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NUCLEAR PRODUCTION DEPARTMENT

May 25, 1984

Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
License No. NPF-13
File 0260/L-860.0
Ref: 1. May 8, 1984 NRC letter from Elinor G. Adensam to J. P. McGaughy
2. September 9, 983 MP&L letter AECM-83/0565 from L. F. Dale to Harold R. Denton
3. May 9, 1984 NRC letter from T. Novak to J. P. McGaughy
4. February 6, 1984 MP&L letter AECM-84/0026 from L. F. Dale to Harold R. Denton
5. May 24, 1984 MP&L letter AECM-84/0283 from J. B. Richard to Harold R. Denton
Response to Request for Additional Information on Proposed Changes to the Technical Specifications
AECM-84/0303

In Reference 1, the Nuclear Regulatory Commission (NRC) requested additional information on a number of the proposed changes to the Technical Specifications. A response was requested by May 25, 1984. This letter is the response to that request for additional information (RAI).

A number of the items on which requests for additional information were made require changes to previously proposed changes to the Technical Specifications or are closely related to other problem sheets identified by the Technical Specification Review Program (TSRP). As a result, the items (all submitted by Reference 2) listed on Attachment One are hereby withdrawn for future resubmittal and handling in accordance with Reference 3.

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Attachment Two provides the response to Item 1.5 of RAI. The response provides summary calculations of the net positive suction head (NPSH) available for the ECCS pumps. For each pump (RHR A, B, and C; LPCS; HPCS) the available NPSH exceeds the required NPSH. The calculations were performed to confirm the minimum suppression pool water level of 12'-8" allowed under operational conditions 4 and 5. The FSAR will be revised no later than the first FSAR update (on the schedule presented in Reference 4) to reflect these summary calculations.

As a result of recent organization changes, a proposed Technical Specification change was submitted by Reference 5. This letter includes revised organization charts, title changes and revisions to the Plant Safety Review Committee membership. Although the organization change which resulted in the proposed change was independent of the Technical Specification Review Program (TSRP), MP&L had received and was therefore aware of the concerns expressed in Item 2.0 of the RAI prior to requesting the new proposed change. The RAI involved two problem sheets, TSPS 101 and 106 both of which had been previously submitted. Because of the close relationship between TSPS 101 and 106 and Item 2.0 of the RAI and the information required for the submittal on the recent organization change, it was appropriate to include material which incorporated the changes appropriate for those two problem sheets and the related RAI in Reference 5 which, in fact, specifically supercedes and formally withdraws the previous submittal on TSPS 101. It should also be noted that Reference 5 supercedes the previous submittal on TSPS 106. As a result, that previous submittal (Item 20 of Reference 2) is hereby withdrawn. MP&L believes that it would be expeditious and, since the proposed change includes the resolution of two TSPS problem sheets, appropriate to handle the Reference 5 submittal by the process outlined in Reference 3.

Attachment Three provides a preliminary response to Item 3.0 of the request for additional information regarding the Safety Review Committee. Following discussion with your staff, a formal proposed change to the Technical Specifications will be made in accordance with the process outlined in Reference 3.

If there are any questions concerning these areas, please contact me.

Yours truly,

S H Hobbs

Sam H. Hobbs
Manager of Nuclear Safety
and Compliance

SHH/mm
Attachment

cc: (See Page 3)

cc: Mr. J. B. Richard, (w/a)
Mr. R. B. McGehee (w/o)
Mr. N. S. Reynolds (w/o)
Mr. G. B. Taylor (w/o)

Mr. Richard C. DeYoung, Director (w/a)
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. J. P. O'Reilly, Regional Administrator (w/a)
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N.W., Suite 2900
Atlanta, Georgia 30303

Attachment One

Items Withdrawn for Resubmittal

Item No. (Note 1)	RAI No. (Note 2)	TSPS No.	Comments
1	1.1	073	See Note 3
3	1.2	133	
4	1.3	123	See Note 4
10	1.4	110	
19	1.6	122	
29	1.7	105	
33	1.8	132	

Notes:

1. Item No. refers to individual items submitted by MP&L letter AECM-83/0565, dated September 9, 1983.

2. RAI No. refers to individual requests for additional information transmitted by the May 8, 1984 NRC letter.

3. RAI No. 1.1 also refers to TSPS 102 which is closely related to TSPS 073 but which has not been formally submitted.

4. RAI No. 1.3 also refers to TSPS 830 which is related to TSPS 123. The RAI actually addresses the concern of TSPS 123 only.

