NORTHEAST UTILITIES

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September 23, 1992

Docket No. 50-336
B14247

Re: SGRP

Mr. Thomas T. Martin
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Dear Mr. Martin:

Millstone Nuclear Power Station, Unit No. 2
Steam Generator Replacement Project Inspection (50-336/92-26)
Information Update Letter

Mr. J. Carrasco and Mr. S. Chaudhary, Region I Staff inspectors, performed an inspection of the Millstone Unit No. 2 Steam Generator Replacement Project (SGRP) during the week of August 31, 1992. At the exit meeting held on September 4, 1992, the inspectors expressed concerns on the reactor coolant system (RCS) pipe movement and plan for resolution. The inspectors also requested that Northeast Nuclear Energy Company (NNECO) keep the Staff informed regarding the status of the resolution. The intent of this letter is to address the Staff's concerns and to provide a status update regarding the pipe movement.

NNECO continues to investigate the source of the pipe movement. The root-cause determination is in progress. Upon further review of the stress analysis of record and a search of construction records, NNECO can account for the observed displacement (i.e., direction) of the RCS cold-leg piping. We also can account for the magnitude of the displacement, but not the absolute amount. Major contributors are the design deadweight of the piping, weld shrinkage, and the out-of-sequence stress relief of the cold-leg piping performed during original construction.

Attachment 1 provides a chronology of events for the SGRP activities related to the RCS pipe cutting and repositioning. It can be seen from the chronology that NNECO has carefully monitored and performed the necessary engineering analysis in moving the RCS piping to prevent pipe damage or an overstress condition. It is important to note that the repositioning of the RCS piping was concurrent with the NRC Staff inspection of August 31 to September 4, 1992. As such, while NNECO had established an action plan, due to a number of unknowns, it was preliminary and subject to change.

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Attachment 2 is the action plan that was presented to the inspectors during their inspection. Due to new information, that action plan has been modified. Attachment 3 provides the revised action plan.

The RCS was restored to its unrestrained state and maximum displacements have been measured. The net displacement (i.e., maximum displacements observed corrected for the design deadweight displacement) has been input as "cold" spring in the RCS piping model. This preliminary analysis indicates stresses well within ASME code allowables. Reactor vessel, reactor coolant pump, and steam generator nozzle loads were reviewed and found acceptable. As such, the SGRP personnel intend to utilize jacking, remachining, etc., to attain proper weld fit-up of the RCS pipe to the steam generators. The final imposed displacement will be measured and the stress analysis will be reconciled.

We trust you find this information useful toward keeping the Staff informed on the developments of the Millstone Unit No. 2 SGRP. If you have any additional questions, please contact my staff.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: J. F. Opeka
Executive Vice President

BY: W. D. Romberg
W. D. Romberg
Vice President

cc: T. T. Martin, Region I Administrator
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2
P. D. Swetland, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

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Attachment 1

Millstone Nuclear Power Station, Unit No. 2

Steam Generator Replacement Project Inspection (50-336/92-26)
Information Update Letter

RCS Pipe Cutting Chronology

September 1992

Millstone Nuclear Power Station, Unit No. 2
Steam Generator Replacement Project Inspection (50-336/92-26)
Information Update Letter
RCS Pipe Cutting Chronology

Date	Event
July 12, 1992	Steam Generator 2 piping severed with noticeable movement of both cold legs.
July 13, 1992	Meeting held with representatives of Asea Brown Boveri (ABB)/Combustion Engineering (CE), Fluor Daniel, and NNECO to discuss pipe movements and establish proper action plan for resolution. Walkdown by CE confirmed movements.
July 17, 1992	Initial pipe pull on Loop 2B in both axial and lateral directions. Pull limited to 24 kips resultant force. (CE calculations allowed 40 kips.) Load cells used to monitor forces. Contracted AEA O'Donnell, Inc., to provide stress evaluation services.
July 18, 1992	Loop 2, Pump B, pulled with 24 kips resultant force. Pump deflection measured in three dimensions. AEA O'Donnell arrived on-site to begin evaluation of pipe movement. Meeting with ABB/CE, AEA O'Donnell, Fluor Daniel, and NNECO to set up action plan.
July 21-22, 1992	Cold-leg pipes spread on Loop 2 by using pancake jacks between lugs welded on the pipe elbows and steam generator nozzles. 80 kips total force allowed from CE calculation. Actual force was 70 kips on B leg and 53 kips on A leg. This was to enable the temporary nozzle closure plates to be welded and the steam generator to be removed.
July 25, 1992	Load transferred from pancake jacks to steam boat ratchets.
August 14, 1992	Loop 1 pumps restrained in two directions. Loads calculated by Byron Jackson to allow for rigid struts with load cells for monitoring. Hot leg and Cold Leg A cut.
August 21, 1992	Loop 1B axial positioner completed and B leg cut.
August 27, 1992	Loop 2B axial steam boat ratchet restraint transferred to lateral and vertical hydraulic positioners.

