U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report: 50-245/84-26 Category C Licenses: DPR-21
50-336/84-24 DPR-65

Licensee: Northeast Nuclear Energy Company

Facility: Millstone Nuclear Power Station

Inspection At: Millstone Unit 1 & 2

Inspection Dates: October 28 through December 8, 1984

Inspectors: Ebe McCabe, for
John T. Shedlosky, Senior Resident Inspector — December 19, 1984

Ebe McCabe, for
David R. Lipinski, Resident Inspector — December 19, 1984

Approved by: Ebe McCabe
E. C. McCabe, Chief, Reactor Projects Section 3B — 12/21/84 Date Signed

Inspection Summary: Routine NRC resident inspection (136 hours) including: evaluation of plant operations, equipment alignment and readiness, radiation protection, physical security, fire protection, plant operating records, maintenance and modifications, surveillance testing and calibration, and reporting to the NRC. Reconstitution activities involving irradiated Unit 2 fuel were reviewed included compliance with procedures, special nuclear material accountability and worker radiation protection. Particular attention was directed to the actions taken by the licensee to correct deficiencies following Unit 2 reactor trips. No violations or unacceptable conditions were identified.

DETAILS

1. Summary

The inspector reviewed plant operations through direct inspections and observations of Unit 1 and 2 throughout the reporting period. This review also included the licensee's implementation of radiation protection and station security requirements in addition to operationally oriented activities such as the conduct of control room evolutions, the alignment of engineered safety systems, the conduct of maintenance and surveillance testing, and the completion of reporting requirements.

a. Plant Status

Unit 1:

The plant operated at full power during this inspection period with the exception of planned power reduction for surveillance testing and preventive maintenance.

Unit 2:

The reactor was operated at full power during the inspection period but experienced two reactor trips. The first, at 0932, November 15, ended a 271 day turbine online period and occurred from full power due to the closure of the No. 1 Steam Generator Main Steam Isolation Valve (MSIV). All systems performed properly following the reactor trip.

The MSIV shut when piston seals failed in the air powered valve operator. The reactor tripped due to reaching the thermal margin/low pressure setpoint following the valve closure. This was caused by the higher Reactor Coolant System cold leg temperature associated with valve closure resulting in an increased Reactor Protective System low pressure setpoint. The reactor was made critical at 0900, November 17 and was returned to full power at 1145, November 20.

The MSIV actuator seal failure was considered by the licensee to be an end of life one. The actuators had been rebuilt during the 1983 refuel/maintenance outage. As corrective action, the seals were renewed in the valve opening actuator and test actuator of both MSIVs.

The second reactor trip, a manual one, was at 1942, November 28 from 62 percent power during a plant shutdown due to high level in the "5A" feedwater heater. The licensee expected to be required to manually trip the reactor at about 50 percent power for turbine protection. At that point, the heater was expected to flood since there would be less pressure available to force the heater to drain, and a trip was performed to assure that water backing up in the extraction steam lines would not damage the turbine blades.

Following the trip of the steam driven feedwater pump, the No. 2 Steam Generator feedwater check valve, 2-FW-5B, apparently remained partially open. This prevented full auxiliary feedwater flow from being applied to that Steam Generator. Operators observed that steam generator level was not recovering and shut remote manual valves upstream of the feedwater check valve. Auxiliary feedwater flow then restored steam generator level.

Auxiliary feedwater had been manually initiated when, following the reactor trip, the running main feedwater pump became vapor bound. At that time the condensate and feedwater systems were in their normal post trip equipment lineup with one high pressure condensate and one feedwater pump running. However, to reduce leakage through ruptured tubes of the "5A" feedwater heater, the condensate pump minimum flow valve was opened manually, bypassing 1000 gpm, to reduce condensate pump discharge pressure to 440 psig, 120 psi below the normal 560 psig condensate header pressure.

When the speed of the steam driven main feedwater pump was reduced to minimum, steam generator water at a higher pressure than pump discharge pressure may have blown back through the stuck open check valve and vapor bound the pump. At that time, increasing pump speed had no effect because pump discharge pressure remained near condensate header pressure. Also, steam hammer occurred in the feedwater pump minimum flow recirculation line to the condenser.

The check valve had stuck in the open position because of excessively tight shaft packing. The licensee had experienced some steam leakage during the operating cycle and tightened the packing follower.

The licensee conducted special testing of this valve per procedure T84-36 and determined it to be operable prior to reactor startup. The reactor was made critical at 1215, November 29, and was returned to full power at 0335, December 3.

An additional discussion of this event is under "Inspection Findings", report paragraph 1.b.(3).

b. Inspection Findings

Unit 1:

(1) Containment Isolation Function in Sample Lines

The licensee conducted a review of the Post Accident Sample System (PASS) and found that the valves added to support this modification in liquid sample lines were not provided with an automatic closure function for containment isolation.

