

March 20, 2003

Mr. John T. Conway  
Vice President Nine Mile Point  
Nine Mile Point Nuclear Station, LLC  
P. O. Box 63  
Lycoming, NY 13093

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT NO. 1 - INSPECTION OF CORE  
SHROUD SUPPORT WELD H9 (TAC NO. MB6893)

Dear Mr. Conway:

By letter dated December 13, 2002, Nine Mile Point Nuclear Station, LLC (NMPNS), requested Nuclear Regulatory Commission (NRC) approval of an extension allowing completion of the sample volumetric inspection of the core shroud support weld attachment H9 by the end of Refueling Outage (RFO)-18 instead of during RFO-17. This request is a revision of the inspection plan proposed by a letter dated August 2, 2001, from Niagara Mohawk Power Corporation, the former licensee, and approved by letter and safety evaluation (SE) dated October 31, 2001, from the NRC staff.

The NRC staff reviewed NMPNS's submittal and determined that the request to extend the H9 weld inspection schedule from RFO-17 to RFO-18 acceptable. Details of the NRC staff's review are set forth in the enclosed SE.

Sincerely,

**\RA\**

Peter S. Tam, Senior Project Manager, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-220

Enclosure: As stated

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

NINE MILE POINT NUCLEAR STATION, UNIT NO. 1

SCHEDULE EXTENSION OF BOILING WATER REACTOR VESSEL

AND INTERNALS PROJECT (BWRVIP)-38 SUPPLEMENTAL INSPECTION

OF CORE SHROUD SUPPORT WELD ATTACHMENT H9

NINE MILE POINT NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-220

1.0 BACKGROUND

The following three paragraphs, providing historical background of this issue, were extracted from the safety evaluation (SE) issued by the Nuclear Regulatory Commission (NRC) staff on October 31, 2001:

By letter dated October 20, 1999, the U.S. Nuclear Regulatory Commission (NRC) staff issued to Niagara Mohawk Power Corporation (NMPC, the licensee) the results of its review of the Refueling Outage 15 (RFO-15) core shroud reinspection results at Nine Mile Point Nuclear Station, Unit No. 1 (NMP1). In that document, the staff requested NMPC to provide information regarding the scope of the core shroud reinspection at least 3 months before the start of RFO-16. Accordingly, NMPC provided such information by a letter dated December 15, 2000. By letter dated April 5, 2001, the NRC staff found NMPC's core shroud reinspection scope for RFO-16 acceptable.

By letter dated August 2, 2001, NMPC submitted its core shroud support weld examination results and the associated flaw evaluation for the detected flaws at NMP1. The ultrasonic (UT) examination of the core shroud support welds H-8 and H-9 was conducted during RFO-16. The UT indications in weld H-8 were considered structurally insignificant. However, the indications in weld H-9 were moderate, and an analytical flaw evaluation was performed by NMPC to demonstrate that the unit could be operated without repair of weld H-9 for at least 10 years.

Since the flaws detected by UT in weld H-8 indicated no growth and flaws detected by a separate set of enhanced visual examination (EVT-1) could not be confirmed by UT, the staff agrees with NMPC's conclusion that the flaws in weld H-8 are structurally insignificant. Therefore, the following evaluation focused on the flaws detected in weld H-9.

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By letter dated December 13, 2002, the current licensee, Nine Mile Point Nuclear Station, LLC, requested NRC approval of an extension allowing completion of the sample volumetric inspection of the core shroud support weld H-9 by the end of RFO-18 instead of during RFO-17. The NRC staff's evaluation follows.

## 2.0 TECHNICAL EVALUATION

### 2.1 The Licensee's Request

In its December 13, 2002, submittal, the licensee stated:

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.

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.

## 2.2 NRC Staff Evaluation

BWRVIP-38 guidelines requires, for weld H-9, that a plant analysis, as documented in Appendix A, Section A.4 of BWRVIP-38, be used for establishing the required inspection coverage and inspection intervals. BWRVIP-38 inspections consist of ultrasonic examinations from the reactor vessel annulus, eddy current examinations from the annulus, and/or enhanced VT-1 visual examinations from the annulus. If a flaw is detected, an evaluation is required for effective flaw length to include non-destructive examination uncertainty, crack growth, and flaw proximity pursuant to ASME Code, Section XI. In addition, a reinspection schedule is established in accordance with the evaluation.

