

Richard B. Abbott
Vice President
Nuclear Engineering

Phone: 315.349.1812
Fax: 315.349.4417

May 21, 1999
NMP1L 1436

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

RE: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Subject: *Generic Letter 94-03, "Intergranular Stress Corrosion Cracking of Core Shrouds in Boiling Water Reactors," Request for Approval Under the Provision of 10CFR50.55a(a)(3)(i) for Modification of the Four Stabilizer Assemblies (Tie Rods) for Nine Mile Point Unit 1 (NMP1)*

Gentlemen:

By letters dated January 6 and 23, 1995, Niagara Mohawk Power Corporation (NMPC) proposed a repair of the Nine Mile Point Unit 1 (NMP1) core shroud by installation of four stabilizer assemblies (i.e., tie rods). The Staff approved the proposed repair in its letter dated March 31, 1995, as an alternate to the American Society of Mechanical Engineers (ASME) Code as allowed by 10CFR50.55a(a)(3)(i). This alternate repair was installed during the 1995 refueling outage (i.e., RFO13).

Subsequently, during the 1997 refueling outage (i.e., RFO14), NMPC identified the need for modification of tie rod lower wedge assemblies by letter dated April 8, 1997. The Staff also approved this modification, which was installed during RFO14, as an alternate to the ASME Code by letter dated May 8, 1997.

The purpose of this submittal is to request Staff approval of a proposed modification to each of the four tie rods pursuant to 10CFR50.55a(a)(3)(i). A visual examination of a tie rod during the current outage (i.e., RFO15) revealed that a 3/8 inch cap screw had failed and that the broken portion was dislodged from the upper spring assembly. An extent of condition evaluation for the upper spring identified other cap screw locations on each of the tie rods that could experience similar failures in the future. In addition, although determined to be acceptable, visual examination of the reactor pressure vessel (RPV) cladding revealed areas of scratches and some evidence of wear at the locations where the upper spring of the four tie rods comes into contact with the RPV cladding.

Accordingly, a proposed modification will replace the design function of the failed cap screw and other cap screws that have the potential for future failure. The modification includes changes to each end of the upper spring for each of the four tie rods. This proposed modification also contains provisions to prevent the creation of loose parts in the reactor vessel due to the potential for failure of the subject cap screws. In addition, the modification includes rounding off the

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leading edges of the upper wedge and upper contact of the upper spring for the four tie rods as a preventative measure to reduce stresses on the tie rods and to reduce the likelihood of future wear on the cladding of the RPV.

The proposed modification is being submitted to the Staff for review and approval as an alternative repair pursuant to 10CFR50.55a(a)(3)(i). This submittal contains the basis for concluding that the modification provides an acceptable level of quality and safety. Approval of this proposed alternative is requested prior to June 7, 1999, which is the scheduled startup date of NMP1.

Enclosure 1 contains a summary of the tie rod inspection findings.

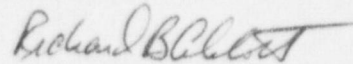
Enclosure 2 contains a summary of the root cause evaluation of the failure of the cap screw.

Enclosures 3 and 4 contain the design documents that describe the proposed modification of the tie rods. Specifically, Enclosure 3 contains four figures which depict the modification to the tie rods and a design stress report. Enclosure 4 contains a summary of the 10CFR50.59 safety evaluation of the proposed changes (i.e., the modification of the tie rods) to the facility as described in the Updated Final Safety Analysis Report (UFSAR). NMPC has concluded that the modification of the tie rods would not involve an unreviewed safety question.

The root cause evaluation provided in Enclosure 2 is preliminary in that it acknowledges one cause with the potential for the inclusion of two other causes. Specifically, the root cause of the cap screw failure was intergranular stress corrosion cracking in the alloy X-750 material driven by large, sustained differential thermal expansion stress due to fastening of dissimilar materials with the cap screw. A potential contributing cause was the sustained stresses that were attributed to the torquing of the cap screw associated with the original assembly of the tie rods. A second potential contributing cause was the stresses associated with friction between the vessel wall and the upper spring contact points. The proposed modification, as evaluated in NMPC's safety evaluation, already considers the combined effects of the one cause plus the two potential contributing causes. Therefore, it is expected that the proposed modification and the basis for concluding that it provides an acceptable level of quality and safety will be unaffected by our final evaluation of the two potential contributing causes. NMPC will provide the results of our final root cause evaluation within 30 days following restart of the unit.