These lines were added to allow PASS sampling of torus water through the Low Pressure Coolant Injection System and also to provide a common return for all liquid samples to the torus.

The PASS system valves with a containment isolation function are remote manual valves and are positioned from the main control room. A key-lock switch electrically locks these valves closed. To allow drawing a sample, that key-lock must be positioned to open permissive. A main control board annunciator is activated with this switch position.

Although this design is consistent with the NRC Standard Review Plan, NUREG-0800, Section 6.2.4, Containment Isolation, the Technical Specifications sections 1.N.1 and 3.7.A.3 require that all manual containment isolation valves on lines connecting to the reactor coolant system (not required to be open during accident conditions) are closed when the reactor is critical or its water temperature is above 212 degrees F. Because of the present Technical Specification, on November 5, the licensee committed to suspend liquid PASS sampling which had been done for a quarterly (non-Technical Specification) surveillance test.

The licensee is planning to resolve this issue to allow testing the PASS system. This may be accomplished by adding automatic closure logic to these valves, making them automatic containment isolation valves. Or, a Technical Specification amendment might be appropriate, including lists of manual containment isolation valves which may be opened on an intermittent basis under administrative control, as stated in NUREG-0123, Standard BWR Technical Specifications, Table 3.6.3-1.b. Such a provision is not presently contained in the Unit 1 Technical Specifications.

The licensee has established a prohibition against liquid PASS sampling when primary containment integrity is required. Because of this action, the licensee has resolved any conflict with regulatory requirements.

The PASS liquid sample point from the "A" recirculation loop and the containment atmosphere sample points are the original plant design locations and are provided with a Group I Isolation and Isolation Bypass functions.

The inspector noted that, although the recirculation loop sample line isolation valves are called out in Technical Specification Table 3.7.1, the containment atmosphere sample line isolation valves are not. This table should be updated during a future Technical Specification revision. This is an open item (245/84-26-01).

(2) Emergency Gas Turbine Generator - Failure of Gasket at Mechanical Fitting on Air Start Line

The Emergency Gas Turbine Generator (EGTG) was removed from standby service at 1100, October 29 when a gasket failed at a mechanical union on the turbine air start line. The mechanical union is between an air operated starting air isolation valve and a pressure regulating valve. Operators were made aware of the gasket failure in responding to a trouble alarm indicating that the air compressor had started.

The failed gasket was in a line which is normally depressurized except during the EGTG starting sequence. A failed solenoid in an air pilot valve to an isolation valve, caused that valve to remain open. This pressurized the line in which the gasket failed.

The EGTG remained operable until starting air was isolated for repairs. It would have started on an automatic signal prior to that time. The solenoid failure opened one of the isolation valves. The other isolation valve, the pressure regulating valve, is also opened during the starting sequence. Therefore a latent or otherwise undetected failure of the EGTG did not exist.

The inspector reviewed the licensee actions following repairs; there were no unacceptable conditions identified.

Unit 2:

(3) Operability of Steam Generator Main Feedwater Check Valves

As previously discussed, following a November 28 plant trip, the No. 2 Steam Generator feedwater check valve, 2-FW-5B, remained partially open after a main feedwater pump trip. This provided a bypass flow path for auxiliary feedwater. At the time of the transient, operators shut remote manual valves in the feedwater pump discharge to establish auxiliary feedwater flow.

The check valve is equipped with a spring loaded actuator which is operated from the main control board by HS-5420. Spring pressure shuts the valve disc when the main control board switch is placed in the "closed" position or when a Main Steam Isolation safeguards actuation signal occurs.

Although HS-5420 was placed in the "closed" position during the transient, that apparently had no or little effect.

Additional discussions of operator actions are included under "Plant Status", report paragraph 1.a.

The check valve shaft packing follower, which had been tightened earlier during the operating cycle, was adjusted. That freed the valve disc.

A special test was performed per T84-36, Air Assisted Feedwater Check valve 5B Functional, Revision 0, dated November 30, 1984. During that test the feedwater check valve was exercised with main feedwater flow. The reactor was in hot standby (Mode 2).

Although the check valve appeared to close with feedwater flow reduced, it did not become leak tight until additional closing pressure was applied by the valve actuator when HS-5420 was placed in the "closed" position.

Although test T84-36 demonstrated the ability of the check valve disk to seat and stop back-leakage, the inspector does not consider that all of the issues concerning the November 28 transient have been fully resolved. There is a lack of positive control concerning packing maintenance of these check valves. Because functional testing may not be possible after that evolution, and an inoperable check valve may result in the loss of both steam generator secondary fluid and auxiliary feedwater flow to that steam generator, this is considered to be an Unresolved Item (336/84-24-01) pending receipt of additional information on valve design and maintenance practices.

