P.O. Box 63
Lycoming, New York 13093

Constellation Energy Group

Nine Mile Point
Nuclear Station

December 13, 2002
NMP1L 1702

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

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

Inspection of Core Shroud Support Weld H9
TAC No. MB6893

Gentlemen:

By letter dated August 2, 2001, Niagara Mohawk Power Corporation (NMPC), then the operating licensee for Nine Mile Point Unit 1 (NMP1), proposed performance of a supplemental sample volumetric inspection of the reactor pressure vessel (RPV) at the H9 weld attachment location during refueling outage number 17. (Weld H9 is the core shroud conical support plate to RPV weld.) The inspection was to be conducted in accordance with BWRVIP-38, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines," to confirm that flaw indications in the H9 Alloy 182 weld material are confined to the weld material. In its safety evaluation dated October 31, 2001, the NRC staff concluded that the proposed inspection was consistent with BWRVIP-38.

Nine Mile Point Nuclear Station, LLC (NMPNS) requests NRC approval of an extension allowing completion of the above sample volumetric inspection by the end of refueling outage number 18 instead of during refueling outage number 17. Attachment 1 to this letter provides the necessary background and justification for this request. NMPNS requests NRC approval by March 1, 2003, to support outage planning for refueling outage number 17, which is expected to begin in March 2003.

Very truly yours,

Bruce S. Montgomery
Manager Engineering Services

BSM/IAA/jm
Attachment

A001

xc: Mr. H. J. Miller, Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector
Mr. P. S. Tam, Senior Project Manager, NRR (2 copies)

ATTACHMENT 1

Weld H9 Supplemental Inspection

A. Background

The inspection of the reactor pressure vessel (RPV) at the H9 weld attachment location, currently scheduled for refueling outage number 17 (RFO-17) at Nine Mile Point Unit 1 (NMP1), is based on the supplemental inspection requirements of BWRVIP-38 (Reference 1); i.e., if cracking is identified in the RPV attachment weld, the inspection (or additional inspections if necessary) should confirm that cracking has not propagated into the RPV low alloy steel (LAS). During refueling outage number 16 (RFO-16), an ultrasonic (UT) inspection was performed to establish the baseline condition of the H9 weld inner diameter (ID) surface (below the core plate), as required by the NRC's safety evaluation on BWRVIP-38 (Reference 2). This UT inspection was qualified in accordance with the standards of BWRVIP-03 (Reference 3) and identified indications in the weld H9 material. However, the UT inspection (performed from inside the vessel) could not confirm if the indications had propagated into the RPV LAS.

Unexpectedly high drywell dose rates were encountered at NMP1 during RFO-16. In order to maintain as low as reasonably achievable (ALARA) occupational dose, the supplemental inspection required by BWRVIP-38 was deferred from RFO-16 to RFO-17. By Reference 4, Niagara Mohawk Power Corporation (NMPC), then the operating licensee for Nine Mile Point Nuclear Station, submitted the RFO-16 inspection results, the proposed weld H9 supplemental inspection planned for RFO-17, and the basis for continued operation until completion of the supplemental inspection in RFO-17.

Reference 4 defined the weld H9 proposed inspection plan for RFO-17 based on a volumetric inspection of the H9 weld flaws at three RPV recirculation nozzle locations (N1A, N1C, and N1E). The selection of these three nozzle locations was partly based on access considerations as these locations were scheduled to undergo the nozzle to vessel weld examinations required by Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) during RFO-17. Reference 4 clarified that the volumetric inspection of the RPV LAS at these locations would require an outer diameter (OD) inspection using current technology. The inspection approach was limited to the suction nozzle locations because these are the only locations that provide access to the RPV outer diameter (OD) due to vessel insulation interference considerations. The inspection plan provided coverage of two of the four indications that matched the BWRVIP-03 (Reference 3) mockup as well as covering a sample of other ID indications characterized as likely "Tsuruga like" axial indications. In its plant specific safety evaluation (Reference 5), the NRC accepted NMPC's proposed inspection plan for RFO-17 and stated that it was consistent with BWRVIP-38.