In addition, NMPC is continuing to evaluate the extent of condition beyond the upper spring. Most of the evaluation has been completed and NMPC to date has concluded that no additional modifications are required to support restart of the unit other than those indicated in this letter. By May 28, 1999, NMPC will provide the Staff the results of our final extent of condition evaluation.

Very truly yours,



Richard B. Abbott

Vice President - Nuclear Engineering

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xc: Mr. H. J. Miller, NRC Regional Administrator
Mr. S. S. Bajwa, Section Chief PD-I, Section 1, NRR
Mr. G. K. Hunegs, NRC Senior Resident Inspector
Mr. D. S. Hood, Senior Project Manager, NRR
Records Management

ENCLOSURE 1

SUMMARY OF THE TIE ROD INSPECTION FINDINGS

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The re-inspection plan for the core shroud tie rods was provided to the Staff in NMPC's letter dated December 30, 1998 and approved by letter dated March 24, 1999. The tie rod inspections included a combination of visual examinations.

Visual inspections (i.e., overall visual scan and the VT-3/EVT-1 visual examinations) were performed on each of the four tie rods. The following observations were made:

1. Adequate contact and engagement was verified at specified locations.
2. The tie rods were confirmed to be visually tight by verifying that contact existed at the clevis pin-to-hook interface and other critical locations.
3. Deflection measurements made on the RFO14 modified lower wedge latches indicates no significant loading and confirms the integrity of the modified latch design.
4. Enhanced visual examinations of all the tie rod latches confirmed the integrity of the latches.

After completion of the overall visual scan and the VT-3/EVT-1 visual examinations, tightness inspections were performed on each of the four tie rods. The tightness inspections demonstrated that sufficient preload was maintained for each of the four tie rods.

The degraded condition of the four tie rods was discovered during the tightness inspections. Specifically, the post-torquing visual inspection of the critical areas of the 166 degree tie rod revealed that a 3/8 inch cap screw made of alloy X-750 material had failed and the broken portion had dislodged from the upper spring assembly. The broken portion included the cap screw head and part of the threaded screw. Approximately 2 to 3 threads were included with the broken portion. The failed cap screw is one of the four cap screws that attaches the upper spring bracket to the upper spring.

Performance of the torquing activity during the tightness inspections for three of the tie rods does not require the removal of the upper springs. However, performance of the torquing activity on the 166 degree tie rod requires removal of the upper spring to allow engagement of the tie rod torque wrench to the tie rod nut due to interference with the shroud head bolt lugs. This interface does not exist at the other three tie rod locations. After completing the torquing activity, the upper spring was re-installed. Subsequently, a visual re-inspection was performed on the 166 degree tie rod. It was this visual re-inspection that identified the degraded condition (i.e., a broken cap screw).

Visual examination of the reactor pressure vessel (RPV) cladding revealed areas of scratches and some evidence of wear at the locations where the upper spring of the four tie rods comes

into contact with the RPV. This wear was most noticeable at the upper contact location on the RPV cladding for the 166 degree tie rod. Specifically, the wear included evidence of metal deformation.

ENCLOSURE 2

**SUMMARY OF
ROOT CAUSE EVALUATION**

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The core shroud tie rod assemblies at Nine Mile Point Unit 1 were designed and installed during RFO13 in 1995, to replace shroud welds H1 through H7. There are four tie rod assemblies and each assembly includes an upper spring. The upper springs are attached to an upper spring bracket by (4) 3/8" cap screws. The upper spring and cap screws are made of alloy X-750 material and the upper spring bracket is made of Type 316 stainless steel.

During the 1999 outage, a cap screw was found to be broken during a visual inspection of the 166 degree tie rod assembly. An evaluation identified the root cause to be intergranular stress corrosion cracking (IGSCC) in the alloy X-750 cap screw material in conjunction with large, sustained differential thermal expansion stress due to fastening of dissimilar materials with the cap screw. A potential contributing cause was the sustained stresses that were attributed to the torquing of the cap screw associated with the original assembly of the tie rods. A second potential contributing cause is the stresses associated with friction between the vessel wall and the upper spring contact points.

The broken cap screw was shipped to the General Electric (GE) Vallecitos Center for metallurgical evaluation. The results of the metallurgical evaluation confirm IGSCC as the failure mechanism. The tie rod dissimilar metal connections affected by this condition exists at two locations per tie rod assembly. These locations involve four cap screws at the upper end and two cap screws at the lower end of each upper spring. A modification to the upper spring assembly has been designed so as to eliminate this problem and will be installed during the current outage.

