Florida Power
CORPORATION

December 20, 1985
3F1285-12

Director of Nuclear Reactor Regulation
Attention: Mr. John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
RESPONSE TO NRC GENERIC LETTER 81-21
NATURAL CIRCULATION COOLDOWN

Reference: 1) FPC letter to NRC, Westafer to Stolz, dated January 25, 1985

2) SMUD letter to NRC, Rodriguez to Director, NRR, dated September 19, 1985

Dear Sir:

The reference 1) letter indicated that, based on our initial review, the current plan by Florida Power Corporation (FPC) was to adopt the General Public Utilities Nuclear (GPUN) approach for analyzing natural circulation cooldown in the Crystal River 3 (CR-3) generating station.

Review of the Sacramento Municipal Utilities District (SMUD) submittal, reference 2, and its attachments has confirmed FPC's belief that the analytical assumptions used by GPUN are reasonable for the application to TMI-1 and, because of the geometrical similarity, are also applicable to CR-3.

The attachments to this letter include the GPUN analysis (Topical Report 017, Rev. 1) and notes, by section, on application of the analysis to CR-3.

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Sincerely,

E C Simpson

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E. C. Simpson
Director, Nuclear Operations
Engineering and Licensing

AD - D. CRUTCHFIELD (Ltr only)
EB (W. JOHNSTON)
RSB (THOMAS)
EICSB (PARR)
FOB (W. REGAN)

Attachments

EHD/feb

Attachment to FPC Letter 3F1285-12

NOTES ON SECTIONS OF TOPICAL REPORT 017, REVISION 1 WHICH ARE APPLICABLE TO CRYSTAL RIVER 3 (CR-3)

SUMMARY

The analysis methods used and the results contained in Topical Report 017, Revision 1, "TMI-1 Nuclear Generating Station Natural Circulation Cooldown Analysis Without Reactor Vessel Upper Head Void Formation", are appropriate for the CR-3 Nuclear Generating Station. The TMI-1 and CR-3 reactor vessels are virtually identical. The analyses contained in Topical Report 017, Revision 1, were run to reactor coolant system (RCS) conditions of 204 F to envelop differences in decay heat removal (DHR) system cut-in temperatures and pressures.

The TMI-1 cooldown times are based on (DHR) system cut-in at 325 psig with a corresponding RCS saturation temperature in the reactor vessel head of 429 F. The CR-3 DHR cut-in occurs at 284 psig with a corresponding RCS saturation temperature in the reactor vessel head of 417 F. The results indicate that for an RCS cooldown rate of 50 F/hr to 280 F, the time required to cool the reactor vessel head to 417 F is on the order of 7 hours.

1.0 INTRODUCTION

1.1 Background

This section is valid for CR-3.

1.2 NRC Concerns and Requirements

This section is valid for CR-3.

1.3 CR-3 RCS Natural Circulation Cooling Procedure

Assuming that the amount of capacity listed in the Technical Specifications (150,000 gallons of which 139,000 gallons is usable) is the only emergency feedwater (EFW) source, cooldown of the RCS would need to be completed in about 15 hrs. to avoid depletion of the capacity prior to reaching the decay heat removal conditions of 280 F and 284 psig.

There is a statement in the Technical Specifications bases for CR-3 which indicates that the reactor decay heat may be removed by the condensate storage tank supply of water for a period of more than 24 hours. We believe that this statement was the result of multiple changes to the pre-license Technical Specifications that at first included the condenser hotwell in the Limiting Condition for Operation and was later deleted.

If an extended loss of offsite power is assumed, emergency feedwater is available from the CR-3 condensate storage tank and condenser hotwells. The total EFW availability is about 300,000 gallons, which would support an average cooldown rate as low as approximately 9 F/hr.

Under assumptions which include availability of EFW from the primary source (condensate storage tank) plus other CR-3 site and nearby fossil electric generating plant sources, the supply of EFW is adequate to assure natural circulation cooldown to DHR conditions at small cooldown rates.

FPC, therefore, commits to:

a) provide operator training to assure understanding of the difference between likely sources of water and the technical specification limitations.

b) revise the emergency operating procedures to assure cooldown rates which lie within the ranges specified in the GPUN analysis (modified to CR-3 conditions) to avoid formation of a steam bubble in the reactor vessel head.

c) revise the emergency and operating procedures to assure RCS cooldown rates which preclude depletion of available emergency feedwater sources prior to reaching RCS conditions of 284 psig and 280 F.

d) update the Technical Specifications and the FSAR to provide consistency for natural circulation cooldown.

1.4 TMI-1 Natural Circulation Cooldown Analysis Without Reactor Vessel Upper Head Void Formation

This section is valid for CR-3 with the exception that the DHR system cut-in conditions at CR-3 are 284 psig and RCS temperature of 280 F. To cut-in the DHR system, the temperature of the fluid in the upper vessel head must be less than the saturation temperature (417 F) which corresponds to 284 psig.

2.0 REACTOR VESSEL UPPER HEAD COOLDOWN PROCESSES

This section is valid for CR-3.

3.0 HEATING 6 MODEL OF TMI-1 UPPER HEAD

This section is valid for CR-3 (including Sections 3.1 through 3.6).

4.0 ANALYSIS RESULTS

This section is valid for CR-3.

5.0 OPERATIONAL GUIDELINES

This section is applicable to CR-3.

6.0 CONCLUSIONS

This section is applicable to CR-3, except for the CR-3 DHR initiation condition below 284 psig and 280 F.