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TELEPHONE: AREA 704
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November 21, 1979

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. R. L. Baer, Chief
Light Water Reactor Project Branch #2

Re: McGuire Nuclear Station
Units 1 and 2
Docket Nos. 50-369, 50-370

Dear Mr. Denton:

Attached is Duke Power Company's response to the request for additional information transmitted by Mr. Robert L. Baer's letter of October 22, 1979.

Please be advised that the revised Offsite Dose Calculation Manual is still under preparation. It is our intent to provide this document for staff review by December 31, 1979. This is identified as item number 24, Radiological Effluent Technical Specifications, on the staff's milestone chart.

Very truly yours,

William O. Parker, Jr.

GAC/sch
Attachment

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5th Anniversary
DUKE POWER 1904-1979

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ENCLOSURE 1

Answers to Request for Additional Information

McGuire Nuclear Station

McGuire Milestone Item 1 (ECCS Pump NPSH)

a. The equation (signs applied as shown), the actual data and the results of the calculations of available NPSH for the Residual Heat Removal Pumps are presented in Enclosure 2. It should be noted, that no credit is taken for containment sump water level. This conservatism accounts for an additional minimum available head of 4.5 feet based on the minimum LOCA injection volume for McGuire of 238,005 gallons.

b. The results presented in Enclosure 2 were based on a maximum RHR pump runout flowrate of 5300 gpm. This maximum flowrate exceeds the RHR pump runout flowrate (5157 gpm) measured during pre-operational testing. For the in-plant test, the RHR pump discharge piping alignment was setup for the recirculation mode of operation; however, the RHR pump suction piping was aligned to the RWST. If the pump suction had been aligned to the containment sump, then pump runout would have been less than the 5157 gpm measured because of the difference in elevation head between the RWST and the sump. Therefore, the 5300 gpm flowrate used in the calculation of NPSH is conservative.

c. The McGuire sump screen design changes were analyzed by Alden Laboratory and the results were included in our August 30, 1979 letter. The reduction in screen area changed the total entrance losses from 0.4 to 0.6 inches of water. This loss was included in the NPSH calculations as shown in Enclosure 2.

McGuire Milestone Item 31 (RWST Capacity)

An alarm has been added to the McGuire switchover design to occur at automatic switchover level (73,431 gallons). This will alert the operator that the RHR pumps have been switched over automatically and that the remaining ECCS pumps must be switched over manually using the procedure in Table 6.3.2-3 starting with step 3. An analysis is presented in Enclosure 3 in support of these added measures.

ENCLOSURE 2 (Sheet 1 of 2)

Available Net Positive Suction Head (NPSH)

For Residual Heat Removal Pumps

To demonstrate that adequate NPSH is provided for the Residual Heat Removal pumps, calculations were performed for the recirculation mode which is the most limiting alignment for NPSH requirements. Available NPSH is determined from the following operation:

$$NPSH_{actual} = (h)_{containment\ pressure} - (h)_{vapor\ pressure} + (h)_{static\ head} - (h)_{loss}$$

To evaluate the adequacy of the available NPSH, several conservatisms are applied:

a. No increase in Containment pressure from that present prior to the accident is assumed.

b. The Containment sump fluid temperature is assumed to be 190°F even though the maximum temperature reached is approximately 173°F (see Figure 6.2.1-26).

c. The static elevation head is calculated from the floor evelvation of the sump (elevation 725' + 0") instead of the available water level. The elevation of the spray pump is 699'+6" (centerline of discharge pipe).

d. The head loss is evaluated based on all pumps running at the maximum runout flow with conservatively assumedfriction factors.

e. The required NPSH is based on one pump running at its maximum runout flow.

Using all of these conservative assumptions, the minimum NPSH available is calculated to be 23.4 feet and the NPSH required is 21.5 feet. The actual available NPSH will always be greater than the calculated value.

NPSH Verification Data

For RHR Pumps

Pump runout flowrate, gpm	5300
Containment pressure, psia	14.34
Vapor pressure @190°F, psia	9.34
Sump bottom elevation, ft	725
Pump suction centerline elevation, ft	699.5
Piping losses (includes 0.05 due to sump screen), ft	14.01
Density of Water @190°F, lb/ft^3	60.343

ENCLOSURE 3

Time Sequence for Switchover To Recirculation (Sheet 1 of 2)
If Operator Action is Delayed Until Second Alarm

Step[1]	Time[3][5] Req.(Sec)	Time Elasped (Sec)	RWST Flowrate (GPM)[2][6]	Change In RWST Volume (Gal)	RWST Volume[10] Remaining(Gal)
-	-	-	-	-	113,431[9]
-	-	127.7	18,800	40,000	73,431
0	60[4]	187.7	9,800	9,800	63,631
4	37	224.7	9,800	6,043	57,588
5	30	254.7	9,800	4,900	52,688
6	30	284.7	9,800	4,900	47,788
7	25	309.7	9,800	4,083	43,705
8	25	334.7	6,100	2,542	41,163
9	35	369.7	2,400	1,400	39,763
10	35	404.7	2,400	1,400	38,363
11	80	484.7	2,400	3,200	35,163
12	25	509.7	2,400	1,000	34,163
13	35	544.7	2,400	1,400	32,763
14	35	579.7	2,400	1,400	31,363
15	80	659.7	2,400	3,200	28,163
16	25	684.7	2,400	1,000	27,163
17	30	714.7	2,400	1,200	25,963
18	30	744.7	2,400	1,200	24,763
19	20	764.7	2,400	800	23,963
20	30	794.7	2,400	1,200	22,763
21	30	824.7	2,400	1,200	21,563
22	20	844.7	1,100	367	21,196
23	30	874.7	1,100	550	20,646
	332.9	1,207.6	1,100	6,103	14,543[7]
24	30.0[8]	1,237.6	1,100	550	13,993
25	60.0[8]	1,297.6	0	0	13,993
26	60.0[8]	1,357.6	0	0	13,993
		22.6 min			

ENCLOSURE 3

NOTES:

(1) See Table 6.3.2-3 for description of steps.

(2) Flow rates are based on conservatively high runout flows with two train operation during the injection mode:

RHR Pump = 4500 GPM
SI Pump = 650 GPM
CC Pump = 550 GPM
Spray Pump = 3700 GPM

(3) Valve operating times are maximum operating times. Time required to start or stop a pump is 5 seconds.

(4) An allowance of time (60 seconds) for response to the Automatic Switchover is conservative due to continuous tank level indication and the fact that the operator must recognize that the RHR Pumps have already been switched over and realign power to 1FW21A.

(5) Time required to complete the required action includes a conservative 20 seconds for operator response time for each manual procedure.

(6) The flowrate in this column is assumed to occur during the entire time interval for its respective step. This is conservative since a pump is stopping or a valve is closing, thus reducing the flowrate during the time interval.

(7) The Lo-Lo Level Alarm is actuated at 14,543 gallons above the level where vortexing could occur. This ensures that suction would never be lost for any of the pumps in the ESF Systems.

(8) These values indicate that the operator still has a sufficient amount of time remaining with all but three (3) steps completed. The centrifugal charging pumps continue to take suction from the RWST until the Lo-Lo Level Alarm is actuated.

(9) The Automatic Switchover is actuated at 73,431 gallons useable RWST volume remaining. An alarm indicates that the remaining ECCS pumps must be switched over.

(10) These RWST water volumes are minimum useable values.