U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-423/84-12

Docket No. 50-423

License No. CPPR-113 Priority _____ Category A

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

Facility Name: Millstone Nuclear Power Station, Unit #3

Inspection At: Waterford, Connecticut

Inspection Conducted: August 6-14, 1984

Inspector: Kamal A. Manoly 9/12/84
K. Manoly, Reactor Engineer date

Approved by: J. P. Durr 9/12/84
J. P. Durr, Chief, Materials and Processes Section, EPB date

Inspection Summary:
Inspection of Millstone #3 on August 6-14, 1984 (Report No. 50-423/84-12)
Areas Inspected: Routine, announced inspection by a region-based inspector to follow up on licensee actions related to the following:

- 50.55e significant Deficiency regarding containment liner out-of-tolerance and stud spacing
- Unresolved items 83-21-04 and 84-04-07 related to design of safety related piping and supports
- Tite-Flex flexible metal hoses nonconformance to ASME III requirements.

The inspection involved eight hours on site and 28 hours at the regional office.

Results: No violations were identified.

DETAILS

1. Persons Contacted

Northeast Utilities Service Company (NUSCO)

*R. Lefebvre, Lead Mechanical Engineer
J. Festa, Lead I&C Engineer
M. Ahern, Engineer

Stone and Webster Engineering Corporation (S&W)

*M. Matthews, Assistant Superintendent, FQC
M. Sinha, Principal Structural Engineer
W. Pananus, Senior Structural Engineer
G. Gregory, Principal I&C Engineer
R. Burnham, Instrumentation Engineer
G. Milley, Lead Engineering Mechanic
*S. Hunt, EA Program Manager
S. Patel, Lead Piping Engineer

*Indicates present at exit meeting.

2. Licensee Action on Previously Identified Items

(Open) Potential Significant Deficiency (423/83-00-09):

Upon the removal of the fire-damaged liner plate, an area approximately 5 ft. high and 3 ft. wide was identified as missing stud anchors to the concrete containment wall. The liner stud spacing as specified in the FSAR is 1'-0 ± 1½". The area with missing studs is located approximately at elevation 65'-0". The licensee performed an analysis for the qualification of the liner and studs for the above identified area. The calculations employed two approaches for the purpose of analysis. The first is a three dimensional finite element as-built model of a 10' x 12' area of the liner, which contains the zone with missing studs. The out-of-roundness of the liner in the affected zone was incorporated in this model. The analysis was performed using the ANSYS computer code. The second approach was formulated using large deflection theory of plates and manual calculation. The loading condition applied to the liner in both models, under what is considered as the most adverse condition of the design basis accident (DBA), differs from those specifically provided in the FSAR (Table 3.8-1) for qualification of the liner and studs.

The analysis results indicate acceptable stud shear loads (below FSAR allowable limits) and tension loads within ASME Section III, Division 2, limits provided in Table CC 3730-1. Maximum liner stresses, at stud location, were found to be within FSAR allowable limits when the ANSYS computer analysis was utilized (79.1 ksi vs. 80 ksi allowable); however, a slight increase over thc FSAR stress limit for the liner at mid-span was

provided when the manual computations were performed (83.7 ksi vs. 80 ksi allowable).

The licensee identified other areas in the liner where studs were missing. Several parametric studies of these areas were performed for the evaluation of liner stresses and stud loads using the manual calculations approach. The ASME Section III, Division 2, allowable limits for strains in liner plate (Table CC 3720-1), and displacements in stud anchors (Table CC 3730-1) were utilized for the qualification of these identified areas. These limits correspond to higher allowable liner stresses and stud loads than those specified in the FSAR.

The inspector briefly reviewed the licensee report for the evaluation of anchor stud spacing of the containment structure steel liner (NERM-59). The report does not cover the quality assurance aspects as related to the identified deficiencies.

The qualification of the liner and studs in the as-built condition requires a detailed safety evaluation of the licensee's analysis and a review of the proposed FSAR change. This task falls within the domain of the office of Nuclear Reactor Regulation (NRR).

This item remains open pending NRC acceptance of the revised design.