1.5 QUESTION: Item 15 - Minimum Suppression Pool Level (TSPS No. 126)

The proposed change to Specification 4.5.3.1 would change the minimum level of the suppression pool in operational conditions 4 and 5 from 12'-5" to 12'-8" to be consistent with other sections of the specifications. This change should be made.

However, MP&L has indicated in discussion with NRR staff that the analysis supporting this level is not in the FSAR. This level is safety significant because the suppression pool is the only seismic Category I supply of makeup for the depressurization condition of the reactor and this is the minimum level to ensure adequate net positive suction head (NPSH) for the pumps used for emergency makeup.

Provide a summary of the NPSH calculation for operational conditions 4 and 5, including assumptions, methods, and results, and also relating instrument "0" to the level assumed in the calculation. Provide also a date when this information will be included in an FSAR amendment.

RESPONSE:

Calculations of NPSH for ECCS pumps with a suppression pool water level of 12'-8" have been performed. These calculations are to support the minimum suppression pool water level allowed under operational conditions 4 and 5 per Grand Gulf Technical Specification 3.5.3.b. The following calculation summaries are in the same format as the post-LOCA ECCS pumps NPSH calculations presently contained in the FSAR (see Q & R 211.128, 211.194). All assumptions/conditions used in the calculations are provided in the summaries. For the available NPSH, the most significant parameter is the suppression pool temperature. A review of the Technical Specifications revealed that there is no temperature limit for the suppression pool water for operational conditions 4 and 5. For the calculation, a pool water temperature of 125°F was used. To assess the impact on NPSH for higher temperatures, the available NPSH for a maximum temperature of 200°F was estimated. Results are as follows:

Pumps	NPSHA @ 125 F	NPSHA @ 200 F
RHR A	33.79 ft.	10.86 ft.
RHR B	33.41 ft.	10.48 ft.
RHR C	33.55 ft.	10.62 ft.
LPCS	34.56 ft.	11.63 ft.
HPCS	32.95 ft.	10.02 ft.

The above NPSHA for the ECCS pumps exceed the required NPSH.

The suppression pool water level assumed in the calculation is elevation 105'-8", (93'-0" + 12'-8" = 105'-8") which is 2'-2" above the instrument zero level of 103'-6" elevation.

SUMMARY OF ECCS PUMPS NPSH CALCULATION

The following summarizes the calculations to determine the NPSH available (NPSHA) for the ECCS pumps for a suppression pool water depth of 12'-8" which is allowed under operational conditions 4 and 5 per Technical Specification 3.5.3.b.

From the pump manufacturer, NPSH is to be evaluated at a datum point 3 ft. above the pump mounting flange.

NPSHA RHR "A" Pump

Reference FSAR Figure 5.4-27 for suction line geometry.

NPSHA for the RHR A pump in operational conditions 4 and 5 is:

$$NPSHA = P + H_s - \Delta P_L - \Delta P_s - P_v$$

where P = containment pressure, absolute (14.7 psia)

H_s = net static head from suppression pool level at 105'-8" elevation (minimum level in operational conditions 4 and 5, 12'-8") to point 3 ft. above top of pump mounting flange at 93'-4 3/4" elevation.

ΔP_L = line losses at maximum pump flow 8940 gpm

ΔP_s = suction strainer max ΔP

P_v = absolute vapor pressure at 125°F.

then, evaluating static head (ρ at 125°F)

$$H_s = (105'\text{-}8" - 96.4 \text{ ft.})\ (61.63 \text{ lb/ft}^3)\ (\text{ft}^2/144 \text{ in}^2) = 3.97 \text{ psi}$$

line losses for the 24" schedule 30 pipe (short length of 24"-0.375" nominal wall included) evaluated at flow conditions of 8940 gpm, 125°F (includes entrance losses)

$$Re = 50.6 \frac{Q\rho}{d\mu}$$

$$\Delta P/100 \text{ ft.} = 0.0216 \frac{f\rho Q^2}{d^5}$$

where Q is Flow, GPM
ρ is Density, lb/ft³
d is Inside Dia., inches
μ is Viscosity, C.P.
f is Friction Factor

Re = 2.3 E06
f = 0.0123
ΔP/100 ft. = 0.21 psi/100 ft.

L (equiv. length of 24" piping and fittings) = 771 ft., then ΔP (24" piping) = (771 ft.) (0.21 psi/100 ft.) = 1.62 psi

line losses for 20" Schedule 20 are evaluated at 125°F, 8940 gpm

Re = 2.8 E06
f = 0.0124

ΔP/100 ft. = 0.50 psi/100 ft.

