

U. S. NUCLEAR REGULATORY COMMISSION
REGION 1

Report No. 50-423/84-08
Docket No. 50-423
License No. CPPR-113 Priority -- Category A
Licensee: Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06101

Facility Name: Millstone Nuclear Power Station, Unit 3

Inspection at: Waterford, Connecticut

Inspection Conducted: May 20 to July 7, 1984

Inspectors: *Therese A. Rebelowski*
T. A. Rebelowski, Senior Resident Inspector

July 31, 1984
date signed

J. Robertson
J. Robertson, Reactor Engineer

AUG. 7, 1984
date signed

Approved by *T. Elsass*
T. Elsass, Chief, Reactor Projects
Section 1B, DPRP

8/7/84
date signed

Inspection Summary: Inspection on May 20 to July 7, 1984 (NRC Report No. 50-423/84-08)

Areas Inspected: Licensee action on previous inspection findings; preoperational testing and operational preparedness program which included preoperational test program review in the areas of document control, plant maintenance, preventive maintenance, training of test personnel; test completion review; observation of electrical testing; observation of hydrostatic testing; observation of flushing program; licensee action on Information Notices; steam generator feedwater inlet nozzle analysis; licensee report of potential significant deficiencies; unauthorized ventilation duct modification; plant tours and cut electrical cables. The inspection involved 55 hours by the Regional inspector and 91 hours by the Senior Resident Inspector.

Results: Of the sixteen areas inspected, no violations were identified. Construction is at 86% completion. The preoperational test program continues to reflect the need for construction system turnovers with a minimum of uncompleted items to facilitate timely testing.

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DETAILS

1. Persons Contacted

Northeast Utilities Service Company (NUSCO)

- J. O. Crockett, Superintendent - Unit 3
- *K. W. Gray, Jr., Staff Assistant - CQA
- M. D. Kess, Assistant Startup Supervisor - NNECO
- *J. S. Harris, Startup Supervisor - Unit 3
- *R. E. Lefebvre, Project Staff Engineer
- D. O. Miller, Jr., Systems Staff - Unit 3
- S. Orefice, Project Engineer
- S. Toth, Superintendent - New Site Construction

Stone & Webster Corporation (S&W)

- *G. J. Basilesco, Engineering Assurance Engineer
- *A. A. Dasenbrock, Resident Manager
- *S. L. Hunt, Engineering Assurance Program Manager
- *R. A. Jensen, Assistant Superintendent of Engineering
- *C. A. Kuhns, Assistant to Quality Assurance Program Administrator
- *O. W. Lowe, Assistant Project Engineer
- *R. E. Reams, Materials Manager
- *G. G. Turner, Superintendent, Field Quality Assurance
- *W. H. Vos, Senior Engineer, Field Quality Control

*The above members of the licensee staff and operating personnel attended the exit interview. Other members of the licensee staff were contacted during the course of the inspection.

2. Licensee Action On Previous Inspection Findings

- a. (Closed) Unresolved Item (423/83-10-01) Engineered Safeguards Features, Residual Heat Removal (RHR) piping configuration required a hydraulic effects review. The licensee performed a review of the design and operation of the residual heat removal system to assess the impact of the piping arrangement installed at the RHR Pump B suction. The analysis assured that sufficient margin of NPSH was present in excess of the pump's requirement to prevent cavitation. The licensee calculated available NPSH at the impeller centerline, and it was 125 percent of the manufacturer's required NPSH. The analysis states that the resultant margin will prevent cavitation of the "B" RHR pump. This item is closed.

3. Preoperational Testing And Operational Preparedness Inspections

The purpose of the preoperational testing and operational preparedness phase inspection activities is to verify through direct observation, personnel interviews, and review of facility records that:

- Systems and components important to the safety of the plant are fully tested to demonstrate that they satisfy their design requirements.
- Management controls and procedures, including quality assurance programs, necessary for operation of the facility have been documented and implemented.

