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APR 26 1978

MEMORANDUM FOR: Darrell G. Eisenhut, Assistant Director for Systems and Projects, DOR

FROM: Robert L. Baer, Chief, Reactor Safety Branch, DOR

SUBJECT: NRR PARTICIPATION IN MEETING ON OCONEE UNIT NO. 1 NEUTRON FLUX QUADRANT TILT, FEBRUARY 28, 1978

Introduction and Summary

This memorandum is written in response to your note which forwarded the referenced memorandum and asked for my "personal attention in reviewing the matter". The referenced memorandum cirticized the conduct of the subject meeting, the knowledge (and perhaps the technical competence) of some of the NRR participants, and the lack of preparation for the meeting by NRR participants.

Although I did not attend the meeting, I was personally involved in discussions and a lengthy conference call that preceded the meeting. I have discussed the referenced memorandum with the project manager who chaired the meeting and the Reactor Safety Branch participants in the meeting. They were all quite upset about the referenced memorandum because:

(1) They considered the meeting very productive. The meeting resulted in the licensee largely agreeing with the position of reporting of increasing flux tilts that was advocated by the staff. The staff in turn obtained useful explanatory information. After this information was formally submitted by Duke Power Company (March 16, 1978), as agreed to in the meeting, the staff on April 17, 1978 was able to write an SER which relaxed some requirements which the licensee felt were not needed and burdensome.

(2) They felt it was the author of reference 1 who did not know or understand the background.

(3) They felt that it was the author of reference 1 who did not understand other potential areas that could be either contributing to the cause of the observed flux tilt or must be considered in assessing the effect of the flux tilt.

This memorandum provides some background on the problem, discusses the specific points raised in the referenced memorandum, and presents our conclusions.

Background

During startup tests of Cycle 4 of the Oconee Unit No. 1 reactor a core flux tilt, not predicted nor understood at the time, was observed. NRC issued a license amendment in November 1977 restricting core operations to 100 EFPD in order for the licensee to gain an understanding of the reasons for the tilt. The tilt had since decreased (as expected) and the licensee made a submittal on January 23, 1978, with an explanation of the phenomenon. By License Amendments dated February 17, 1978, the Oconee Nuclear Station's Technical Specifications were revised to allow Cycle 4 operation of Oconee Unit No. 1 past 100 EFPD to the end of the cycle. In the February 17, 1978 License Amendment, NRC approved a flux tilt limit of 3.41%. The licensee had requested a flux tilt limit of 6.03%.

The licensee's request was discussed at length in a conference call that took place approximately two weeks prior to the subject meeting. During that conference call the staff pointed out that the flux tilt in Oconee had decreased considerably with burnup as expected. If the tilt now started to increase again, it would be an entirely unexpected occurrence warranting rapid action by the licensee, B&W and the staff. B&W personnel agreed with that assessment; however, no agreement was reached regarding technical specifications that were satisfactory to both the licensee and the staff. During the telephone call we also expressed the staff concern that the basis for the power peaking estimate as a function of tilt did not consider tilts from broken axial power shape rod (APSR) fingers, misloaded assemblies, and burnup gradients. Also, the staff was concerned about the capability of the plant computer system to monitor flux tilts without extensive support from B&W personnel and computer codes.

Since these considerations could not be completely resolved at that time and Oconee required a technical specification change immediately to continue operation, the staff on February 17, 1978 issued a Safety Evaluation Report which required that the tilt limit for operation beyond EFPD be restricted to 3.41%. However, that SER stated, "We are continuing our review of the 6.03% limit and are awaiting additional information from the licensee." The "additional information" which we required to evaluate the merits of the proposed tilt limit change had been discussed in detail with both the licensee and B&W.