B. Proposed Change and Its Justification

The proposed change will allow completion of the RPV OD volumetric inspections at the weld H9 location by the end of refueling outage number 18 instead of during refueling outage number 17, based on the following justification.

BWRVIP-38 requires that flaws identified in the H9 weld be characterized and evaluated to determine if the flaws extend into the RPV LAS. The flaw characterization is required to complete the evaluation required by subsection IWB-3600 of Section XI of the ASME Code. The inspection performed in RFO-16 was not capable of completing the required flaw depth characterization. The indications were located in the H9 weld with depth orientation towards the vessel wall. The RFO-16 ID UT inspection technique was not capable of depth resolution beyond qualitative determination of orientation and depth as compared to the plant specific H9 mockup. BWRVIP-38 allows for a plant specific evaluation if BWRVIP-38 requirements cannot be completed. Accordingly, a plant specific evaluation was performed for NMP1, and then submitted for NRC review in Reference 4. In Reference 5, the NRC staff accepted the NMP1 plant specific evaluation as consistent with BWRVIP-38.

Reference 4 provided the results of evaluations to establish that the probability of failure associated with the observed indications, even after conservatively assuming that these indications extend to the LAS, is extremely low. The evaluations calculated the allowable operating interval assuming flaw propagation into the RPV based on BWRVIP-60 (Reference 6) crack growth rate assumptions. Based on these assumptions, the evaluation concluded that it would take an operating interval in excess of 100,000 hours for an assumed crack at the RPV ID to exceed the ASME Code subsection IWB-3600 allowable flaw depths. Additionally, the evaluation concluded that the probability of propagation of any of the H9 indications into the RPV LAS was extremely low. The industry data supporting this conclusion included the Tsuruga inspection data, which showed no propagation into the RPV LAS.

Reference 4 also cited a supplemental probabilistic fracture mechanics review of the significance of the H9 Alloy 182 weld indications on the NMP1 vessel integrity. This review was a plant specific study that considered both Tsuruga-like axial cracking in the Alloy 182 weld and the circumferential cracking in the Alloy 182 weld that were identified during the RFO-16 inspection. The study considered the Alloy 82/182 weld pad residual stress and stress corrosion propagation in the LAS in accordance with BWRVIP-60 (Reference 6). The study assumed a 40-year plant design life and concluded that the failure probabilities associated with the above scenario were slightly lower than the failure probabilities for the vessel axial welds in the beltline region.

Reference 4 concluded that the required ASME Code Section XI operating margins would be maintained for at least one additional two-year operating cycle prior to completing the required supplemental inspections. This conclusion was based on engineering judgement that crack propagation into the LAS to any significant depth was highly unlikely considering the industry inspection history, the BWRVIP-60 crack growth and IWB-3600 evaluation, and the probabilistic risk assessment.

Subsequent to the NMP1 inspection in RFO-16, several boiling water reactors, including Oyster Creek, which has essentially the same BWR/2 H9 weld configuration as NMP1 and Tsuruga, have performed the BWRVIP-38 baseline vessel OD volumetric inspections at the H9 weld location. These baseline inspections have identified no indications in the RPV LAS associated with service induced cracking at the H9 weld location. The Oyster Creek inspection included three nozzle locations with coverage of approximately 10% per nozzle. The Oyster Creek OD inspection coverage achieved was approximately 30% of the circumference compared with the NMP1 ID coverage of approximately 80%. The Oyster Creek inspection did not identify any axial cracking (similar to Tsuruga) or cracking similar to NMP1 in the H9 weld with the exception of a single 4 inch long circumferential indication that was characterized as a service induced flaw. Although the Oyster Creek inspection results do not represent a bounding condition relative to the NMP1 H9 inspection results, the Oyster Creek data does add to the industry database that shows no known instance of a H9 weld crack propagating into the RPV LAS. However, it is important to recognize that the OD inspection technique detection capability for axial flaws in the attachment weld is not equivalent to the detection capability for axial flaws occurring in the RPV LAS. The BWRVIP vessel H9 mockup uses notches in the weld to simulate flaws and therefore the probability of detection of tight interdendritic stress corrosion cracking in an axial orientation has not been established for this method.

