

DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

September 25, 1979

TELEPHONE: AREA 704
373-4083

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

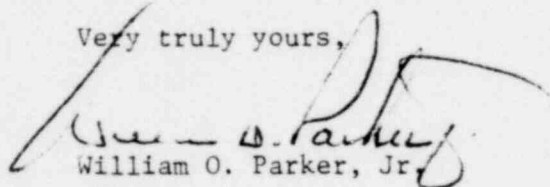
Attention: Mr. R. L. Baer

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

Dear Mr. Denton:

Please find attached Duke Power Company's response to your letter of August 15, 1979, which requested information concerning the refueling water storage tank design. If you have any questions regarding this response, do not hesitate to contact us.

Very truly yours,


William O. Parker, Jr.

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Attachment



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ENCLOSURE 1

ANSWERS TO REQUEST FOR ADDITIONAL INFORMATION MCGUIRE NUCLEAR STATION REFUELING WATER STORAGE TANK DESIGN

ITEM 1

a. Injection Requirements (LOCA)

The LOCA injection volume for McGuire is 238,005 gallons, assuming no operator action for twelve minutes after injection initiation signal and both trains of ECCS are operating at runout flow. The manual switchover begins with 113,431 gallons useable volume remaining in the RWST. Utilizing the McGuire switchover scheme, the total minimum RWST useable volume injected is 337,443 gallons.

b. Instrumentation Error

The RWST is equipped with a continuous (160 inch span) level probe. Based on information supplied by the instrument vendors, a $\pm 4\%$ (± 6.4 inch) instrument error is expected. This corresponds to a ± 5005 gallon change in RWST level.

c. Working Allowance

A 1400 gallon working allowance was added for margin to prevent alarms during normal operating volume changes due to thermal expansion, etc.

d. Transfer Allowances

A specific transfer failure allowance has not been taken into account in the RWST design; however, the McGuire switchover scheme was designed for manual switchover of the RHR and Containment spray pumps when the proper quantity of water has been transferred to the containment, very early in the transfer process; therefore, providing more than adequate transfer allowance (time) to manually transfer the safety injection and centrifugal charging pumps.

e. Single Failure Allowances

A specific single failure allowance was not required in the RWST design because the McGuire switchover scheme was designed to handle single failures and still provide more than adequate time to complete manual switchover.

f. Unuseable Volume

Due to the discharge pipe design, the RWST unuseable volume is 15638 gallons.

ITEM 2

a. Total RWST Tank Volume (Useable)

The McGuire RWST useable volume is 373,878 gallons.

ITEM 2 (Cont'd)

Technical Specification Required Volume

The current minimum required RWST volume in the McGuire Tech Spec is 350,000 gallons. This will be revised to a minimum required volume of 372,100 gallons.

Switchover Initiation

Switchover procedures are initiated at the low level alarm set point corresponding to 113,431 gallons minimum useable tank volume.

Automatic Switchover

The backup automatic switchover setpoint for the RHR pumps corresponds to 73,431 gallons of minimum useable tank volume.

Lo-Lo Level Alarm

The lo-lo level alarm set point is 14,543 gallons of minimum useable volume.

- b. The minimum useable volume remaining in the RWST following switchover from injection to recirculation using either the normal manual switchover or the automatic switchover procedure is 13,993 gallons. Single failure analysis for both operator errors and valve failures during switchover were evaluated and the results were transmitted by McGuire FSAR Revision 13 in Table 6.3.2-3B.

ITEM 3

Manual and automatic procedures and functions during switchover were previously transmitted by the McGuire FSAR Revision 13 in Table 6.3.2-3 and Table 6.3.2-3A based on nominal RWST water volumes. Times required to perform operator procedures were sufficiently justified. For single failures, only considerations for large pipe breaks are required since this minimizes the time (or volume) available for the completion of switchover (assuming maximum RWST out flow). Table 6.3.2-3A (see Enclosure 2) has been reconstructed to show actual useable RWST volume remaining as a function of switchover procedure (i.e., time). Failure analysis for the switchover scheme was transmitted in Table 6.2.3-3B. As indicated in that analysis, neither operator errors nor valve failures during manual switchover will prevent successful completion of switchover for at least one train of the ECCS pumps.

ITEM 4

Analysis has shown that at completion of switchover, more than adequate useable RWST volume (13,993 gallons minimum) is remaining to prevent vortex problems. At the completion of switchover, the RWST water level is 32 inches above the discharge tank nozzle and 44 inches above tank bottom. The RWST discharge pipe exits the tank 20 inches above the tank bottom and turns down into the tank with the pipe entrance 12 inches above the tank bottom. Since only the centrifugal charging and safety injection pumps are taking suction from the RWST, a relatively low entrance velocity exists at the tank discharge

ITEM 4 (Cont'd)

pipe (0.8 ft/sec); therefore vortexing will not be a problem. It is Duke Power Company's position that a test, to demonstrate that vortexing does not exist, is not necessary.

ENCLOSURE 2

Table 6.3.2-3A

(Sheet 1 of 2)

Time Sequence for Switchover to Recirculation

<u>Step (1)</u>	<u>Time (3)(5) Req (Sec)</u>	<u>Time Elapsed (Sec)</u>	<u>RWST Flowrate (GPM) (2)(6)</u>	<u>Change in RWST Volume (Gal)</u>	<u>RWST Volume (10) Remaining (Gal)</u>
-	-	-	-	-	113,431
0	20 ⁽⁴⁾	20	18,800	6,267	107,164
1	42	62	18,800	13,160	94,004
2	42	104	14,300	10,010	83,994
3	20	124	9,800	3,267	80,727 ^(a)
4	37	161	9,800	6,043	74,684
5	30	191	9,800	4,900	69,784
6	30	221	9,800	4,900	64,884
7	25	246	9,800	4,083	60,801
8	25	271	6,100	2,542	58,259
9	35	306	2,400	1,400	56,859
10	35	341	2,400	1,400	55,459
11	80	421	2,400	3,200	52,259
12	25	446	2,400	1,000	51,259
13	35	481	2,400	1,400	49,859
14	35	516	2,400	1,400	48,459
15	80	596	2,400	3,200	45,259
16	25	621	2,400	1,000	44,259
17	30	651	2,400	1,200	43,059
18	30	681	2,400	1,200	41,859
19	20	701	2,400	800	41,059
20	30	731	2,400	1,200	39,859
21	30	761	2,400	1,200	38,659
22	20	781	1,100	367	38,292
23	30 ⁽⁸⁾	811	1,100	550	37,742
	1265 ⁽⁸⁾	2,076	1,100	23,199	14,543
24	30 ⁽⁸⁾	2,106	1,100	550	13,993
25	60 ⁽⁸⁾	2,166	0	0	13,993
26	60 ⁽⁸⁾	2,226	0	0	13,993

37.1 min

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ENCLOSURE 2

Table 6.3.2-3A

(Sheet 2 of 2)

NOTES:

- (1) See Table 6.3.2-3 for description of steps.
- (2) Flow rates are based on runout flows which are conservatively high:
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 (20 seconds) for response time to the RWST Low Level Alarm is conservative due to continuous tank level indication and the fact that the operator has no major operations to perform prior to this alarm.
- (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 considerable 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 Set Point is actuated at 73,431 gallons useable RWST volume remaining.
- (10) These RWST water volumes are minimum useable values.