In an attempt to resolve and clarify staff concerns, the licensee requested the subject meeting. At the meeting, the licensee and B&W presented information to the NRC staff to justify an increase in the core flux tilt limit from 3.41% to 6.03%. Duke Power discussed the plant computer system

that monitors tilt, data reduction techniques and data available to the plant operators for monitoring of the flux tilt. B&W described the incore monitoring system. B&W also discussed the effects of tilt on power peaking and dropped or ejected control rod worths. Curves of Change in Peak Power (%) versus Indicated Incore Tilt (%) (with uncertainties) were shown to the staff. We requested that the inputs used to derive the curves be submitted with any proposed license amendment from Duke to increase the limit. The licensee agreed to this request. In addition, the licensee agreed to include a reporting requirement in the Technical Specification request if the tilt reaches approximately the 3.41% level. By letter dated March 16, the licensee has submitted a response to our request for additional information on the derivation of the power peak versus tilt curve and the proposed Technical Specification change.

The Reactor Safety Branch has completed its review of this information and a SER has been issued to the Assistant Director for Engineering and Projects by the Reactor Safety Branch.

Discussion

The various points raised in the referenced memorandum are discussed below.

1) The referenced memorandum states, "The NRR people seemed to have no appreciation that there is full time in-core monitoring available in the B&W reactors which is more likely to promptly indicate subtle changes in power distribution than the ex-core system, with only occasional in-core monitoring, used in other reactors."

This statement is a gross over-simplification of the problem. The NRR staff is aware of the in-core monitoring capabilities of B&W-designed reactors. However, whether in-core or ex-core monitors are used, the output is in milli-volts, not neutron flux. Extensive computer capability is required to calculate neutron flux and particularly power distributions from the in-core monitors. As explained in the section entitled "Background", the staff's major concern was that an increase in flux tilt after 100 EFPD of operation would be completely unexpected and would require very rapid evaluation. Therefore, the ability of the licensee to detect and take appropriate action in a timely manner was the major staff concern. Some of the considerations were that: 1) B&W plants had computer program errors in background subtraction for on-line neutron flux indications; 2) computer reliability; 3) in order to evaluate tilt changes extensive plant effort is required; and 4) to obtain a full-core power distribution, data must be sent to B&W with a substantial delay in analysis time. Therefore, prior to the meeting, it was not clear that the licensee could respond to potential tilt changes rapidly enough.

2) The referenced memorandum states, "The NRR staff preparation for this meeting appeared to be nonexistent, with no prepared questions or contingent positions. . ."

This statement is completely incorrect. As stated in the section entitled "Background", there was a lengthy conference call two weeks before the

subject meeting. In addition, as noted below, there were several calls with B&W and the licensee by the principal reviewers during the period between the conference call and the meeting.

The referenced memo fails to point out that the meeting was requested by the licensee in response to staff concerns and positions on a Duke license amendment submittal. Therefore, Duke and B&W were responding to concerns transmitted by telephone. This consisted of a list of approximately ten specific questions to be addressed during the meeting. This list had been provided to B&W during phone conversations that took place between the principal staff reviewers, B&W, and the licensee during the period between the conference call and the subject meeting. The staff requirements on the responses to their concerns had been previously established by the principal reviewers, and where the presentation differed from these requirements, these differences were pointed out.

In the staff caucus some discussion was held; and a position, which had been previously outlined by the principal reviewers, was proposed. The members in attendance found this position acceptable and the position was presented to the licensee and fuel vendor. (Since this meeting, Duke has resubmitted their request with responses to these requirements and the staff review on this submittal has been completed.)

3) The referenced memorandum states, ". . .no one (was) really chairing the meeting. Mort Fairtile, the Licensing Project Manager for Oconee, did a good job of controlling the resulting fragmented meeting."

The comment that no one was chairing the meeting may be attributed to the meeting's occurring during a project manager transition period and the common NRR practice of encouraging discussion and comment from all areas and disciplines. A wide spectrum of NRR personnel was in attendance. The free communication of questions on a wide range of technical disciplines is considered desirable, so that an open atmosphere is generally maintained in NRR meetings. This situation often tends to raise some conservative comments, which is the nature of regulation, and this may have been what the referenced memo's author mistook for a mistrust of Duke and B&W. (See item 4.)