ENCLOSURE 3

MODIFICATION FIGURES AND DESIGN STRESS REPORT

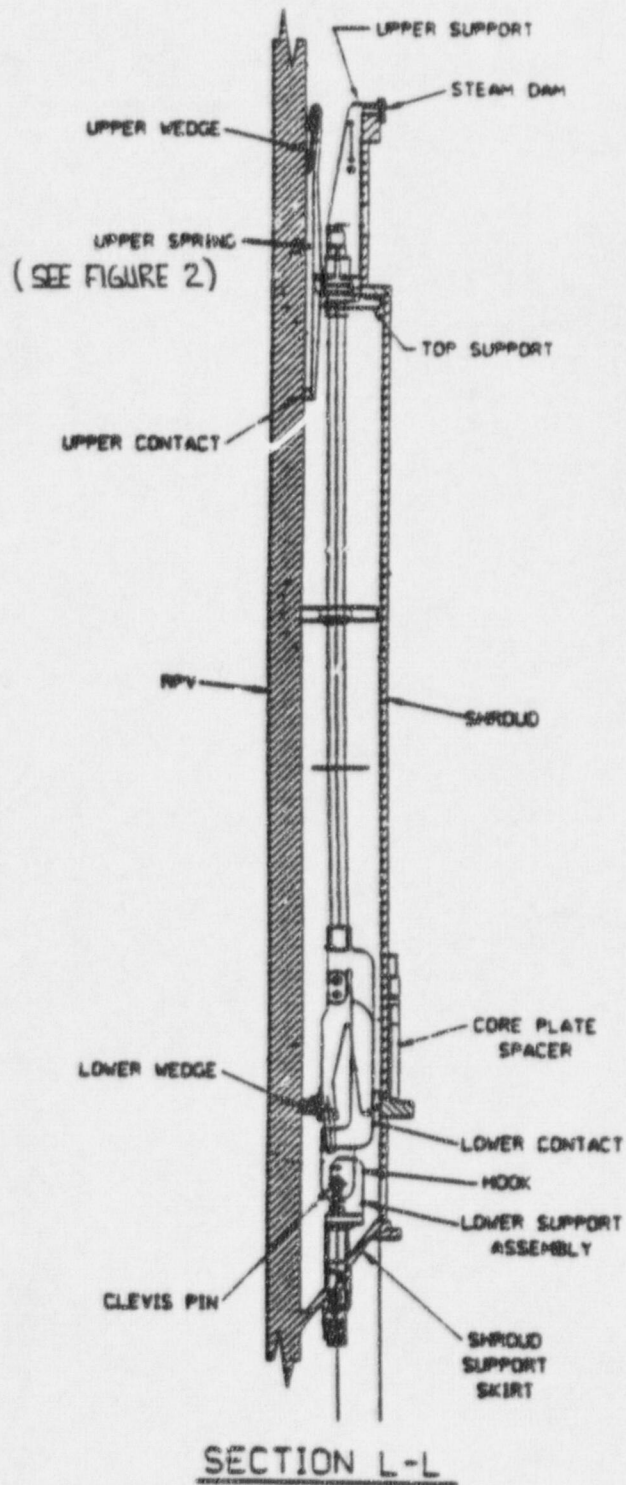
