U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No.	50-423/87-30
Docket No.	50-423
License No.	NPF-49
Licensee:	Northeast Nuclear Energy Company P.O. Box 270 Hartford, CT 06101-0270
Facility :	Millstone Nuclear Power Station, Unit 3
Inspection At:	Waterford, Connecticut
Inspection Dates:	November 25, 1987 through January 15, 1988
Inspectors:	A. A. Asars, Resident Inspector, Haddam Neck J. T. Shedlosky, Senior Resident Inspector, Haddam Neck

Approved by: _____ 2/1/88
E. C. McCabe, Chief, Reactor Projects Section 1B — Date

Summary: Inspection 50-423/87-30 (11/25/87 through 1/15/88)

Areas Inspected: Routine on-site inspection (90 hours) of shutdown planning, plant operations, radiation protection, physical security, fire protection, surveillance and maintenance.

Results: Satisfactory performance was identified in all areas. An unresolved item (Detail 4.3) was opened pending issuance of an NRC Safety Evaluation Report on Safety Parameter Display System (SPDS) compliance with the facility license. Also, causing the SPDS display to change state when newly added indications exceed acceptable bounds remains an open item.

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DETAILS

1. Summary of Facility Activities

The reactor was shutdown for a refueling/maintenance outage during this inspection period. The reactor had been shutdown on October 30, 1987 for the plant's first refueling outage. The major licensee activity in progress during this inspection was the inspection and repair of the four reactor coolant pumps' flow diffuser attachment bolts' retention device.

2. Review of Inspection Activities

The resident inspectors observed plant operations, maintenance and surveillance during regular and back shift hours. Control Room instruments were observed for correlation between channels, proper functioning, and conformance with Technical Specifications. Alarm conditions in effect and alarms received in the control room were reviewed and discussed with the operators. Operator awareness and response to these conditions were reviewed. Operators were found cognizant of board and plant conditions. Control room and shift manning were compared with Technical Specification requirements. Posting and control of radiation, contaminated and high radiation areas were inspected. Use of and compliance with Radiation Work Permits and use of required personnel monitoring devices were checked. Plant housekeeping controls were observed including control of flammable and other hazardous materials. During plant tours, logs and records were reviewed to ensure compliance with station procedures, to determine if entries were correctly made, and to verify correct communication of equipment status. These records included various operating logs, turnover sheets, safety tag and jumper logs, process computer printouts and Plant Information Reports. The inspector observed selected actions concerning site security including personnel monitoring, access control, placement of physical barriers, and compensatory measures. No unacceptable conditions were identified.

3. Containment Local Leak Rate Testingg

During the current refueling outage, the licensee is conducting containment penetration Type B and C testing. Testing is being conducted in accordance with Technical Specification (TS) 4.6.1.2.d and 10 CFR 50 Appendix J. The governing procedures are Station Procedure (SP) 3612B.4, Containment Local Leak Rate Test Type C Penetrations.

Inspector review of the test procedures identified no inadequacies. Also reviewed were the test logs kept for the duration of testing; entries of interest were discussed with operations personnel dedicated to this testing.

On November 11, 1987, the "B" Safety Injection and Quench Spray Pump Room was contaminated due to an open vent valve in the hot leg recirculation line. After penetration leak rate testing was completed, the system lineup was restored with the exception of the vent and drain valves. When a motor operated valve in the system was stroked, contaminated water was sprayed into the room

out the open vent valve. The need to ensure that all vents and drains are closed prior to returning a system to service after leak rate testing was re-emphasized to operations personnel involved with leak rate testing. This incident is discussed in more detail in NRC Inspection Report 50-423/87-24, Detail 3.2.

On November 18, 1987, testing identified that leakage for a containment isolation valve exceeded the Enclosure Building Bypass Leakage limit of 0.01 La (13,690 SCCM), set by TS 3.6.1.2.c. The Enclosure Building Bypass Leakage Limit is applicable to those containment penetrations whose outboard isolation valve is outside of the Supplementary Leak Collection and Release System (SLCRS) boundary. A list of the affected penetrations is contained in TS Table 3.6-1. The failed valve is the inboard containment isolation valve for penetration #72 (CDS*CTV91B) which supplies chilled water to containment. The leakage was determined to be approximately 198,000 SCCM. A Trouble Report and Plant Incident Report 225-87 were issued. The licensee determined that a Licensee Event Report is required based on the penetration exceeding the TS leakage limit.