A number of NRR personnel of varying backgrounds participated in the subject meeting. For example, there were two project managers (old and new, due to transition), six members of the Reactor Safety Branch (two directly involved in the Oconee 1 tilt, three generically involved in power assymetry considerations, and one from a T&H viewpoint), two members of the Core Performance Branch from DSS (for feedback to CP and OL licensing process), and one member of Plant Systems Branch (involved in power oscillation in another Oconee unit). Also present was a participant from the ACRS staff and an inspector from Region II. This broad coverage, although not always necessary, does help ensure all potential problem areas are considered, although it at times tends to broaden the scope of questions and background presentation.

4) The referenced memorandum states, "The core performance people seemed to be laboring under the assumption that the licensee could not be trusted to deal with problems promptly and responsibly. They were unaware of the licensee's performance in the past. This sort of misunderstanding could have been avoided by a preparatory meeting among NRR personnel."

The Core Performance Branch members at the meeting were Howard Richings and Walter Brooks. Both are highly respected members of the staff. Walt Brooks was a major participant in the conference call discussed in the "Background" section and was certainly aware of, and in general agreement with, the position taken by the RSB members of the staff. The project manager and RSB personnel who attended the meeting all felt that both Howard Richings and Walter Brooks made a significant contribution to the meeting.

The referenced memo also suggests that a preparatory meeting would be useful. We agree with this suggestion; however, it appears that the only staff participant who was not up to speed was the author of the referenced memorandum. Therefore, we would suggest that perhaps it would be useful for I&E participants to discuss the subject background with the principal reviewer before future meetings. It would also be useful to increase the exchange of information between NRR and I&E on operating reactor problems. This will require a joint effort by NRR and I&E.

5) The referenced memorandum states, "The meeting room (actually Vic Stello's office) was inadequate and lacked facilities. The overhead projector arrived after the first presenter for B&W was finished."

The subject meeting was hurriedly called by the licensee and B&W. This caused some location and schedular complications which had little influence on the effectiveness of the meeting. A previously arranged-for conference room was preempted by NRC management. This situation has occurred before and probably will continue because of the limited conference room facilities and large number of meetings.

Conclusion

A great deal of interaction between NRC staff and Duke and/or B&W had taken place prior to the meeting. Areas of staff concern were identified on a timely basis and were responded to by the licensee and B&W. From the substantial review effort previous to this meeting, an acceptable staff position and necessary information had been identified by the principal reviewers. Upon airing of all staff concerns, this position was adopted and agreed to by the licensee.

The staff indicated a general positive attitude toward the accomplishments of the meeting with one exception (reference 7). The wide spectrum of NRR personnel in attendance at the meeting lent itself to an open discussion of

technical considerations and opinions. Staff requirements and positions were outlined previous to the meeting and presented during the meeting and subsequent st[illegible] caucus. The apparent restrictive staff positions on reactor operation were based on technical concerns as discussed in this memorandum. The meeting ended with the staff stating their findings and position, and the licensee and fuel vendor indicating that the required information would be submitted. The background of this memo demonstrates that indeed the meeting did supply appropriate direction for this effort, and the staff review has now been completed.

In the case of the one exception to the general positive attitude generated in the meetings, we would suggest that for future meetings at which I&E wishes to be represented, the I&E representative may find it useful to discuss the background and NRR position with the principal reviewer before attending a meeting. We are more than happy to discuss any technical areas with I&E and would encourage such action.

Robert L. Baer

Robert L. Baer, Chief
Reactor Safety Branch
Division of Operating Reactors

Reference

1. Unsigned memorandum for: F. J. Long, Chief, Reactor Operations and Nuclear Support Branch, thru: R. D. Martin, Chief, Nuclear Support Section No. 1, Reactor Operations and Nuclear Support Branch, Subject: Meeting on Oconee Unit No. 1 Quadrant Power T. H. Held at NRR, Bethesda on February 28, 1978, dated March 17, 1978.

cc: V. Stello, Jr.
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