L (equiv. length of 20" Schedule 20 piping and fittings) = 39 ft.

then ΔP (20" Schedule 20) = (39 ft.) (0.50 psi/100 ft.) = 0.20 psi
finally ΔP_L = ΔP (24" piping) + ΔP (20" piping)
$= (1.62 + 0.20)$ psi
$\Delta P_L = 1.82$ psi

$\Delta P_S = 0.43$ psi (from vendor flow tests for 50% clogged strainer)

$P_V = 1.96$ psia @ 125°F

the NPSHA = 14.7 psia + 3.97 psi - 1.82 psi - 0.43 psi
- 1.96 psia
= 14.46 psi

Converting this to feet

NPSHA = 14.46 psi (144 in^2/ft^2)/61.63 lb/ft^3)

NPSHA = 33.79 feet Per FSAR Figure 5.4-20, the required NPSH at the datum point is 2 ft.

NPSHA RHR "B" Pump

Reference FSAR Figure 5.4-28 for suction line geometry

By the same method and assumptions as for "A", the following is calculated:

static head = $H_S = 3.97$ psi

Line losses for 24" Schedule 30 suction piping (including 24"-0.375" wall piping and entrance loss)

ΔP/100 ft. = 0.21 psi/100 ft.
L = 847 ft. (Equiv. length)

then ΔP (24" piping) = (847 ft.) (0.21 psi/100 ft.) = 1.78 psi
Line losses for 20" Schedule 20 suction piping

ΔP/100 ft. = 0.50 psi/100 ft.
L = 40 ft. (equiv. length)

then ΔP (20" piping) = (40 ft.) (0.50 psi/100 ft.) = 0.20 psi
finally, ΔP_L = (1.78 + 0.20) psi
$\Delta P_L = 1.98$ psi

$\Delta P_S = 0.43$ psi

$P_V = 1.96$ psi @ 125°F

then NPSHA = 14.7 psia + 3.97 psi - 1.98 psi - 0.43 psi - 1.96 psia
= 14.3 psi

in feet:

NPSHA = 33.41 feet Per FSAR Figure 5.4-20, the required NPSH at the datum point is 2 ft.

NPSHA RHR "C" Pump

Reference FSAR Figure 5.4-29 for suction line geometry

By same method and assumptions as for "A", the following is calculated:

Static head = H_s = 3.97 psi

Line losses for 24" Schedule 30 suction piping (including 24" - 0.375" wall piping and entrance losses)

ΔP/100 ft. = 0.21 psi/100 ft.
L = 816 ft. (Equiv. length)

then ΔP (24" piping) = (816 ft.) (0.21 psi/100 ft.) = 1.71 psi
Line losses for 20" Schedule 20 suction piping

ΔP/100 ft. = 0.50 psi/100 ft.
L = 42 ft. (Equiv. length)

then ΔP (20" piping) = (42 ft.) (0.50 psi/100 ft.) = 0.21 psi
finally, ΔP_L = (1.71 + 0.21) psi
= 1.92 psi

ΔP_s = 0.43 psi

P_v = 1.96 psi @ 125°F

then, NPSHA min. = 14.7 psia + 3.97 psia - 1.92 psia -
0.43 psi - 1.96 psia
= 14.36 psi

in feet:
NPSHA = 33.55 feet Per FSAR Figure 5.4-20, the required NPSH at the datum point is 2 ft.

NPSHA - LPCS PUMP

Reference FSAR Figure 6.3-70 for suction piping geometry

NPSHA for the LPCS pump in operational conditions 4 and 5 is

$$NPSHA = (P_{atm} - P_{vap}) \times \frac{144\ (in^2/ft^2)}{61.63\ lb/ft^3} + H_s - H_f - H_o$$

where:

P_{atm} = Atmosphere containment pressure, 14.7 psia

P_{vap} = Absolute vapor pressure at 125°F

H_s = Net static head from suppression pool level at 105'-8" elevation (minimum level in operational conditions 4 and 5, 12'-8") to a point 3 feet above top of pump mounting flange at 93'-4 3/4" elevation.

H_f = Frictional losses through pipe and fitting at maximum pump flow

H_o = Maximum head loss (ft) for suction strainer

Then, evaluating the static head
(ρ at 125 °F)

H_s = (105'-8" - 96.4) ft = 9.27 ft.