(4) Nuclear Fuel Reconstitution

Twenty irradiated fuel assemblies were reconstituted in a process which substituted spacer rods for fuel rods with clad defects. To maintain material accountability among fuel pins and because of the potential for significant radiological hazards to personnel presented by handling irradiated fuel, the licensee required that their contractor develop and use detailed step-wise procedures.

Also to address these potential problems, the licensee provided full time personnel to independently maintain material accountability controls. Station Health Physics personnel monitored the work activities.

On several occasions the licensee or NRC personnel discovered that an activity was not consistent with established step-wise procedures. This resulted when personnel failed to follow procedures or failed to obtain a procedure change consistent with inplace administrative controls. In each case, the licensee issued a "Stop Work Order" which remained in effect until the incident and the corrective actions were reviewed by the Unit 2 Plant Operations Review Committee (PORC).

The inspector attended several Unit 2 PORC meetings during which reviews were conducted of fuel reconstitution activities. The inspector found that the PORC dealt with the problems in a forceful and forward manner. These reviews included the events requiring "Stop Work Orders" of which one was issued following the drop of a fuel pin on November 8. At that time, a pin fell from a handling tool into an inspection fixture. There was no fission gas release. The pin was retrieved and inspected. Although there were no defects found, the fuel pin was rejected "for cause." The licensee required that the fuel pin handling tools be inspected and evaluated; and that procedures be evaluated for changes in the possibility for and risk of a pin drop. Changes in tool design as well as to procedures resulted from these reviews.

Inspections 336/84-21 and 22 also document findings concerning the fuel reconstitution program. No unacceptable items were identified during the current inspection.

c. Change in the Status of Open Items

New Items:

Unit 1:

245/84-26-01, Include containment atmosphere sample line isolation valves in Technical Specification Table 3.7.1. Report paragraph 1.b.(1).

Unit 2:

336/84-24-01, Resolve operability of steam generator main feedwater check valves to insure full auxiliary feedwater flow. Report paragraph 1.b.(3).

Old Items:

336/84-21-01, (Closed) Corrective actions to ensure that proper whole body surveys are made as required. The inspector found acceptable radiation protection practices implemented during plant inspections.

336/84-21-02, (Closed), Corrective actions for radioactive material shipments. The inspector reviewed the additional controls placed on shipments of irradiated in-core detectors. These included the actions stated in a letter from the licensee to the State of South Carolina, Bureau of Radiological Health, dated November 13, 1984. There were no unacceptable conditions identified.

2. Maintenance Observations

The inspector observed portions of corrective and preventive maintenance to confirm that the work was conducted in accordance with regulatory requirements regarding the plant conditions, the maintenance activity and required retest. These included:

Unit 1:

-- Emergency Gas Turbine Generator air start isolation valve maintenance and gasket replacement of October 29.

-- Emergency Diesel Generator Mechanical Blower maintenance on November 19.

Unit 2:

-- No. 1 Steam Generator MSIV operating air cylinder, November 16,

-- Service Water pipe repairs, November 16,

-- Core Protection Calculator RPS Channel D, Thermal Margin/Low Pressure circuit, November 20.

3. Observation of Surveillance

The inspector observed portions of surveillance testing to confirm that the activity was conducted in accordance with regulatory requirements. These tests included:

Unit 1:

-- Emergency Diesel Generator Functional Testing per SP668.1 on October 30 and November 19.

-- RPS Manual Scram Functional per SP609.1 on November 28.

Unit 2:

-- Emergency Diesel Generator Functional Testing per SP2654, Section 7.4 of "A"-EDG on October 30 and of the "B"-EDG on October 30 and November 6,

-- RPS Matrix Trip Testing on November 9.

4. On-Site Safety Review Committee (Unit 2)

The inspector attended meetings of the Unit 2 PORC on October 29, November 1, 9, 15, 16, 21, 28 and 29. The inspector found that the conduct of the meetings met the requirements of Technical Specification 6.5.1 for committee membership, meeting frequency and fulfillment of responsibilities. The pre-

sentations elicited active questioning and discussions. Committee members presented an acceptably informed and critical overview of plant design and operations.

5. Transportation of Radioactive Materials (Unit 2)

The inspector observed the loading of the GE IF-300 shipping container with 53,200 Curies of Activated material on November 1. The shielded cask surveys, conducted prior to shipment on November 7, were also observed. There were no unacceptable conditions identified.

6. Exit Interview

At periodic intervals during the course of the inspection, meetings were held with senior licensee management to discuss the inspection scope and findings. At no time during this inspection was written material concerning inspection findings provided to the licensee by the inspectors.

Information which may have been proprietary and was addressed during this inspection period was discussed with licensee representatives. None of that proprietary information was included in this report.