. II.E.4.1.2 Dedicated Hydrogen Penetrations

The inspector verified the installation of reach rod operators, in the accessible AFW pump room, for manual valves in the hydrogen purge system. Additionally, during the cycle 6/7 refueling outage, dedicated pipe connections for installation of an external hydrogen recombiner were installed to meet the requirements of 10 CFR 50.46. The inspector reviewed this installation (Plant Design Change 20-82). This item is closed.

c. II.K.3.25 Power on Pump Seals

The licensee's present design adequately maintains reactor coolant pump seal integrity during loss of off-site power events. Consequently, no modifications were required. By letter dated December 22, 1982, NRC accepted the licensee's position. This item is closed.

9. In-Office Review of Licensee Event Reports (LERs)

The inspector reviewed the following LERs received in the RI office to verify that details of the event were clearly reported including the accuracy of the description of cause and adequacy of corrective action. The inspector also determined whether further information was required from the licensee, whether generic implications were indicated, and whether the event warranted on-site followup. The following LERs were reviewed:

- 82-36 Overloaded Main Feed Line Spring Hangers
- 82-37 Failure of Snubber Rod-end Bushing
- 82-38 Residual Heat Removal Pump Power Supply Operability

10. On Site Followup of LERs

During on site followup, the inspector verified that reporting requirements of Technical Specifications and Regulatory Guide 1.16 had been met, that appropriate corrective action had been taken, that the event was reviewed by the licensee as required, and that continued operation of the facility was conducted within Technical Specification limits. The review included discussions with licensee personnel, review of PORC meeting minutes, and applicable logs. The following LER was reviewed:

-- 82-33 Spent Fuel Pool Rack Swelling

On October 21,22 and November 4, 1982, the licensee reported in LER 82-33 indications of bulging in the cells of **the oldest design** (Phase I) spent fuel racks installed at the facility. Twenty-one of the 290 Phase I cells showed visual or test indications of bulging of the aluminum clad BORAL poison plates, in either the inward direction (toward fuel) or both directions. The inspector reviewed the status of the problem and its resolution with a licensee representative on November 20. Further, the inspector visually examined an affected cell stored in the RCA Storage area.

Testing has been completed on the applicable racks. Fifteen (15) unoccupied and six (6) occupied cells showed evidence of inward bulging. No fuel assembly, however, was totally bound in a cell. Investigation by the licensee and the vendor for the racks indicate that the probable cause was hydrogen gas generation resulting from an aluminum-water chemical reaction in the Boral matrix. The water source has yet to be positively identified, but investigation continues.

A reactivity analysis performed by Yankee Nuclear Services Division (YNSD) showed that a $K_{eff} \leq .95$ is maintained with 0 ppm soluble boron in the spent fuel pool water, 3.3% fuel enrichment, 68°F pool temperature and an assumed voiding of the neutron flux trap (caused by the ballooning of the Boral plates) of up to 92.5%. A similar analysis using the normal pool boron concentration of 1720 ppm results in an additional 30% reduction in K_{eff} . The magnitude of ballooning for each fuel rack is not known, however, based on the observed racks, neither the radius or length of the bulges approach a 92.5% void. The licensee plans to vent the 21 affected cells to outgas the hydrogen, relax the bulging and prevent further voiding.

No Schedule for accomplishment was available.

The licensee intends final resolution of the problem by replacement of these old racks with racks of the new design specified for the high-density storage modification, presently in the NRC hearing process. The rack venting operation and the final determination of the cause of the water inleakage will be followed in subsequent inspections (309/82-26-05).

11. Followup of Events Occurring during the Inspection

- a. On December 9, 1982, while conducting low power physics testing for cycle 7 plant operations, the licensee determined that non-conservative high nuclear power reactor trip setpoints were used during physics testing. Because of the cycle 7 low leakage core design, the neutron flux at the excore nuclear instrumentation was reduced by about 17%. This reduction would cause the high nuclear power trip to actuate 17% higher than the assumed setpoint in three accident safety analyses. Upon identification of this situation the licensee biased the nuclear power signal by 17% to restore the assumed conditions. A complete excore instrumentation calibration was completed prior to exceeding 50% power. The high startup rate trip channel was operable during this event and a loop differential temperature equivalent power signal auctioneered with the excore detector signal to the high power trip was available throughout the event. The licensee reported the event to the inspector and NRC Region I on December 9, 1982.
- b. On December 16, 1982, during a plant startup with about 29 MW of plant power loads being supplied by the offsite power grid, the licensee placed one of two offsite power lines out of service for maintenance. Upon divorcing the line, incoming bus voltage dropped from 115 KV to 109 KV and safeguards bus voltage dropped from 4.16 KV to 3.75 KV. Amperage on running safeguards pumps rose to abnormally high values and pump operating temperatures began to rise. Plant operators took action to restore the isolated offsite power line within an hour of the occurrence. As a result of this occurrence, licensee and NRC investigations into the adequacy of the offsite supply are on-going. Only one offsite 115 KV line is required by technical specifications. The licensee has issued operations orders directing that both offsite power lines be maintained until this problem is resolved. This action insures that collectively at least one fully capable 115 KV line is available. The inspector verified the implementation of these administrative controls including operator understanding of the event. The adequacy of the individual offsite power lines will remain unresolved pending NRC review of the cause of the event and evaluation of the present offsite power specifications. (309/82-26-06).

12. Unresolved Items

Unresolved items are matters about which more information is required in order to determine whether they are acceptable items or items of noncompliance. Unresolved items identified during this inspection are discussed in paragraph 11b.

13. Exit Interviews

At periodic intervals during the course of the inspection, meetings were held with senior facility management to discuss the inspection scope and findings.