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SUBJECT: Forwards TR-6801-2,Rev 1, "Mark I Torus Shell & Vent Sys Thickness Requirements Nine Mile Point Unit 1...."

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NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/301 PLAINFIELD ROAD, SYRACUSE, N.Y. 13212/TELEPHONE (315) 474-1511

February 14, 1989
NMP1L 0358

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

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

Gentlemen:

In our letter of May 27, 1988 (NMP1L 0260), we provided information regarding the Nine Mile Point Unit 1 torus wall thinning. That letter indicated that our long-term program included increased surveillance of the torus and the investigation of possible modifications such as installation of saddles at mid-bay, oxygen control, cathodic or anodic protection and coatings to mitigate the torus wall thinning concern. This letter is to inform you of the long-term actions we plan to take to ensure adequate torus wall thickness at Nine Mile Point Unit 1.

We have completed our evaluation of alternatives for providing a long-term solution to the torus wall thinning concern. Based on this evaluation, we have decided to install mid-bay saddle supports on each of the twenty torus bays. The installation of these mid-bay saddle supports will provide the required torus wall thickness margin for the life of the plant. Our current plans are to complete the installation of these mid-bay saddle supports by the end of the next scheduled refueling outage. However, we have not completed the required engineering for this modification. Therefore, we are not certain if the modification can be completed during the next scheduled refueling outage.

Due to the schedule uncertainty, we need to pursue an alternate path. As discussed with you during our April 26, 1988 meeting, we have the Certified Material Test Reports (CMTRs) for most of the torus materials. We believe that the CMTRs can be used to provide additional design margin and thus allow more time to complete the modifications. We are requesting your approval to use the CMTRs. The bases for this approval are discussed below.

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A review of the Mark I Torus Containment Program Analysis was completed in January 1988 to determine the minimum shell thickness for the torus bays. This effort included a review of the CMTRs for the torus plate material to determine if an additional margin would result when compared to the corresponding stress intensity values from the ASME Code.

Use of the allowable stress intensity based on CMTRs, instead of the present ASME Code allowable, results in an increased torus shell thickness margin of approximately .028 inches. Therefore, based on a projected corrosion rate of .002 inches per year, the minimum wall at the worst location at mid-bay bottom center would not be reached until at least the year 2000.

The attachment to this letter demonstrates that the use of actual CMTRs to determine the allowable stress intensity in the torus shell for calculating minimum shell thickness provides an acceptable level of quality and safety. Therefore, we request your approval to use the higher allowable stresses based on the use of CMTRs.

This submittal completes our actions regarding Restart Action Plan Specific Issue No. 7, Torus Wall Thinning.

Very truly yours,

NIAGARA MOHAWK POWER CORPORATION

C. D. Terry
Vice President
Nuclear Engineering and Licensing

AER/pns
6698G
Attachment

xc: Regional Administrator, Region I
Mr. R. A. Capra, Director
Ms. M. M. Slosson, Project Manager
Mr. W. A. Cook, Resident Inspector
Records Management

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT UNIT #1

DOCKET NO. 50-220

DPR-63

Description of the Problem

Our letter of May 27, 1988, provided information relative to a presentation made to Region I Representatives regarding torus wall thinning at Nine Mile Point Unit 1. The presentation included a discussion of required minimum torus wall thickness to support Mark I containment loads, using stress intensities based on actual mill certification stresses versus those allowable by the ASME Code. Our current Mark I analyses are supported by the allowable ASME code stresses.

ASME III, Division I, Subsections NE and NA, Table I-10 contain the allowable stress values for carbon steel plate used in metal containments (MC). The design stress intensity value indicated in Table I-10 for SA516, Grade 60 steel (the equivalent for ASTM A201, Grade B steel plate used in the Nine Mile Point Unit #1 torus) is 16,500 psi. Niagara Mohawk requests approval to use a design stress intensity of 17,600 psi. This value is based on the use of actual mill certification stresses as described in the Teledyne Technical Report TR-6801-2 included in our May 27, 1988, letter (copy attached).