The failed valve is an air operated valve with a T-ring rubber seating surface which was found out of its alignment groove. The T-ring was replaced and the valve was retested satisfactorily on November 20, 1987.

Leak Rate Testing results thus far indicated that the as-found leakage for the valves subject to Type B and C testing will be well under the TS limit of 0.6 La. The as-found leakage limit for the Enclosure Building Bypass Leakage has already exceeded the limit of 0.1 La with the failure of Penetration #72. At the close of the inspection period, several containment penetrations had yet to be tested. As-left testing is ongoing. With the extension of the outage, the licensee is making efforts to repair several containment isolation valves which displayed relatively large leakage although leakage was well under the TS limits.

4. Fulfillment of License Conditions Prior to Startup

The Millstone Unit 3 Operating License contains several license conditions which must be completed by the end of the first refueling outage. The inspectors reviewed steps taken by the licensee for the following license conditions to evaluate item completion and technical adequacy.

4.1 2.C.(6), Instrumentation for Monitoring Post Accident Conditions, Regulatory Guide 1.97 Revision 2 Requirements

This condition required that the licensee install and have operational instrumentation to monitor containment sump water temperature at the first scheduled outage of sufficient duration after procurement is complete, but no later than startup after the first refueling outage.

Compliance with Reg Guide 1.97 was initially reviewed and documented in Millstone Unit 3 Supplemental Safety Evaluation Report (SSER) 4 Section 7.5.2.6. NRC review had concluded that the licensee met all of the requirements of Reg Guide 1.97 or was justified in deviating from these requirements with the exception of a Category 2 containment sump water temperature monitoring instrumentation. The licensee had installed Category 3 instrumentation because the operator does not initiate any emergency actions based on containment sump water temperature. Consideration was also given to available NPSH for the recirculation spray pumps. It was determined that, since the calculation for available NPSH assumed a saturated sump model, there would be adequate NPSH regardless of sump temperature. NRC agreed with this, however, it was determined that containment sump temperature should be provided to the operators.

The licensee submitted requests for deviations from the requirement to install Category 2 sump instrumentation by letters dated December 9, 1985, November 17, 1986, and May 1, 1987. By letter dated October 21, 1987, the NRC permitted a delay in the installation of Category 2 instruments and determined that this license condition has been met. The inspector had no further questions on this license condition.

4.2 2.C.(8), Emergency Diesel Generator Engine Air Starting System Moisture Control

The original plant design did not include air dryers within the emergency diesel generator engine starting air system. This was of interest to the NRC prior to the issuance of the operating license. Because condensation of entrained moisture in compressed air lines can cause the build-up of rust and scale on the internal working parts of the control and starting air valves, these components may fail and prevent a successful start of the diesel engine.

In their May 8, 1984 response to pre-licensing questions by the NRC (Q430.102 and Q430.105), the licensee committed to install air dryers to improve the on-site emergency power source reliability. This commitment was made a condition of the Operating License. Paragraph 2.C.(8) of the license requires that moisture in the air start system be eliminated through the installation of air dryers no later than startup after the first refueling outage. In their response to pre-licensing question Q430.102 the licensee committed to installing "desiccant type air dryers, after-coolers, coalescing prefilters, and after filters ... downstream of each starting air compressor, between the compressor discharge and the check valve on the inlet of the air receiver tanks." (To ensure diesel generator air starting system availability and therefore justify operation through the first cycle the licensee committed to "blowing down" moisture from the air receivers and maintaining in-line strainers and filters as a preventive maintenance action (reference SER Paragraph 9.5.6).

A modification to install four (4) air dryers was in its final stage of completion during this inspection. That modification was being tracked as a Plant Design Change Record (PDCR) MP3-86-038. The inspectors reviewed the detailed design description of the modification, the licensee's design review report, the installation implementation plan, and the preoperational test plan along with the safety evaluations.