The inspection program includes those activities directed toward operational readiness of the plant and will coincide with the final portions of the construction inspection program. Initial phases of the startup testing inspection program will also overlap the latter phases of this program.

A. Preoperational Test Program Review

A review was performed on the administrative controls over pre-operational testing for the areas of Document Control of Test Procedures, Plant Maintenance/Preventive Maintenance during preoperational testing, and training of test personnel.

1. Document Control

Formal administrative measures which establish review, approval and issuance of test procedures are documented in the Startup Manual. It requires the NNECO staff, S&W and/or Westinghouse to review the test procedure and complete a review form to document the reviewer's comments. Both the test procedure and the review form are retained by the startup office until after the plant warranty run is completed. Any necessary changes to a test procedure are made by an originator and then the procedure is returned to the reviewers for acknowledgement.

Approval of test procedures follows the guidelines shown in Table 4.1 of the Startup Manual. Measures which control the revision of approved procedures require the following:

- a. Changes to approved test procedures receive the same level of approval as that required for the test procedure.
- b. For each change, a test procedure change form is used to document the approvals required and is placed with the official test procedure copy; and
- c. Review and approval by the same groups as the original procedure.

The Final Safety Analysis Report and the Startup Manual assigns the responsibility of review, approval, issuance and implementation of the test procedure to the following staff members or group of staff members:

- a. PORC - review and approve all test procedures
- b. Joint Test Group - review and approve all preoperational tests and subsequent startup tests
- c. Test Supervisor - test coordination
- d. Startup Supervisor - arranges tests to be scheduled
- e. Startup Engineer - coordinates completion of procedure prerequisites and phase direction
- f. Shift Supervisor - verifies readiness of appropriate plant systems for testing

Administrative Controls Procedure (ACP) 6.5.1.1 provide that operating and surveillance procedures used during preoperational testing are subject to the same reviews and approvals required for preoperational test procedures.

Administrative Controls (ACP-6.2.3.5) have been established which require test procedures to be updated to reflect design changes. Currently, revised drawings are sent to the plant nuclear records facility which in turn distribute the new drawings. Master indexes are available for drawings and manuals that indicate their current revision numbers. When manual or drawing revisions occur, the affected Phase I test procedure is changed directly and re-typed. Changes to Phase II test procedures must be approved by the Plant Operations Review Committee and the Joint Test Group before the revised procedure becomes effective. The responsible test engineer is required to check all referenced drawings, vendor manuals and test procedures for current design changes before performing preoperational testing.

2. Plant Maintenance

Plant maintenance is required to be performed in accordance with Administrative Control Procedure ACP-QA-3.02. Procedures must be prepared, reviewed and approved for all safety related work.

The work order system controls and documents maintenance work at Millstone 3. This system provides for the reporting of failures and problems, dispositions work requests including necessary approvals, aids in the determination and documentation of work requests, documents retests or functional verifications performed, and provides a means to attain information on work scheduled (in progress or completed).

As required by MP-3701A, "Maintenance Procedures and Forms", the MP's must be a step-by-step instruction and can include material from an instruction manual, but cannot reference a manual for instructions. MP-3701A provides a detailed instruction on the preparation of the MP's. A MP draft must be approved by the Maintenance Supervisor and the final typed copy is reviewed by the department head. The QC department reviews the MP to assure appropriate QA requirements are specified and inspection plans, procedures and other required documentation are included with the work order. This review also ensures that adequate hold points have been established. The need for PORC/SORC review is determined by the requirements of Administrative Control Procedure ACP-QA-3.02 and final approval is by the Unit Superintendent. The "Procedure Responsible Person" reviews changes and revisions to ensure that they are consistent with the original intent, and performs a bi-annual review of the procedure.

Maintenance items are tracked on the computerized Production Maintenance Management System (PMMS). This offers a ready source of information to testing, operations and maintenance personnel of system status.

Operations personnel must authorize all work orders. It is their responsibility to ensure that no conflict exists between the maintenance item and planned testing or plant conditions. Authorization by test personnel is not required, however, the operations staff tracks the status of testing with entries in the shift turnover log, the shift supervisor's logs and the tagout log, to ensure compatibility between testing and maintenance.

