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SUBJECT: Provides 90-day response to GL 97-04, "Assurance of Sufficient Net Positive Suction Head for ECC & Cotainment Heat Removal Pumps."

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JOHN T. CONWAY
Vice President
Nuclear Engineering

December 30, 1997
NMP2L 1741

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

RE: Nine Mile Point Unit 2
Docket No. 50-410
NPF-69

*Subject:* *90 Day Response to Generic Letter 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps"*

Gentlemen:

On October 7, 1997, the Nuclear Regulatory Commission issued the referenced Generic Letter (GL) regarding an issue which may have generic implications for Emergency Core Cooling System pumps. The GL required, within 90 days, that licensees provide the information outlined below for each of their facilities:

1. Specify the general methodology used to calculate the head loss associated with the ECCS suction strainers.

2. Identify the required net positive suction head (NPSH) and the available NPSH.

3. Specify whether the current design-basis NPSH analysis differs from the most recent analysis reviewed and approved by the NRC for which a safety evaluation was issued.

4. Specify whether containment overpressure (i.e., containment pressure above the vapor pressure of the sump or suppression pool fluid) was credited in the calculation of available NPSH. Specify the amount of overpressure needed and the minimum overpressure available.

5. When containment overpressure is credited in the calculation of available NPSH, confirm that an appropriate containment pressure analysis was done to establish the minimum containment pressure.

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By this letter, Niagara Mohawk Power Corporation is providing the required 90-day response. The requested information is provided on Attachment 1 to this letter.

Very truly yours,

John T. Conway
Vice President - Nuclear Engineering

JTC/TRE/cmk

xc: Mr. H. J. Miller, Regional Administrator, Region I
Mr. B. S. Norris, Senior Resident Inspector
Mr. A. W. Dromerick, Acting Director, Project Directorate I-1, NRR
Mr. D. S. Hood, Senior Project Manager
Records Management

UNITED STATES NUCLEAR REGULATORY COMMISSION

| | | |
|---|---|---|
| **In the Matter of** | ) | |
| | ) | |
| **Niagara Mohawk Power Corporation** | ) | |
| | ) | |
| **Nine Mile Point Unit 2** | ) | **Docket No. 50-410** |

John T. Conway, being duly sworn, states that he is Vice President - Nuclear Engineering of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the document attached hereto; and that the document is true and correct to the best of his knowledge, information and belief.

John T. Conway
Vice President - Nuclear Engineering

Subscribed and sworn before me,
in and for the State of New York
and the County of Oswego,
this 30 day of December, 1997

My Commission expires: 4/2/98

Eunice B. Naklick
NOTARY PUBLIC

**Eunice B. Naklick #4964683**
**Notary Public, State of New York**
**Qualified in Jefferson County**
**My Commission Expires April 2 1998**

# Attachment 1

The information requested by Generic Letter 97-04 is provided below for Nine Mile Point Unit 2 (NMP2).

1. Specify the general methodology used to calculate the head loss associated with ECCS suction strainers.

   Response:

   NMP2 uses the generic net positive suction head (NPSH) equation, $NPSHa = h_a + h_{st} - h_{vpa} - h_{fs}$, where,

   $h_a$ = Absolute pressure (in feet of liquid) on the surface of the liquid supply
   $h_{st}$ = Static height (in feet) that the liquid supply level is above the datum point
   $h_{vpa}$ = Head (in feet) corresponding to the vapor pressure of the liquid at the temperature assumed to be pumped
   $h_{fs}$ = All suction line losses (in feet) including entrance and friction losses

   $h_a$: NMP2 does not credit containment overpressure so the atmospheric pressure is assumed to equal the vapor pressure of the fluid being pumped. For NMP2, $h_a = 35.39$ ft

   $h_{st}$: NMP2 utilizes a common datum point for each pump referenced to a common location specified for each ECCS Pump. This location is an elevation point two (2) feet above the pump flange for each pump. The elevation of the Suppression Pool is calculated at a minimum draw down level of 197' 8", which is below the Technical Specification minimum (200') utilized as the starting point for the calculation. For NMP2,

   | | |
   |---|---|
   | Residual Heat Removal System (RHR) in the Low Pressure Coolant Injection System (LPCI) mode | $h_{st} = 20.38$ ft |
   | High Pressure Core Spray System (HPCS) and Low Pressure Core Spray System (LPCS) | $h_{st} = 20.34$ ft |

   $h_{vpa}$: NMP2 considers this to be based on the maximum hypothetical suppression pool temperature of 212 degree F. This assumed temperature is in excess of the maximum calculated suppression pool temperature (208 degree F). For NMP 2, $h_{vpa} = 35.39$ ft.

