U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 50-336/85-07

Docket No. 50-336 License No. DPR-65 Category C

Licensee Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06101

Facility: Millstone Nuclear Power Station, Unit 2

Location: Waterford, Connecticut

Dates: February 19 - March 15, 1985

Inspector: J. A. Robertson, Reactor Engineer — 3 APRIL 85 (date)

Approved by: E. C. McCabe, Chief, Reactor Projects Section 3B, DRP — 4/4/85 (date)

Inspection Summary:

Routine region-based safety inspection (87 hours) of refueling operations, steam generator nozzle dams, steam generator primary head hydrolazing, IE Bulletin 84-03, surveillance, and maintenance. No unacceptable conditions were identified.

DETAILS

1. Operations

a. Radiation Protection Controls

Radiation protection control areas were inspected. Radiation Work Permits in use were reviewed. Compliance with those documents as to protective clothing and required monitoring instruments was found acceptable.

Fifteen (15) randomly selected radiation protection instruments (i.e., friskers and portable survey instruments) were examined to determine if the appropriate scale was selected, power was on, and calibration was current. One frisker was reading approximately zero. The adjacent frisker was reading greater than 100 counts, as expected. The Health Physics office was notified and the non-reading frisker was replaced. The Health Physics office was also notified of background radiation on the turbine deck that was high enough that personnel would routinely have to reset the RM-3 Frisker. This was caused by airborne Cesium-138 from Unit 1. The fission gas entered through doors joining Units 1 and 2 turbine decks. This high background condition was evaluated to be an isolated case, which lasted for only a few hours. No unnecessary or high exposures were identified as a result of this transient condition.

b. Physical Security

During plant tours the inspector checked on whether plant security was being implemented in accordance with the physical security plan. Access controls for the protected area and designated vital areas, control of packages and use of identification badges were observed and found to be acceptable. Appropriate compensatory measures were in place when required.

c. Jumer/Bypass Control

A review was made of the jumper/bypass log maintained in the control room. Two systems are now in effect for handling jumpers and bypasses; one for those processed prior to February 1, 1985 and another (a new system) for those processed after February 1, 1985.

Jumper/bypass tag control sheets in effect were reviewed and found to be properly approved and reviewed by PORC. Audits had been documented as required.

Revision 3 to Administrative control Procedure ACP-QA-206B lists devices that are considered to be jumpers or bypasses. Previously, jumper/bypass tags were hung on items such as the spent fuel pool gate (because it did not meet the design drawing material requirements) and on lead used to shield a gaseous radwaste monitor to bring it on scale. The Operations Supervisor explained that this was done to document technical and safety reviews. No temporary plant design change system existed and, although the tags may be hanging in excess of a year, the associated changes are not intended to be permanent.

Revision 3 to the jumper/bypass control procedure requires audits to be performed quarterly and prior to mode changes. Those in effect for six months or longer are evaluated by the department head. They are cleared if no longer required, or made into design changes, or given a new estimated duration date. This instruction has not been applied to tags hung prior to February 1, 1985. Some of those have been in effect for several years.

The licensee's method of addressing tags hung prior to February 1, 1985 is an inspector follow item (IFI 85-07-01).

3. Steam Generator Nozzle Dam Installation

During the previous outage the licensee had problems with the steam generator nozzle dam installations. These were attributed for the most part to inadequate mockup and training by the vendor. The result was personnel exposures of four (4) times the estimated amount.

For the present outage the licensee has developed a more comprehensive mockup training program. That training includes a movie which covers past problems and how they were corrected, improvements to the nozzle dams, the installation and removal procedure, and injured worker rescue. The workers receive health physics training and mockup training in street clothes and then must qualify in the mockup while dressed in accordance with Radiation Work Permit requirements.

Installation of the nozzle dams on No. 2 Steam Generator Cold Leg B was observed. The effort was found to be well coordinated between the contractor and utility personnel, and demonstrated effective training.

No unacceptable conditions were identified.

4. Steam Generator Primary Head Hydrolazing

Hydrolazing (high pressure water jetting) was used to clean the primary heads of the steam generator in order to reduce the radiation hazards by removing surface contamination. This was an ALARA consideration for workers who would have to enter the primary head for nozzle dam installations.

The inspector reviewed the steam generator hydrolazing procedure and safety evaluation and attended the meeting in which they were reviewed by the PORC. A concern of the inspector and PORC members was limiting impingement pressure to a value consistent with the design bases. Calculations were performed assuming maximum design pressure of the hydrolazer pump (10,000 psi). These showed that impingement pressure would be well below the limit of 2500 psi. The actual pressures observed by the inspector at the hydrolazer nozzle was approximately 6000 psi or less. The inspector had no further questions on this aspect.

Another concern was that the water used for hydrolazing would dilute the boron concentration in the primary system. Licensee calculations indicated that, if the maximum possible amount of water were added continuously for 8 hours by the hydrolazing, the boron concentration would still not be reduced below the Technical Specification limit of 426 ppm for Mode 5, if the original concentration were greater than 1200 ppm. Procedural requirements require sampling for boron concentration every 4 hours while hydrolazing. Initial boron concentration was greater than 2000 ppm. The inspector had no further questions on this aspect.

Hydrolazing was not as effective as anticipated at reducing general radiation fields and hot spots. The table below summarizes the results in Rem per hour for general area radiation.

	No. 1 Steam Generator Hot Leg	No. 1 Steam Generator Cold Leg	No. 2 Steam Generator Hot Leg	No. 2 Steam Generator Cold Leg
Initial Survey	20	12	28	14
After Hydrolazing	20	12	19.8	13.2

The licensee will evaluate the need to further reduce radiation fields by chemically decontaminating the primary heads. This would reduce personnel exposures for eddy current testing, nozzle dam removal, steam generator tube plugging and sleeving, and steam generator secondary chemical cleaning. The determining factor will be how many steam generator tube sleeves must be done manually. The licensee has determined that a significant number of manual tube sleeve installations (greater than 200) would justify the chemical decontamination. The licensee estimated that this process would have a decontamination factor of 10 ± 5 and would add 15 days to the outage.

