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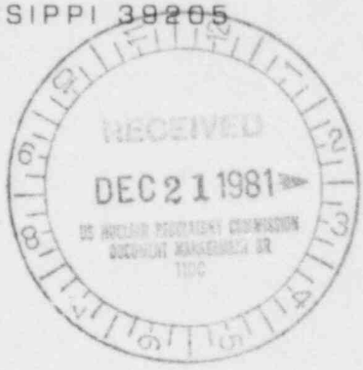
December 18, 1981

NUCLEAR PRODUCTION DEPARTMENT



U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
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
File 0260/L-334.0/L-350.0
Additional Information to NRC
Question 281.9
AECM-81/456

The purpose of this letter is to provide additional information in support of the response to Question 281.9 as provided in letters from L. F. Dale to H. R. Denton, dated October 23, 1981 (AECM-81/410) and November 24, 1981 (AECM-81/166). The additional information is in response to concerns of the Chemical Engineering Branch (CEB) as identified in conversations between members of our staff and CEB's Frank Witt and Conrad McCracken on October 28, 1981.

Portions of the enclosed information represents changes to the Grand Gulf Final Safety Analysis Report (FSAR). Appropriate changes will be made in a forthcoming amendment to the FSAR. If you have any questions or require additional information, please contact this office.

Yours truly,

L. F. Dale
Manager of Nuclear Services

RFP/JGC/JDR:lm
Attachment

cc: Mr. N. L. Stampley (w/a)
Mr. G. B. Taylor (w/a)
Mr. R. B. McGehee (w/a)
Mr. T. B. Conner (w/a)

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

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CEB Concern: (Oct. 23, 1981)

a) The additional information in addition to that given in the letter dated October 23, 1981 (AECM-81/410) demonstrating the amount of natural circulation possible for temperatures as low as 120°F.

b) Provide clarification of the assumed reactor water level for core flow caused by natural circulation.

RESPONSE

a) As per discussions held on October 28, 1981 between CEB's F. Witt and members of our staff, additional Grand Gulf specific analysis has been performed to further demonstrate the natural circulation flow rates. As presented in the letter dated October 23, 1981 (AECM-81/410), core flow calculations were performed at a reactor pressure of 15 psia and 1% decay heat rate (2.3 hrs. after scram). The results were as follows:

Reactor Coolant Downcomer Temperature, °F	Natural Circulation Flow % of Nominal Core Flow
200°F	1.9%
190°F	1.3%
180°F	1.1%

The above flow rates are conservatively based on the minimum water level necessary to afford natural circulation in the GGNS reactor vessel as presented in the response to Question 281.9, Condition 10, of the above referenced letter.

In accordance with Mr. Witt's request the above natural circulation flow analysis was extended to lower reactor downcomer temperatures while adhering to the same water level assumption as stated previously. The flow rates are as follows:

Reactor Coolant Downcomer Temperature, °F	Natural Circulation Flow % of Nominal Core Flow
160°F	.8%
140°F	.6%
120°F	.5%

b) In the letter dated October 23, 1981 (AECM-81/410) the following table was presented to indicate the minimum required downcomer water level necessary in order to allow natural circulation in the reactor:

Minimum Downcomer Water Level (Ft. above BAF) for Internal Natural Circulation

Time From Scram	Decay Heat* % rated core power	RPV Pressure psia		
		1035	500	15
20 seconds	4.3%	13'	9'	8.3'**
4 hours	0.86%	23'	16'	8.3'**
7 days	0.086	33'	24'	12.0'

* ANS Standard 5.1 September 1978 revision
** Elevation of Jet Pump Suction Inlet

The above conservative levels were used to calculate the core flow due to natural circulation. In that the above levels are minimums, it should be noted that the aforementioned flow rates would be the lowest flow achieved.

It should also be noted that the core will remain covered when the downcomer water level is at its minimum allowed for the RPV internal natural circulation, ie., the 2-phase swollen water level will be above the TAF. In general the BWR natural circulation will have 2-phase flow in the core region when downcomer water level is below normal operating level, as indicated in the above table. Due to the high void fraction at core exit, especially when RPV pressure is low (void fraction 70%), the required downcomer level can be much lower than the level inside the shroud.

The sample locations for reactor coolant listed in FSAR table 9.3-3, assuming that the recirculation pumps are inoperable, would be either RHR loop A, RHR loop B, or the jet pump diffuser. In the event of an accident, it is estimated that good mixing is achievable in 10-20 minutes. This time is based upon the time required for natural circulated flow to complete one internal circulation loop with the flow rate at about 1% of rated.

If plant conditions warranted the use of RHR system operation in the shutdown cooling mode, the downcomer water would be subcooled. The effects of shutdown cooling flow on flow created by natural circulation were considered in the Grand Gulf analysis. The results indicate that natural circulation flow will continue at the flow rates indicated for the temperatures presented in a) above.

Based on the Grand Gulf analysis, we are confident that provisions exist for adequate mixing of the core and downcomer fluids and that samples taken at the sample points indicated for reactor coolant in Table 9.3-3 will be representative of core conditions.

CEB Concern: Analytical procedures and on-line equipment applicability.
(Oct. 23, 1981)

Ques. 281.9 In addition to the above licensing conditions the staff is conducting a generic review of accuracy and sensitivity for analytical procedures and on-line instrumentation to be used for post-accident analysis. We will require that the applicant submit data supporting the applicability of each selected analytical chemistry procedure or on-line instrument along with documentation demonstrating compliance with the licensing conditions four months prior to exceeding 5% power operation, but review and approval of these procedures will not be a condition for full power operation. In the event our generic review determines a specific procedure is unacceptable, we will require the applicant to make modifications as determined by our generic review.

RESPONSE

At the present time, Post Accident Sampling procedures are being drafted using the guidance offered by established chemical/radiochemical procedures in Section 7 of General Electric Co. C & RE transmittal 81 HRH005 DRF D00-3 as contained in NEDC 24889. An engineering review of the on-line instrumentation and a gathering of the documentation demonstrating compliance with the mentioned licensing conditions is currently in progress. Additional information will be presented to you for review and approval as it becomes available.