Line losses for the 24" - HBB-8 piping (0.375" nominal wall thickness) are evaluated at the flow conditions of 9100 gpm, 125°F.

$$Re = 50.6 \frac{Q\rho}{d\mu}$$

$$\Delta P/100 \text{ ft.} = 0.0216 \frac{f\rho Q^2}{d^5}$$

where: Q is Flow, gpm
ρ is Density, lb/ft.^{3}
d is Inside Dia., inches
μ is Viscosity, C.P.
f is Friction Factor

$Re = 2.35 \times 10^6$
$f = 0.0123$

$\Delta P/100$ ft. = 0.20 psi/100 ft.

L (Equiv. length of 24" piping and fittings) = 651 ft.

then ΔP (24" piping) = (651 ft) $\left(\frac{0.20 \text{ psi}}{100 \text{ ft}}\right)$ = 1.30 psi

Line losses for 20" HBB-8 (0.375" nominal wall thickness) are evaluated at the flow conditions of 9100 gpm, 125°F.

$Re = 2.83 \times 10^6$
$f = 0.0124$

$\Delta P/100$ ft = 0.52 psi/100 ft

L (Equiv. length of 20" piping and fittings) = 36 feet

then, ΔP (20" piping) = (36 ft.) (0.52 psi/100 ft.) = 0.19 psi

Finally: $H_f = [\Delta P\ (24") + \Delta P\ (20")]\ \frac{(144\ in^2/ft^2)}{61.63\ lb/ft^3}$

$= [1.30 + .19]\ psi\ (2.337\ \frac{ft.}{psi}) = 3.48\ ft.$

Pressure drop through 24" strainer

H_o = 1.0 ft. (from vendor flow tests for 50% clogged strainer)

P_{vap} = 1.96 psia @ 125°F

Then NPSHA = $(14.7\ psia - 1.96\ psia)\ \frac{(144\ in^2/ft^2)}{61.63\ lb/ft^3}$

+ 9.27 ft. - 3.48 ft. - 1.0 ft.

= 34.56 ft.

NPSHA = 34.56 Ft.

Per FSAR Figure 6.3-69, the required NPSH at the center suction nozzle is 2 ft. or 1'-7½" at the datum point.

NPSHA - HPCS Pump

Reference FSAR Figure 6.3 - 68 for suction piping geometry

$NPSHA = (P_{atm} - P_{vap})\ \frac{144\ in^2/ft^2}{61.63\ lb/ft^3} + H_s - H_f - H_o$

where:

P_{atm} = Atmosphere containment pressure = 14.7 psia

P_{vap} = Absolute vapor pressure at 125°F

H_s = Net static head from suppression pool level at 105'-8" elevation to a point of 3 ft. above top of pump mounting flange at 93'-4 3/4" elevation

H_f = Frictional losses through pipe and fittings at maximum pump flow

H_o = Maximum head loss (ft.) for suction strainer

Then, evaluating the static head at minimum pool water density (ρ at 125°F)

H_s = 105"-8" - 96.4" = 9.27 ft.

Line losses for the 24"-HBB-21 piping (0.375 nominal wall thickness) are evaluated at the flow conditions of 9100 gpm, 125°F.

$Re = 2.35 \times 10^6$

$f = 0.0123$

$\Delta P/100$ ft. = 0.20 psi/100 ft.

L (Equiv. length of 24" pipe and fittings) = 996 ft.

then ΔP (24" piping) = (996 ft.) $\left(\frac{.20 \text{ psi}}{100 \text{ ft.}}\right)$ = 1.99 psi

Line losses for 20" - HBB (0.375" nominal wall thickness) are evaluated at the flow conditions of 9100 gpm, 125°F.

$Re = 2.83 \times 10^6$

$f = 0.0124$

$\Delta P/100$ ft. = 0.52/100 ft.

L (Equiv. length of 20" pipe and fittings) = 37 ft.

then, ΔP (20" piping) = (37 ft.) (0.52 psi/100 ft.) = 0.19 psi

Finally $H_f = [\Delta P(24") + \Delta P(20")] \left(\frac{144 \text{ in}^2/\text{ft}^2}{61.63 \text{ lb/ft}^3}\right)$

$= (1.99 + 0.19) \text{ psi} \times 2.337 \frac{\text{Ft.}}{\text{psi}} = 5.09 \text{ ft.}$

Pressure drop through 24" strainer

H_o = 1.0 ft. (from vendor flow tests for 50% clogged strainer)

P_{vap} = 1.96 psia @ 125°F

Then NPSHA = (14.7 psia - 1.96 psia) $\left(\frac{144 \text{ in}^2/\text{ft}^2}{61.63 \text{ lb/ft}^3}\right)$

+ 9.27 ft. - 5.09 ft. - 1.0 ft.