The inspector observed the hydrolazing of #2 Steam Generator primary head hot leg side from control point monitors. Actions were in accordance with procedural guidelines and RWP requirements.

5. Response to Bulletin 84-03

The licensee's response to IE Bulletin 84-03, "Refueling Water Cavity Seals," dated November 29, 1984, was evaluated to determine the potential for and consequences of a cavity seal failure.

Failure Mode Review

The Millstone Unit 2 refueling cavity pool seal is made up of flat steel plate that is reinforced with twelve radial stiffeners and one circumferential stiffener. This plate overlaps the reactor vessel flange and the refueling cavity floor and is bolted in place on the inner and outer edges. The seal is provided by two rubber seals in grooves on each edge of the plate. The seals are compressed as the bolts are tightened. This arrangement provides redundant rubber seals on the inside and outside edges. The credible seal failure mode was identified by the licensee as a small leak on the order of several gallons per minute.

The licensee had evaluated the consequences of a catastrophic failure of the outer redundant rubber seals and concluded that there would be adequate time available to place a fuel bundle in transit into a safe storage location (i.e., core, deep pit, spent fuel storage rack). This capability was demonstrated prior to fuel movement, using a dummy fuel bundle, per T85-11, Movement and Timing of a Fuel Assembly to a Safe Storage Location. The dummy fuel assembly was moved from the furthest position above the core to the south saddle (deep pit). This test was performed in approximately 12 minutes, well below the acceptance criterion of eighteen (18) minutes. The 18 minute criterion is based upon a 28 minute time period until receipt of a 2000 mR dose, with 10 minutes allotted to a delay period during which no action is taken. The inspector observed the demonstration and found it to be adequate. Later checks during actual fuel movement found the personnel involved to be fully knowledgeable of the governing procedure.

In the event of a cavity seal failure, the licensee has also concluded that dose rates in the control room would be acceptably low and that offsite doses would be well below 10 CFR 100 limits. (At the termination of draindown, the active fuel would remain covered by about one foot of water.)

The inspector reviewed the assumptions and calculations used to determine the flow rates and times to drain the refueling pool for the postulated failure. Overall, the method of calculation was found to be conservative. The flow rate was calculated for the maximum driving head and assumed to remain constant. No credit was taken for makeup in determining the drain time. These two factors add conservatism to the calculation for the time available to the operator to place a fuel assembly in transit in a safe storage location.

No unacceptable conditions were identified.

Seal Installations

Maintenance Procedure MP 2704B, Revision 4, Installation of Refueling Pool Seal, was reviewed. The procedure contained adequate instructions for inspecting the seal for signs of deterioration prior to installation. After installation, a pressure drop test must be satisfactorily completed prior to flooding the refueling cavity. The inspector had no further questions on seal installation.

Procedure for Mitigating Seal Failure

Abnormal Operating Procedure 2578, Revision 0, Loss of Refuel Pool and Spent Fuel Pool Level, prescribes action to be taken by Operations and Health Physics personnel. This procedure provides definitive instructions for placing fuel in a safe storage location, evacuating unnecessary personnel, and minimizing exposures. A table is provided that contains the following information:

a. Maximum leak rate,

b. Maximum level decrease rate,

c. Expected radiation levels, and

d. Time to start of boiling after level stabilizes.

The inspector concluded that the licensee has adequately evaluated the potential for and consequences of a failure of the refueling cavity seal, and that procedures to prevent and mitigate a seal failure are properly reviewed and approved.

6. Maintenance

a. Letdown Prefilter

The changeout of the letdown prefilter was observed. The prefilter was in a High Radiation Area and was reading approximately 300R on contact. The personnel involved were knowledgeable. Preplanning was effective at minimizing personnel exposures and airborne radioactivity. This was evidenced by a total exposure of 215 mR for this job, and no airborne radioactivity by air samples.

The old filter was pulled directly from the filter casing to a shielded cask for transporting to radwaste. The cask reduced rad levels to approximately 15-20 mR at the surface of the cask.

The RWP was reviewed and was found to contain sufficient detail for the scope of the work.

b. Repair of Transfer Tube Gate Valve (2-RW-280)

Repairs were required to the transfer tube gate valve due to galling of the stem and stem nut threads. NRC review of this maintenance included the following:

-- Replacement parts were consistent with original design specifications.

-- Certification requirements (Category 1) for replacement parts were in accordance with the Material, Equipment, and Parts List.

-- Material Accountability was maintained for tools and equipment used in the fuel canal.

-- RWP requirements were met.

No concerns were identified.

7. Surveillance

The inspector observed a portion of Surveillance Procedure SP 2605F, Revision 5, Leak Test of Containment Personnel Access Door Gaskets. This test was performed to demonstrate the personnel door operability prior to fuel movement. The volume between the door seals is pressurized to greater than or equal to 25 psig for at least 15 minutes. No detectable pressure decrease indicates a satisfactory seal. No concerns were identified.

8. Plant Tours

Plant tours were made on a daily basis throughout the inspection period. Observations were made of the ongoing activities including the following:

-- Refueling cavity seal installation.

-- Reactor vessel stud detensioning.

-- Reactor vessel head removal.

-- Fuel movements.

-- Fuel sipping.

-- Fire proofing cable penetrations.

-- Control point activities.

No concerns were identified.

9. Exit Meeting

The inspector met with the Unit Superintendent on March 14, 1985, and summarized the scope and findings of the inspection activities.