In its submittals dated August 2, 2001 and December 13, 2002, the licensee 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. During RFO-16, the licensee obtained 79.7% volumetric coverage and identified 34 indications for a total of 51.4 degrees for weld H-9. The licensee also identified indications that are consistent with the Tsuruga observed circumferential indications and determined that the potential for an axial cracking condition similar to Tsuruga is likely considering the similarity in the weld geometry and fabrication sequence. The licensee noted that Tsuruga inspection data showed that no propagation into the LAS vessel occurred, even with significant H9 Alloy 182 attachment weld cracking present. The licensee concluded that the overall potential for axial or circumferential crack growth into the LAS for NMP1 is equivalent to Tsuruga and that the impact of a Tsuruga-like axial cracking condition in combination with the NMP1 observed circumferential indications has been demonstrated not to change the structural margins defined by BWRVIP-38 methods.

In its August 2, 2001, submittal, the licensee provided its RFO-16 core shroud support weld examination results and the associated flaw evaluations for the detected flaws for weld H-9. The NRC staff evaluated the licensee's weld examination results and the associated flaw evaluations in its October 31, 2001, SE. The NRC staff concluded that the licensee's evaluation of the inspection results and plans for reinspections in RFO-17 were acceptable. For core shroud support weld H-9, the NRC staff also concluded that NMP1 could be operated without repair of the weld for 10 years of operation. In the same SE, the NRC staff further

noted that NMP1 is currently operating with hydrogen water chemistry and noble metal chemical addition which will significantly reduce the crack growth rate and would provide additional margins to the results of the licensee's crack growth calculations.

When performing inspections to establish the baseline condition of the H9 weld inner diameter surface as required by NRC's SE for BWRVIP-38, dated July 24, 2000, the licensee unexpectedly encountered high drywell dose rates. The licensee then deferred the inspection of weld H9 from RFO-16 to RFO-17 to maintain as low as reasonably achievable occupational doses. The licensee estimated that the dose for completing the subject inspections during RFO-17 would be approximately 45 man-rem (total). As a result of the high radiation projections, the licensee also rescheduled the ASME Code Section XI inservice examinations previously planned for RFO-17 to RFO-18. In RFO-18, the licensee is planning to decontaminate the reactor coolant system to reduce the dose rate for RFO-18 in order to perform the Section XI examinations at lower dose. This will allow the licensee to access and examine weld H-9 at a lower dose rate. Therefore, the licensee is requesting the examination of weld H-9 be deferred to RFO-18, tentatively scheduled for March 2005 (i.e., may vary by a month or two, or longer if an unscheduled outage occurs).

The NRC staff determined that for the licensee to perform the subject supplemental examinations in RFO-17 would be a significant hardship without a compensating increase in quality and safety. Based on the water chemistry, the licensee's evaluation of its inspection results and acceptance by the NRC in its SE dated October 31, 2001, the licensee's request to extend the reinspection schedule to RFO-18 for the core shroud support weld attachment H-9 provides reasonable assurance of structural integrity of weld attachment H-9.

### 3.0 CONCLUSION

The NRC staff has reviewed the licensee's December 13, 2002, submittal and concludes that for the licensee to perform the subject supplemental examinations in RFO-17 would be a significant hardship without a compensating increase in quality and safety. Therefore, the licensee's request to extend the reinspection schedule to RFO-18 for the core shroud support weld attachment H-9 is acceptable.

### 4.0 REFERENCES

- (1) BWR [Boiling Water Reactor] Vessel and Internals Project, BWR Shroud Support Inspection and Flaw Evaluation Guidelines (BWRVIP-38), September 1997.
- (2) NRC's SE of BWRVIP-38, dated July 24, 2000.
- (3) BWR Vessel and Internals Project, Reactor Pressure Vessel and Internals Examination Guidelines (BWRVIP-03), November 1997.
- (4) Letter, NMPC to NRC, "Inspection Results for Core Shroud Support Welds H8 and H9," August 2, 2001.

- (5) Letter, P. Tam of NRC to J. Mueller of NMPC, transmitting SE on weld H8 and H9 inspection, October 31, 2001.

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Date: March 20, 2003

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