= 32.95 ft.

NPSHA = 32.95 ft.

Per FSAR Figure 6.3-67, the required NPSH at the datum point is 4 ft.

ESTIMATED NPSHA FOR A MAXIMUM OF 200°F POOL WATER TEMPERATURE

Assuming all data remains the same except absolute vapor pressure

P_v = 11.53 psia @ 200°F, ρ = 60.11 lb/ft^3

The difference between the vapor pressure at 200°F and 125°F is

ΔP_v = 11.53 psia - 1.96 psia

= 9.57 psia

in feet:

$$= 9.57 \text{ psia} \times \frac{144 \text{ in}^2/\text{ft}^2}{60.11 \text{ lb}/\text{ft}^3}$$

= 22.93 ft.

NPSHA for the ECCS pumps at pool water temperature of 200°F are:

RHR A	NPSHA = 33.79 ft. - 22.93 ft. = 10.86 ft.
RHR B	NPSHA = 33.41 ft. - 22.93 ft. = 10.48 ft.
RHR C	NPSHA = 33.55 ft. - 22.93 ft. = 10.62 ft.
LPCS	NPSHA = 34.56 ft. - 22.93 ft. = 11.63 ft.
HPCS	NPSHA = 32.95 ft. - 22.93 ft. = 10.02 ft.

CONCLUSION:

The minimum level of suppression pool in operational conditions 4 and 5 (12'-8") is adequate for the ECCS pumps NPSH requirements.

3.0 QUESTION:

By letter dated June 14, 1983, MP&L requested that a change be made to Technical Specification 6.5.2.2 to permit the corporate Safety Review Committee (SRC) to include more than two consultants from outside MP&L as voting members of the SRC, rather than only two as Specification 6.5.2.2 permitted at the time. This request was approved, as indicated in License Amendment Number 9. However, should more than five consultants be used as voting members at any SRC meeting, the present Specification 6.5.2.6 would be inadequate. Specification 6.5.2.6 states that a quorum for the SRC shall consist of the Chairman or a delegated alternate and at least six SRC voting members. A quorum should be at least one-half of the voting members plus one. With the present eight voting corporate members, this quorum requirement could accommodate no more than five voting consultants. Furthermore, the staff does not believe that the use of outside consultants should be permitted to the extent that the decisional responsibilities of the corporate members are significantly reduced. It is conceivable that the SRC could conduct its business with the Chairman as the only corporate member - the other voting members could all be outside consultants. The staff envisions most consultants being used primarily for their expertise in particular subjects with which corporate personnel are not sufficiently knowledgeable. Therefore, the staff does not believe that more than a few consultants should be voting members at all meetings - let consultants provide knowledge that corporate members can consider when they, the corporate members, vote or otherwise take responsible action. The staff suggests that the licensee revise his proposed change to consider the staff's concerns noted above. The staff would find the following wording acceptable for Specification 6.5.2.6:

> A quorum of the SRC necessary for the performance of the SRC review and audit functions of these Technical Specifications shall consist of the Chairman or a designated alternate and at least six corporate SRC voting members including alternates. No more than three consultant members shall be voting members for any particular matter being considered. No more than a minority of the quorum shall have line responsibility for operation of the unit.

Note that the word "minimum" has been deleted from Specification 6.5.2.6; it is superfluous.

Provide a proposed change to Technical Specification 6.5.2.6 as indicated in the staff's evaluation above.

RESPONSE:

MP&L finds the NRC Staff proposed change to TS 6.5.2.6 acceptable with the exception that the modifier "corporate" in regard to SRC quorum should be deleted. This term used within MP&L generally refers to the Company's corporate offices. In this context, there are currently five members that meet that definition and, therefore, SRC quorum, by the NRC's proposed TS revision could not be met. Given this modification, the NRC Staff proposed revisions are acceptable to MP&L.

It should be noted that the use/purpose of consultants to the SRC is considered by MP&L to be broader than that discussed by the NRC Staff in Item 3.0 above. In addition to bringing in unique expertise on some subjects, consultants also provide a degree of independence from the matters under SRC review. The consultants provide comment and criticisms that are often novel and always valuable to the other SRC members who are involved in the plant's day-to-day operations. The experience and counsel that MP&L's consultants bring to focus on review items are most valuable due to the consultant independence, as opposed to unique expertise.