BWRVIP-104 (Reference 7), issued in September 2002, contains evaluations and recommendations to address core shroud support cracking in BWRs. BWRVIP-104 includes a generic probabilistic fracture mechanics evaluation that considers Tsuruga-like attachment weld axial cracking. The results consider a plant design life of 40 years and conclude that there are no failures due to fracture and leakage during normal operation for the lower shroud support cracking into the RPV base metal for all residual stress cases considered. The BWRVIP-104 evaluation concludes that the conditional failure probabilities for the Tsuruga like axial cracking with propagation into the LAS at the H9 location due to low temperature operating pressure (LTOP) transient conditions, are generally lower than those for the RPV shell axial welds in the beltline region as described in BWRVIP-05 (Reference 8). The overall conclusion of BWRVIP-104 is that if flaws are present in the attachment weld, the inspection should verify that the flaws have not propagated into the RPV LAS. BWRVIP-104 also indicates that when OD access is limited, sample inspection is an acceptable alternative. It should be noted that the NMP1 vessel is approximately 2 inches thicker than assumed in the BWRVIP-104 generic assumptions, which ensures that the BWRVIP-104 evaluation is conservative for NMP1.

Based on the above discussion, the risk of RPV failure or leakage due to H9 attachment weld cracking remains extremely low through the end of RFO-18 and the proposed change to the inspection plan is consistent with BWRVIP-38 guidelines and the proposed BWRVIP-104 recommendations.

It should also be noted that the ASME Code Section XI inservice examinations previously planned for RFO-17 have been rescheduled to RFO-18. This rescheduling was due to elevated drywell dose rate projections for RFO-17 and is consistent with the ASME Code as both RFO-17 and RFO-18 will occur within the second inservice inspection period. Performance of the weld H9 RPV OD inspection during RFO-17, as described in Reference 4, would make it necessary to open up access to nozzle locations N1A, N1C, N1E from inside the drywell. The estimated dose for completing these inspections during RFO-17 is approximately 45 man-rem (total). The flexibility to complete these inspections by the end of RFO-18 will give Nine Mile Point Nuclear Station, LLC (NMPNS) the ability to maintain the occupational dose rates ALARA based on optimized inspection planning and the added potential for dose rate reduction due to reactor coolant piping decontamination, which is currently being considered for RFO-18.

C. Conclusion

NMPNS considers an extension until the end of RFO-18 for completing the weld H9 supplemental inspection to be justified based on continued reactor safety considerations as well as occupational dose considerations.

D. References

1. BWR Vessel and Internals Project, BWR Shroud Support Inspection and Flaw Evaluation Guidelines (BWRVIP-38), September 1997

2. NRC's Final Safety Evaluation of the "BWR Vessel and Internals Project, BWR Shroud Support Inspection and Flaw Evaluation Guidelines (BWRVIP-38)," July 24, 2000

3. BWR Vessel and Internals Project, Reactor Pressure Vessel and Internals Examination Guidelines (BWRVIP-03), November 1997

4. NMPC-NRC letter dated August 2, 2001, Inspection Results for Core Shroud Support Welds H8 and H9

5. NRC-NMPNS letter dated October 31, 2001, Nine Mile Point Nuclear Station, Unit No. 1 Inspection Results for Core Shroud Support Welds H8 and H9

6. BWR Vessel and Internals Project, Evaluation of Stress Corrosion Crack Growth in Low Alloy Steel Vessel Materials in the BWR Environment (BWRVIP-60), March 1999

7. BWR Vessel and Internals Project, Evaluation and Recommendations to Address Shroud Support Cracking in BWRs (BWRVIP-104), September 2002

8. BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05), September 1995