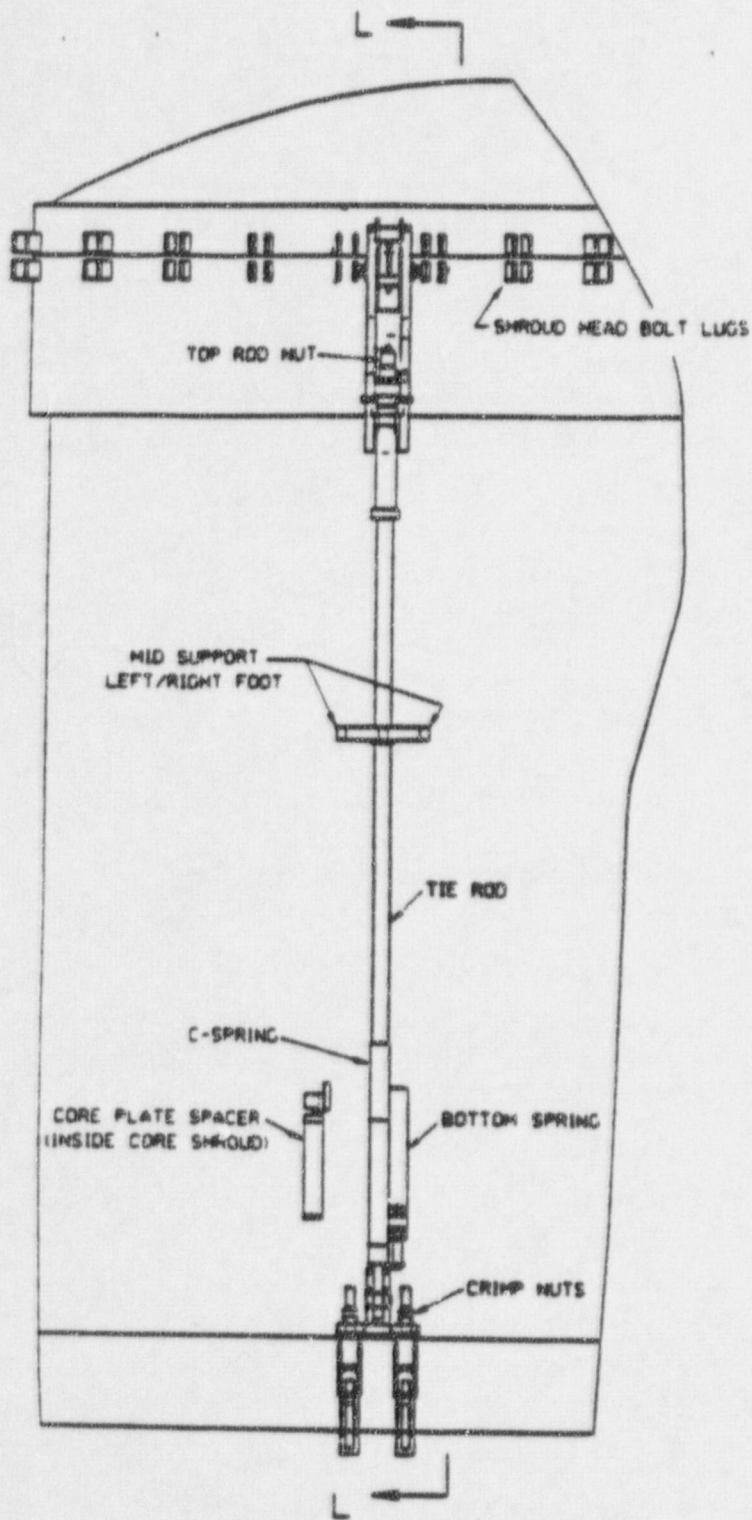
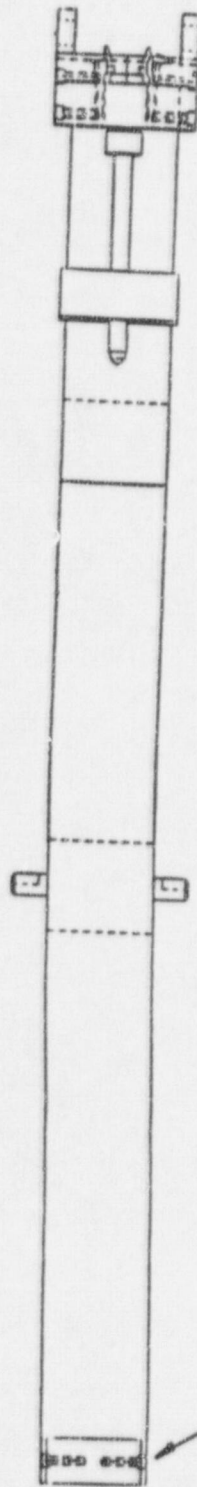
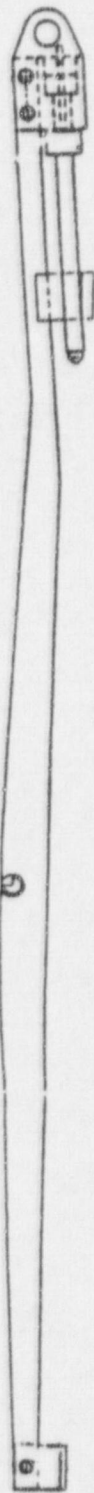