(Open) Unresolved item (423/83-21-04):

The inspector reviewed the preliminary analysis provided by the licensee and performed by Stone and Webster for the evaluation of feedwater piping at the steam generator inlet nozzle. The analysis employs stress intensification factors (SIF) of a reducer for factoring piping stresses at the reduced end of the reducing elbow. The junction of concern represents the jurisdictional boundary between Stone and Webster's feedwater piping and Westinghouse's steam generator inlet nozzle. The inspector restated the concerns regarding this junction in the following four areas:

a. The combined effect of stress intensification of nozzle stresses on both sides of the junction is undetermined since it involved two reduced sections of fittings qualified by two different organizations. The qualification of the nozzle junction should address the combined effect.

b. The effect of actual fittings wall thickness should be addressed in this evaluation. Stone and Webster's piping analysis utilizes standard fitting stiffnesses which are based on nominal catalog thicknesses. A reduced fitting stiffness will result in a less than conservative estimate of thermal loads and stresses.

c. Stone and Webster's piping stress analysis utilized a more flexible reducing elbow than actual. The NUPIPE model divides the elbow into two segments, each having a constant outside diameter. Using an outside diameter for the second segment equal to that of the reduced

section of the elbow would considerably underestimate the elbow stiffness. This is demonstrated from review of the measurements of the elbow circumference at various locations along the centerline. The effect of reduced elbow stiffness would impact the thermal loads as explained in item (b) above.

d. The effect of water hammer loads on feedwater/nozzle junction should be assessed for the as-built configuration.

This item remains open pending further licensee action and NRC review.

(Open) Unresolved item (423/84-04-07):

The inspector reviewed the revised calculations for the pipe support package 3-CCP-1-PSA 152 where calculation errors were identified in the interface loads between the pipe support and the embedded plate. The inspector also reviewed the embedded plate calculations and verified that the proper design interface loads were used rather than those specified in the pipe support package. This confirms the licensee's response of July 11, 1984 to the findings reported in CTI Report No. 50-423/84-04. Additionally, the licensee is in the process of preparing a proposal for performing a sample review of small bore pipe support calculations beyond the normal checking/reviewing process being implemented for all calculations involving safety related structures and components. This additional review is expected to be performed along with the piping/support as-built reconciliation effort of safety related piping systems. The proposal will be submitted to the NRC within one month for evaluation and approval.

This items remains open.

3. Titeflex Flexible Metal Hose Assemblies

The regional office received a notification from the Vendor Program Branch in Region IV regarding the identification of nonconformances in bellows supplied to facilities in Region I. The Titeflex Corporation reported the nonconforming parts of the metal hose assemblies for ASME Section III, Class 2 and 3, requirements per 10 CFR 50, part 21. The nonconforming items for Millstone Nuclear Station, Unit #3, were also reported to Stone and Webster Engineering Corporation (S&W) by the manufacturer.

The inspector reviewed the nonconformance and disposition reports (N&Ds) issued by S&W's Procurement Quality Assurance regarding the following identified nonconformances:

- Radiographs of circumferential welds revealed an internal root weld condition causing an abrupt density change which is unacceptable per ASME III, NX-4424(e).

- Radiographic location markers were not placed on each part per ASME V, Article 2, Paragraph T.235.2.

The above nonconformances were reported in N&D No. A012.

The inspector also reviewed N&D No. A011 which identifies the fabrication of the flexible hoses as not meeting the specification requirements for compliance to ASME III, NC-4800 and ND-4800 for Class 2 and 3 respectively. These requirements were based on Code Case No. N192-1.

Stone and Webster's disposition of these nonconformances was to return some of the hose assemblies to the vendor for modification per code requirements and to mark the remaining assemblies as "Reject" for use on nonsafety systems.

S&W indicated that all of the assemblies delivered to the site were of the small bore category. The large bore assemblies were not shipped to the site upon identification of these nonconformances.

The licensee indicated that the nonconformance of Titeflex metal hose assemblies to ASME III requirements is being reviewed for possible issuance of construction deficiency per 10 CFR 50.55(e).

This item is unresolved pending completion of the licensee review (423/84-12-01).

4. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations or deviations. Unresolved items disclosed during the inspection are discussed in Sections 2 and 3 of this report.

5. Exit Meeting

An exit meeting was held on August 14, 1984 with members of the licensee staff and contractors as denoted in Section 1 of this report. The inspector discussed the scope and findings of the inspection. At no time during this inspection was written material provided to the licensee by the inspector.