The detailed design description contained in PDCR MP3-86-038 Attachment 3D reflected conditions which would satisfy both the licensee's commitment to the pre-licensing question stated in Section 9.5.6 of NUREG-1031, the Millstone Unit 3 Safety Evaluation Report (SER) and also the plant design basis for the diesel air start system in Section 9.5.6 of the plant Final Safety Analysis Report (FSAR).

Likewise, the modification implementation plan supported the interface required for maintenance of emergency diesel generator operability.

The preoperational test plan was implemented through Station Test Procedure IST 3-87-020, Diesel Generators' Air Dryers Startup. The test acceptance criteria reflected the licensee's commitment for a system to supply clean dry air (with an effluent dewpoint of at least -25 Degrees C at 450 psig). In addition, the capacity of the air compressors had to meet the original system design basis such that the associated air receiver tank was recharged from the minimum diesel starting pressure (375 psig) and the maximum starting pressure (425 psig) in no more than 30 minutes (Reference FSAR Section 9.5.6.1). The procedure provided an expected preoperational test sequence of initial checks and calibrations, leak tests and line flushes followed by performance testing. There were no unacceptable conditions identified.

The installation of the air dryers was essentially completed prior to this NRC inspection. The inspectors examined the four (4) air dryer units to verify that their design met the PDCR description and therefore the condition of the operating license. Installed instrumentation was calibrated and acceptable workmanship was displayed in the air dryer construction and installation. Line flushing and performance testing was observed during several periods of this inspection. There were no unacceptable conditions identified.

Although the preoperational test was substantially complete at the end of this inspection period, it had not yet been accepted by the test director because of the need to correct minor material problems. The inspector reviewed these items, none of which caused any significant deficiency in dryer performance. All four (4) were in normal service supporting the individual sub-systems of the air start system.

The items remaining included correction of minor air leaks, final adjustment of the dryer purge air flow and the possible replacement of coalescing filter desiccant in the two units (1A and 1B) performing at the air dryer dew point test acceptance criteria of -25°C. (The NRC

required that the starting air dew point be at least 10°F less than the lowest expected ambient temperature. This is 40°F for the unit diesel enclosures). The inspector recommended that, since the dryer purge air flow indicators had been removed, a positive method of control be established over that flow rate. It is presently controlled by throttle valve position.

The inspectors concluded that the Emergency Diesel Generators' starting air dryers presently installed fulfilled the conditions of Operating License condition 2.C.(8).

4.3 2.C.(12), Safety Parameter Display System

This item requires the following additional values to be included into the Safety Parameter Display System (SPDS) prior to reactor restart following the first refueling outage:

-- Residual Heat Removal (RHR) Flow
-- Containment Isolation
-- Containment Hydrogen Concentration
-- Primary Coolant System Hot Leg Temperature

Additional background information concerning these items is contained in the Millstone Unit 3 Safety Evaluation Report, Section 18.2, Human Factors Engineering Review of the Safety Parameter Display System of the Report, and its Supplements No. 4 and 5.

The licensee has addressed their position and the implementation of these requirements in letters dated November 13, 1987, December 24, 1987 and January 14, 1988.

The inspectors found that plant process computer software changes had been accomplished within the SPDS Display "Core Cooling" to add a sixth selection "Post LOCA Cooling." This selection displays Reactor Coolant System Hot Leg Wide Range Temperatures from all four (4) loops, flow from both RHR Systems, Charging Pumps' discharge header flow and pressure, Safety Injection Pumps' discharge pressure, Containment Recirculation Pumps' Discharge Pressure and Recirculation Heat Exchanger Flow. Within the SPDS Display titled "Containment" a third selection "Hydrogen" was added. This selection displays the readings of both Hydrogen Monitors.

The licensee has not yet upgraded the SPDS sub-system of the plant process computer such that the new SPDS variables will cause the SPDS High Level Display to change state as a new parameter goes out of acceptable bounds. That aspect of the SPDS, while not a license condition, remains open.