ACP-QA-4.02, "Procurement, Control and Identification of Material", is the licensee's document which governs replacement materials and parts for safety related maintenance. The licensee's process of purchase requisition review and approval, material receipt inspection, storage and issue is adequate to ensure that spare parts issued to maintenance personnel for safety related work is equivalent to those committed to in the FSAR. Controls are also established for the return or exchange of unused material. The licensee's method of controlling replacement materials meets the requirements of 10CFR50, Appendix B, Criterion XIII.

MP-3708A, "Unit 3 Maintenance Training" specifies training requirements for the maintenance department intended to develop and improve the knowledge and skill of mechanics, electricians and the technical staff. Retraining is required annually and is documented on a Training Evaluation Record form. The Assistant Maintenance Supervisor (AMS) is responsible for evaluating assigned personnel qualifications. He is also responsible for determining when personnel training is required in the use of a particular maintenance procedure. Normally, inexperienced personnel are assigned with experienced personnel as a form of on-the-job training.

Any special equipment required for maintenance is specified on the work order. Equipment identification numbers and calibration due dates are recorded on the work order by the maintenance personnel, whose responsibility it is to obtain the proper test and measurement equipment with current calibrations.

3. Preventive Maintenance

The licensee has an established procedure MP-3704A to ensure that preventive maintenance and surveillance requirements and schedules will be developed and implemented on equipment transferred from the construction to the test or operations group. An equipment list is generated for each system turnover package. The Assistant Maintenance Supervisor (AMS) evaluates each piece of equipment and recommends preventive maintenance guidelines. The Production Maintenance Management System (PMMS) planner will assign required procedure numbers and the AMS (or designee) will write the procedure. The PMMS planner will input the PM's to the PMMS program and issue a weekly schedule to each AMS for his area of responsibility.

The licensee has administrative controls established (ACP-QA-4.01) which provide instructions for housekeeping zones, vital area cleanliness, no smoking areas, area housekeeping, identifying housekeeping deficiencies and designating the responsibilities of overall cleanliness.

Administrative controls have been established (MP-3701A) which provide guidelines for writing, numbering, approving and filing maintenance records. Responsibilities to carry out the above actions have also been properly assigned.

4. Training of Test Personnel

Administrative Control Procedure, ACP-QA-8.16, contains the requirements for certification of test personnel. This procedure is consistent with ANSI N 45-2.6, "Qualifications of Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants". Per ACP-QA-8.16, test personnel must be trained in the following areas in order to be certified:

- a. Indoctrination of personnel with the technical objectives of the department as specified in the departmental or other training programs.
- b. The codes, standards, specifications and procedures to be used, as specified in the departmental or other training programs.

- c. The Quality Assurance elements to be employed with guidance regarding their limitations and capabilities as specified in departmental, Quality Assurance or other training programs.

The above training is given to all test personnel by the engineering department, and is documented in accordance with EN-31051, "Unit 3 Engineering Department Training". Lists of self-study items are given to the employee with questions on each topic to provide a means of self-evaluation. Upon completion of the study items, the Startup Supervisor documents that the individual has satisfactorily demonstrated his or her knowledge of the subjects.

B. Test Completion Review

A review was made of a random sample of 17 completed official copies of Phase I Test Procedures. Test changes were properly approved and annotated in the test procedure. None of the changes reviewed changed the basic objective of the test procedure. Individual steps of the procedures and data sheets were properly signed and dated. Data was reviewed and source documents were checked to ensure that the data was within acceptable tolerances. No concerns were identified.

C. Electrical Testing

1. On May 31, 1984, the inspector reviewed and witnessed a portion of the electrical checkout test (T3330 B1E01) of the three CCS pump motors. This test is the initial energization of the pump motors from the normal power source and it verifies that the pump logic functions properly. The motors were verified to be uncoupled from the pumps, and a strap wrench was used by test personnel on the shaft to check for freedom of movement prior to energization.