FIGURE 1 — CORE SHROUD STABILIZERS



SEE FIGURE 3
FOR REPAIR DESIGN

SEE FIGURE 4
FOR REPAIR DESIGN

FIGURE 2 - UPPER SPRING

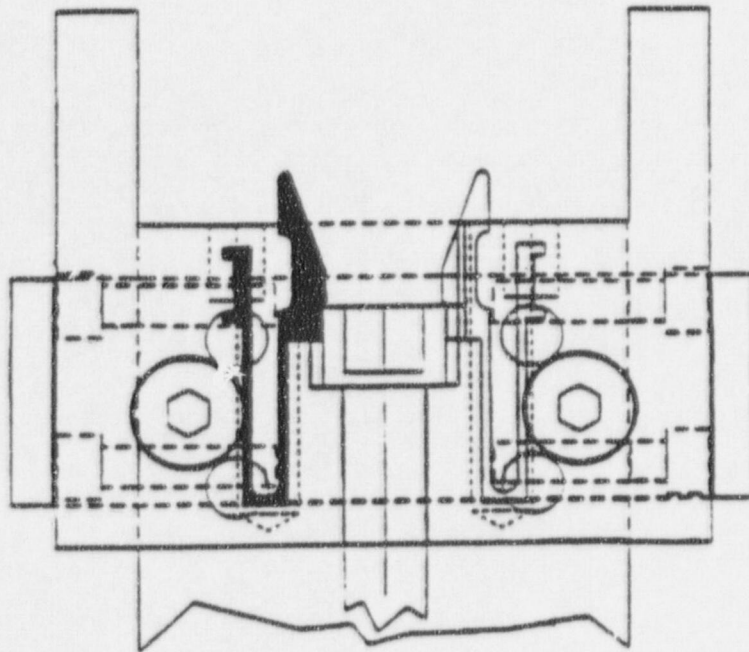
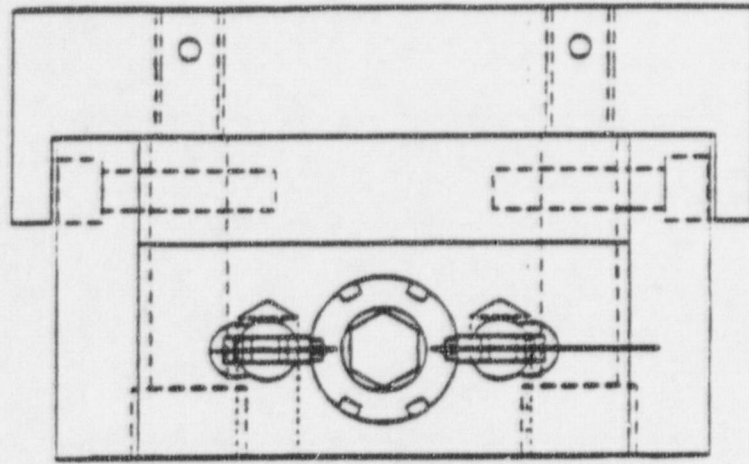


FIGURE 3 - UPPER CLAMP INSTALLATION

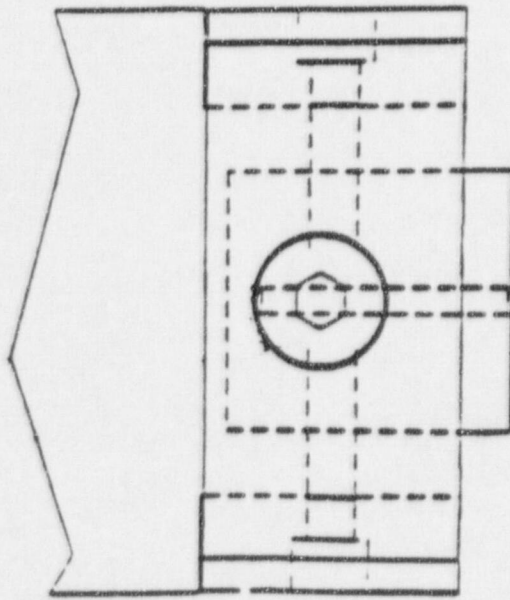
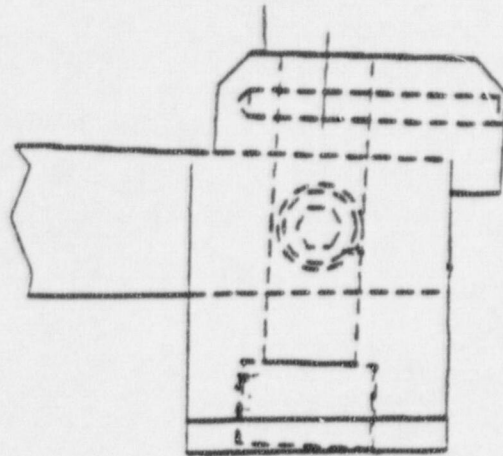


FIGURE 4 - LOWER CLAMP ASSEMBLY