The licensee is including the Main Control Board Number 2 Engineered Safety Feature (ESF) Status Display as part of the SPDS system to take SPDS credit for the Containment Isolation section of the ESF Status Dis-

play. After the inspection period, on January 29, 1988, it was determined by telephone contact with NRR that the NRR technical reviewer, project manager, and project director had concurred that this license condition was met for the SPDS and that a Safety Evaluation Report (SER) was in preparation. This license condition is unresolved (87-30-01) pending issuance of that SER.

Additionally, it is the licensee's understanding that they will provide the NRC a status response to the SPDS items by the end of April, 1988 and complete additional upgrades by the end of the second refueling outage.

5. Emergency Diesel Generator Maintenance and Modifications

In conjunction with the inspections of the Emergency Diesel Generator (EDG) Starting System Air Dryer Modification discussed above, the inspectors conducted inspections of the two diesel generator systems. The "A" EDG was out of service for inspection, maintenance and modifications during a portion of the inspection. This work had been completed on the "B" EDG and that subsystem had been returned to service. Portions of the following activities were observed:

Preventive Maintenance Mechanical Inspections of 3EGS*EGA per Maintenance Procedure SP3712K Revision 0, Change 2 for refueling outage activities (AWO M3 87-07714). Because of low service on the engine, the procedure was modified to delete the removal and inspection of the camshaft bearings.

Preventive Maintenance Mechanical Inspections of 3EGS*EGA per Maintenance Procedure MP3720CB for weekly and monthly activities (AWO M3 87-13895).

High Potential Insulation Testing of 3EGS*EGA Generator and Cables per procedures PT31404A Revision 0 and PT31410 Revision 1 (AWO M3-87-13283).

Implementation of Design Change to the Brown Bovery VTR 400 turbocharger of 3EGS*EGA per design change (T&DCR) N-EC-01463 (AWO M3-85-35409). This change added an external air channel connecting the air outlet casing and the gas inlet casing to supply positive air pressure to the labyrinth seals of the turbocharger rotor shafts. This will supply air to prevent engine exhaust gasses from entering the turbocharger bearing chamber and contaminating the lubricating oil. The modification is effective when the engine is run at no load or under light load; a pre-existing air channel is effective under heavy load.

Install New Hanger to Support "A" EDG Electrical Panel 3EGS*TBEG1A (AWO M3-87-13474).

Repair Pump Shaft Oil Seal Leaks of Engine Driven Pump 3EGS*P1A (AWO M3-87-04312).

Repair Pump Shaft Oil Seal Leaks of Engine Driven Pump 3EGS*P3A (AWO M3-87-04311).

Repair Exhaust Flange Leaks (AWO M3-87-15076).

Air Flush of Air Receiver Tanks (AWOs M3-87-16691 and -17062).

Implementation of the EDG Manufacturer's Service Information Letters as applicable concerning the following (AWO M3-87-14857):

-- Piston Ring Installation Inspection,
-- Generator Bearing Insulation Check Procedure,
-- Intercooler Spacer Bar Tightness Check,
-- Two Piece Replacement Cam Inspection and Retorquing,
-- Removal of Lubricating Oil Pressure Regulator Filter Screen.

The inspectors reviewed the work in progress during the inspections. They found that the personnel involved were following approved procedures, recording as-found inspection data and maintaining acceptable work practices. Examples of good workmanship were evident, for example the installation of the Brown Bovery turbocharger external air channel.

The inspectors also observed engine performance monitoring by the licensee's Reliability Engineering Group. Personnel from the Reliability Group were using a newly acquired microprocessor based engine analyzer. The device is able to provide detailed performance data for individual engine cylinders. It was apparent that the device is able to provide important information for trending engine performance. The inspector was informed that performance data also will be trended on the licensee's other diesel engines with nuclear standby power applications.

6. Status of Items Remaining Open Under the Plant Completion Program

The inspectors reviewed the items remaining open within the Plant Completion Program tracking system and all open Plant Design Change Records within its tracking system. There were no items identified which were needed to be completed to fulfill a license condition.

7. Management Interview

During this inspection, meetings were held with plant management to discuss the findings. No proprietary information relating to this inspection was identified.