Adequate communications and safety area boundaries were established and maintained throughout the test. The prerequisites were documented as completed and test results were recorded for each pump individually as the procedural steps were completed. Test results were satisfactory. The test was conducted in accordance with an approved procedure and in a professional manner. No concerns were identified.

2. Dielectric Absorption and Overpotential Test: On June 6, 1984, the inspector witnessed a dielectric absorption and overpotential test on "B" service water motor per generic electrical procedure GPR-05. Initial examination of the "B" service water pump for the test required safety posting and examination of the motor. The relative humidity readings were taken at the service water intake structure. The test consisted of placement of test voltage from cubicle 34D16 and monitoring the amperage decay. The test verified that the motor was satisfactory for electrical operation.

D. Observation of Hydrostatic Testing

The inspector observed the Hydrostatic Test of the Chemical Mixing Tank and associated piping (CHS-1061). This included the verification of the calibrations of the test gages and contact pyrometer and the set point of the temporary relief valve. The system was adequately filled and vented, and test pressure was held for the required time. The test gages were selected with a range of approximately twice the test pressure. After depressurizing, the gages were verified to return to zero. The test was performed in accordance with HTP-3.1 and ANSI B31.1, and test prerequisites and results were properly documented. Inspection Report P4A02608 on the test results was reviewed and the test was found to be satisfactory.

E. Flushing Program Observations

The licensee's program for assuring cleanliness grades of piping systems incorporates a flushing program as part of the Phase I testing. The inspector observed a typical flush of the Component Turbine Plant Closed Cooling Water System, T3330-B1F01, Rev. 1, on June 7, 1984.

The procedure included the parameters outlined in the Flushing Manual which includes Objectives, Acceptance Criteria, Reference, Prerequisites, Initial Conditions, Special Precautions, Procedures and Restoration.

During the observation of flush, the following concerns were identified:

1. The licensee experienced problems in maintaining power to the motor driven component cooling pumps. The pump motors were tripping out after pump runs of less than thirty (30) seconds. The engineer attributed the problem to an inaccurate setting of a time delay relay or a low suction pressure pump cutout.

The test engineer isolated the low suction pressure switch and monitored the suction gage with watchstanders. No change was written to the test procedure. Based on the procedure precautions and change in the pump protection (low pressure switch isolated), the inspector stated that a test change describing new conditions was necessary. This item was discussed with the Startup Test Supervisor and it was determined that a change will be written if similar conditions arise during testing of components related to nuclear safety.

2. The licensee instituted a change to test procedures that eliminated Appendix A which required instrument documentation of calibration due dates and QA numbers. The reason for change stated that only instruments used to record data would be recorded.

The inspector stated that the flushing procedure required, under Paragraph 6, Special Precautions, the monitoring of the appropriate gages. Examples of use of the required instrumentation

gages as they appear in the procedure are as follows:

Par. No.

- 6.6 If pump inlet pressure drops to 15 psig, secure the affected pump, isolate the strainer, remove and clean as required.
- 6.7 Remove and clean the system startup strainer when the flow D/P increases by 10 psid above the initial full flow D/P.
- 6.8 Do not exceed the following pressures at the inlet to the below listed heat exchangers:
 - 6.8.1 Instrument Air Compressors 65 psig.
 - 6.8.2 Service Air Compressors 65 psig.
- 6.9 Monitor D/P across trash screens installed in step 5.15. When D/P increases by 10 psid above initial full flow D/P, isolate the applicable cooler and clean the screen.

All the above gages are used to prevent damage to equipment and/or injury to personnel.

This change in requirements to the test manual and procedure is considered an unresolved item pending review of the safety implications by PORC Committee. (423/84-08-01)

The test flush appeared to be manned by sufficient personnel to monitor the initial flush and the mechanical testing of the pumps.

The inspector has no further concerns on the manner of testing at this time.

Summary: The initial review of the Administrative Procedures and Management Systems that address the preoperational program appear to support a program that will verify properly tested components and systems. Further reviews in this area will be addressed in subsequent inspections.