Use of the allowable stress intensity of 17,600 psi based on actual mill certifications instead of the present Code allowable of 16,500 psi will provide an additional 1,100 psi relief. The code allowable stress intensity of 16,500 psi was used during the Mark I analysis of the torus shell material for the full range of anticipated event temperatures from 70 to 350°F. In terms of relief on the shell thickness requirements, the increased allowable will provide approximately 28 mils or 6% additional margin.

Justification

Technical Report TR-6801-2, Appendix C, presents a statistical analysis of the mean yield and ultimate strength of the torus plate material. The actual minimum yield and ultimate strengths of the material are bounded by using two sample standard deviations from the statistically estimated minimum mean values.

The ASME Code (1977 through Summer 1977 addenda) requires that the minimum yield and minimum ultimate strength of the material be used to determine the allowable stress intensity (S_{MC}) as follows:

S_{MC} at 70°F is the lessor of

$$1.1\left[\frac{5}{8} S_{Y\,min}\right] \text{ or } 1.1\left[\frac{1}{4} S_{U\,min}\right]$$

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The code allowable stress intensity is 17,600 psi at 70°F, using the actual minimum ultimate strength values minus two standard deviations from Appendix C of Technical Report TR-6801-2. We have verified that the applicable mill certifications are presented in Technical Report TR-6801-2 Appendix C. Therefore, the statistical analysis (based on actual mill certifications) supporting the new stress intensities is valid.

The current code allowable stress intensity of 16,500 psi used to support our Mark I Analyses results in a worst-case minimum wall thickness of 0.447" (at mid bay, bottom center). The minimum wall thicknesses are delineated in Table 1 of Technical Report TR-6801-2. New values for minimum wall thicknesses have been calculated and are presented in the attached table. These new values are based on the allowable stress intensity of 17,600 psi associated with actual mill certification reports.

The present situation is as follows when the design basis ASME Code allowable stress limit is applied:

Based on our UT measurements, the actual torus wall thickness has the least margin at the mid bay bottom center location. A statistical analysis of the most recent (December 1988) UT results shows the average thickness, minus one standard deviation for the most conservative data taken at mid-bay bottom center, is about 0.008" above the required minimum thickness at mid-bay bottom center of 0.447". These recent results have been compared to previous measurements dating back to 1975. The results indicate that the corrosion rate is still approximately 0.002" per year and the minimum wall of 0.447" at the worst location at mid-bay bottom center will not be reached until at least 1992. In addition, Technical Report TR-6801-2 provides methods for analyzing defects or pits where the actual torus wall can be less than 0.447" (at mid bay bottom center) and still be acceptable. For example, a pit or defect 0.2" deep and 5" in diameter (below 0.447" thickness) can exist and not compromise the Mark I containment supporting analyses.

We have performed an analysis of three long-term torus modifications for tentative implementation during the next refueling outage. The modification selected as a long-term fix is the installation of saddle supports at mid-bay (1 for each of 20 bays).

Niagara Mohawk requests approval of the higher allowable stresses based on actual mill certifications, since the saddle modification may not be completed by the end of the next refueling outage. A statistical analysis of UT measurements of the torus wall (at the bottom) indicates the presently required minimum wall 0.447" would not be reached until at least 1992, based on projected corrosion rates. However, by using actual minimum ultimate strength values the required minimum wall thickness of 0.419" would not be reached until at least the year 2000 based on projected corrosion rates.

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Attachment

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT UNIT 1

TORUS MINIMUM REQUIRED WALL THICKNESS AT MID BAY BOTTOM

Mid Bay Element #	Technical Report TR-6801-2 Table 1 Values (inches)	New Values Based on Actual Mill Cert Stress (inches)
11	0.304	0.285
13	0.362	0.339
15	0.418	0.392
17	0.446	0.418
19	0.447	0.419
21	0.425	0.398
23	0.382	0.358
25	0.320	0.300
27	0.287	0.269