Date	Event
August 28, 1992	Loop 2A axial steam boat ratchet restraint transferred to lateral and vertical hydraulic positioners.
August 31, 1992	NRC entrance meeting.
September 1, 1992	Initial reposition attempt on Loop 2A.
September 2, 1992	Continued reposition attempts on 2A. NRC walkdown of Loop 2. Removed two split nut spring can restraints on 2A with no assist on repositioning.
September 3, 1992	Remaining split nuts removed on Pump 2A with no assist on repositioning.
September 9, 1992	Pipe restraints removed and maximum displacements determined.
September 11, 1992	Project direction to use positioning devices and remachining of pipe to attain weld join fit-up.

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Attachment 2

Millstone Nuclear Power Station, Unit No. 2

Steam Generator Replacement Project Inspection (50-336/92-26)
Information Update Letter

Pipe Stress Analysis Action Plan

September 1992

Millstone Nuclear Power Station, Unit No. 2
Steam Generator Replacement Project Inspection (50-336/92-26)
Information Update Letter
Pipe Stress Analysis Action Plan

- Step 1

  Determine the current state of stress in reactor coolant system (RCS) loop piping and components.

  -- Task 1

     Model the as-is RCS conditions (with steam generators removed) as given by piping end displacements, restraint loads, spring settings, etc., to determine the current state stresses.

  -- Task 2

     Use the original RCS model with preloaded and unloaded springs with temporary deadweight support to perform deadweight and thermal analysis. Determine if the system is at zero state of stress when hot. Release at steam generator to determine force and displacements of hot leg and cold leg.

- Step 2

  Determine the state of stress to effect fit-up.

  Determine the forces required to displace the pipe into fit-up position. Add/remove temporary supports and adjust spring settings as required to effect fit-up. Ensure that stresses are acceptable and do not exceed code allowables.

- Step 3

  Perform pressure, deadweight, thermal, dynamic characteristics (frequency, mode shapes, mass participation factor), fatigue checks to ensure that the cold preloaded RCS loop will meet the existing code requirements.

- Alternate paths may also be pursued.

  -- Buttering pipe ends
  -- Spool pieces/elbow
  -- Refined analyses

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Attachment 3

Millstone Nuclear Power Station, Unit No. 2

Steam Generator Replacement Project Inspection (50-336/92-26)
Information Update Letter

Revised Action Plan

September 1992

Millstone Nuclear Power Station, Unit No. 2
Steam Generator Replacement Project Inspection (50-336/92-26)
Information Update Letter
Revised Action Plan

- Step 1

  Release all externally applied restraints, excluding design basis support scheme, and allow the piping to move freely. Record free end displacements.

- Step 2

  Review design basis calculations and fabrication records to explain observed free-end displacements.

- Step 3

  Model unaccounted free-end displacement as "cold" spring in the reactor coolant system (RCS) piping model. Evaluate piping and reactor vessel, reactor coolant pump, and steam generator nozzle loads to determine acceptability in accordance with ASME code.

- Step 4

  Based on an acceptable ASME Code analysis in Step 3, jack machine RCS piping back into position measured prior to cutting old steam generator.

- Step 5

  Weld steam generator nozzles.

- Step 6

  Verify that pipe free-end displacement which cannot be restored is bounded by the "cold" spring analysis in Step 3.