4. Licensee Action On IE Issued Information Notices (IN)

The inspector reviewed the licensee's system for addressing NRC Information Notices (IN) and when required, their method of implementing corrective action. The licensee follows the guidelines documented in the Nuclear Operation Department Policy NOP-R-204 and the Nuclear Engineering and Operation Procedure NEO 3.02. Additional guidance is found in Stone and Webster's procedure NEAM-31.

The inspector reviewed IE Information Notices 83-21 thru 83-84 to ascertain whether the following actions were taken by the licensee:

- a. The Information Notice was received by licensee management.
- b. A review of applicability was performed.
- c. For Information Notices applicable to the facility, appropriate corrective actions have been taken or are scheduled to be taken.

The following Information Notices are closed based on the above criteria:

83-21, 22, 24, 26, 28, 29, 33, 35, 37, 39, 40, 41, 42, 43, 44, 46, 47, 49, 50, 51, 52, 53, 54, 56, 58, 59, 60, 61, 62, 63, 64, 66, 68, 73, 74, 75, 76, 77, 78, 79, 81, 82, 84.

The licensee has committed to further review or corrective action by revising or developing appropriate procedures for the following IE Information Notices:

83-23, 25, 27, 30, 31, 32, 34, 36, 38, 45, 55, 57, 65, 67, 69, 70, 71, 72, 80.

A review of the licensee's outstanding commitments addressing the Information Notice program will be conducted at a subsequent inspection.

5. Steam Generator - Feedwater Inlet Nozzle To Elbow Weld Stress Analysis

The inspector conducted a visual inspection of the steam generator feedwater piping of concern. (423/83-21-04) Feedwater piping to 2 of 4 steam generators appears to conform to the Westinghouse piping design. However, feedwater piping to the remaining 2 steam generators does not appear to conform to the Westinghouse design between the final reducers and steam generator nozzle. The licensee committed to perform a re-analysis of the feedwater piping in the "as-built" configuration. This re-analysis will be conducted during certification of "as-built" conditions.

The inspector reviewed the preliminary stress analysis calculations for the non-standard reducer and pipe supports. The calculations, identified as 12179-NP(B)-X1701, used the "Nupipe" model code. The "Nupipe" model was, however, misapplied in that the engineer entered a reducing elbow into the model, where a standard elbow welded to a reducer actually exists in the plant. The relative "stiffness" of a reducing elbow is significantly different from that of a standard elbow with a reducer, thus changing the system response.

Another difficulty identified by the inspector involves the fact that the current ASME Boiler & Pressure Vessel Code Section III does not address calculations of Stress Intensity Factors (SIF's) for adjacent reducers placed with the smaller ends abutting. The SIF at the resulting "vena contracta" can be expected to be substantially different than the SIF's expected at a reducer joining to runs of different diameter pipe.

This item remains open pending recalculation using correctly applied models and using either a measured piping thickness or an assumed range of thicknesses. (423/83-21-04)

6. Licensee Report Of Potential Significant Deficiencies (10 CFR 50.55(e))

a. Items Where Licensee Action Remains Outstanding

The licensee reported a potential deficiency on June 5, 1984, regarding two safety issues.

1. High Energy Line Breaks Outside Containment which concerns the temperature envelope requirements on the environmental qualifications of equipment outside the containment.
2. An inconsistency in the number of operating reactor coolant pumps (RCP) required between hot shutdown and the shift to the residual heat removal system activation has been identified. The FSAR versus the Westinghouse Analysis requires, respectively, two and one operating RCP's. The licensee has this item under review (SD-57). These items remain open. (423/84-00-08)

b. Items Where Licensee Has Determined Corrective Action

1. Repairs To Robertshaw Thermostatic Control Valves -(SD-22)

The licensee reported on August 12, 1982, a potential significant deficiency (SD-22), which identified a possible failure of Robertshaw Thermostatic Control Valves that could result in overcooling of the Emergency Diesel Generator cooling system. The cause of the failure was the backing off of a nut on the lower overrun assembly. The repairs required the placement of a new nut and cotter pin assembly. On disassembly of the valve on EDG No. 1, the hex nut was missing on the lower overrun assembly - licensee inspection report No. P4A02575. The effect of the missing nut on the cooling system is under review. This significant deficiency remains open. (423/82-00-10)

c. Items Licensee Has Determined Not To Be Reportable Under 10 CFR 50.55(e)