$h_{fs}$: NMP2 calculated both a clean and fouled head loss for the existing strainers. These strainers were evaluated by the supplier (ZURN) for a 50% clogged condition to assure head losses were less than specified for the strainers and that approach velocity was less than 1 foot per second in the fouled condition. The fouled head loss for the existing strainers was calculated for each ECCS system at pump runout flows. The strainer losses for a 50% clogged strainer are as follows:

| | |
|---|---|
| RHR (LPCI) | 0.65 psi or 1.57 ft |
| HPCS and LPCS | 1.0 psi or 2.41 ft |

Included in the $h_{fs}$ term are the frictional losses for all pipe, fittings and valves from the strainer to the pump which are calculated for each piping loop utilizing "Crane Technical Paper 410" for frictional loss factors. These factors were calculated at a minimum fluid temperature of 40 degree F to provide additional conservatism. 10% was added to the $h_{fs}$ term to account for pipe aging. For NMP2, $h_{fs}$ are as follows:

| | | |
|---|---|---|
| RHR (LPCI) | Loop A | 4.73 ft |
| | Loop B | 5.29 ft |
| | Loop C | 5.00 ft |
| | HPCS | 6.37 ft |
| | LPCS | 9.17 ft |

2. Identify the required NPSH and the available NPSH.

Response:

The NMP2 USAR does not describe NPSH margin; rather the calculations performed show that the available NPSH (NPSHa below) met the requirements of the G.E. ECCS design specifications for the required NPSH (NPSHr below) at a point 2 feet above the pump flange. This is described in Section 6.3 of the NMP2 USAR as shown below.

| | | |
|---|---|---|
| RHR (LPCI) Loop B (limiting) | NPSHr = 14 ft | NPSHa = 15.09 ft* |
| HPCS | NPSHr = 12 ft | NPSHa = 13.97 ft* |
| LPCS | NPSHr = 11.17 ft | NPSHa = 11.17 ft* |

*Presented in the USAR as $NPSH_{min}$

For evaluation of new strainers sized to account for debris loading required by NRC Bulletin 96-03, the required NPSH and available NPSH were recalculated to determine if there is adequate margin. The results of these calculations are shown below:

Approximate NPSH required for each pump @ pump runout flow (2 feet above pump flange)

| | |
|---|---|
| RHR (LPCI) Loop B (limiting) | = 8.5 ft |
| HPCS | = 3.0 ft |
| LPCS | = 5.0 ft |

The basis for the approximate NPSH required value is the certified manufacturer pump curves (Byron Jackson), also referenced to the point 2 feet above the pump flange. These curves are the same as those depicted in the USAR. Therefore, the following can be shown for each ECCS Pump:

| | | | |
|---|---|---|---|
| RHR (LPCI) Loop A | NPSHa = 15.65 ft | NPSHr = 8.5 ft | Margin = 7.15 ft |
| B | NPSHa = 15.09 ft | NPSHr = 8.5 ft | Margin = 6.59 ft |
| C | NPSHa = 15.38 ft | NPSHr = 8.5 ft | Margin = 6.88 ft |
| HPCS | NPSHa = 13.97 ft | NPSHr = 3 ft | Margin = 10.97 ft |
| LPCS | NPSHa = 11.17 ft | NPSHr = 5 ft | Margin = 6.17 ft |

3. Specify whether the current design-basis NPSH analysis differs from the most recent analysis reviewed and approved by the NRC for which a safety evaluation was issued.

Response:

The current design basis NPSH analysis is based on the original design as presented in the NMP2 USAR. Evaluations performed for NMP2 Power Uprate showed that the design basis for containment conditions and ECCS in the USAR was bounding.

4. Specify whether containment overpressure (i.e., containment pressure above the vapor pressure of the sump or suppression pool fluid) was credited in the calculation of available NPSH. Specify the amount of overpressure needed and the minimum overpressure available.

Response:

NMP2 does not take credit for containment overpressure in current calculations of NPSH.

5. When containment overpressure is credited in the calculation of available NPSH, confirm that an appropriate containment pressure analysis was done to establish the minimum containment pressure.

Response:

NMP2 does not credit containment overpressure in calculation of available NPSH; therefore, this question is not applicable.