1. The following items have been reviewed by the licensee and found not to be reportable under 10 CFR 50.55(e):
 - a. Cable Tray Offset Reducer (SD-30)
 - b. Seismic Duct Welds Potentially Underdesigned (SD-47)

Both reports base their non-reportability on calculations. A request for the licensee's calculations that were the basis for their conclusion was requested. These items remain open. (423/83-00-16 and 423/82-00-12)

7. Unauthorized Ventilation Duct Modification

During the licensee's routine area inspections prior to final walkdown of the building ventilation system, it was noted that extensive modification to the ductwork had been performed. It was determined that NNECO maintenance personnel had reworked the ductwork in the Machine Shop Tool Room to accommodate storage without documentation of a design change.

This item was discussed with the maintenance supervisor to determine if this was an isolated incident. The licensee stated that the changes to the ductwork has been investigated, and retraining as to administrative documentation in order to obtain changes was stressed. The present configuration of ductwork is being evaluated by the licensee to ensure compliance to construction requirements. A Nonconformance and Disposition Report (N&D) No. 5794 has been issued to track this item. The inspector has no further questions at this time.

8. Plant Tours

The inspector observed work activities in progress, completed work and construction status in several areas of the plant. The inspector examined work in progress for any obvious defects or violations of regulatory requirements or the Final Safety Analysis Report.

- Plant Housekeeping Controls: Plant housekeeping controls were observed including control and storage of flammable material and control of potential safety hazards. The areas requiring additional housekeeping attention continue to be the containment areas and the steam valve building.
- The control room also exhibited poor trade cleanup practices with electric tie cuttings and rags behind the main control panels. Electrical cabinets have not been effectively protected from the environment.
- In the area of recent personnel accidents which could be attributed to poor housekeeping, one item was identified on April 18, 1984, that addressed a tradesman slipping on a bolt on the floor of the turbine building.
- A marked improvement in the protection of equipment in the area of motor operator valve stems and pump shafts was noted. The cleanliness concerns identified will be reviewed at a subsequent inspection. (84-04-11).
- Tours of the fence line for maintenance of obstruction-free distances between the operating units were made on a weekly basis.

Observations of the toured areas included the following:

- Control Room manning by licensee operating personnel was noted. Discussions with the Shift Supervisor indicated that the methods of identifying the systems under test in the Control Room continue to be acceptable.

- Observations were made of the replacement of the electrical connectors (Systems Controls) at the shutdown panels. No concerns were identified.
- Observations were made of areas of cut cables in the turbine building.
- The service water intake structure appears to present an area where good housekeeping is prevalent.
- The presence of quality control inspectors was verified. Samples of quality control inspection records, material identification and nonconforming material identifications were examined as part of the total activity review. The inspector noted a satisfactory effort by the licensee to correct the identified items of concern.

No violations were identified during these inspection tours.

9. Cut Electrical Cables

On June 29, 1984, at 11:40 a.m., the licensee reported the identification of six cut electrical cables at the 37' level in the turbine building. The six cables were not safety related.

Licensee Inspection Reports E4A04644 and E4A04645 have been issued to document the incident. The inspector observed cable cuts in the turbine building.

The inspector determined that additional attention by construction personnel and NUSCO in the areas of reporting vandalism to security forces was necessary. The licensee is presently reviewing their policies on follow-up of industrial incidents. Pending the licensee's documentation of policies on prompt reporting and investigation of vandalism, this item is unresolved. (423/84-08-02)

10. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. The unresolved items disclosed during the inspection are discussed in paragraphs 3E.2 and 9.

11. Management Meetings

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