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SUBJECT: Forwards addl info re inadequate core cooling instrumentation. Info concludes that water level mismatch events & concerns associated w/Generic Ltr 84-23 corrective actions not related.

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Gentlemen:

In the Matter of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - NUREG-0737, ITEM II.F.2, INADEQUATE CORE COOLING INSTRUMENTATION (GENERIC LETTER 84-23)

In a letter dated November 18, 1986, NRC requested that TVA reevaluate the completion dates for the reactor water level instrument reference leg modification required by Generic Letter 84-23. By letter from TVA to D. R. Muller dated March 12, 1986, TVA committed to reroute the reactor water level reference legs to reduce their vertical drop inside the drywell to less than two feet in accordance with the generic letter. The current commitment schedule for the modification is cycle 6 refueling outage for unit 2, which has been accelerated from the original commitment of cycle 7 refueling outage.

The current schedule involves operation of unit 2 for one cycle before performing the modification. The staff, in its November 18, 1986 letter, expressed concern that a relationship may exist between the Generic Letter 84-23 concerns and the water level mismatch events which occurred on BFN unit 3 in 1985. The enclosure provides the necessary information to conclude that the water level mismatch events and the concerns associated with the Generic Letter 84-23 corrective actions are not related. Also provided is justification for operation of unit 2 for one cycle before performing the modification.

Please refer any questions pertaining to this letter to J. L. Turner at (205) 729-2853.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. Gridley, Director
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Enclosure
cc: See page 2

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U.S. Nuclear Regulatory Commission

SEP 25 1987

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ENCLOSURE

BROWNS FERRY NUCLEAR PLANT (BFN)
ADDITIONAL INFORMATION CONCERNING INADEQUATE
CORE COOLING INSTRUMENTATION (GENERIC LETTER 84-23)

In November 1984 and again in February and November 1985, events occurred which involved a mismatch between different water level indicating instruments on BFN unit 3. TVA conducted comprehensive investigations into the two most recent events. This enclosure provides information about those events and demonstrates that they are not a factor in establishing the safety significance and priority of the modification required by Generic Letter 84-23.

Relationship of Instrument Mismatch Events

In the February 1985 event, the reactor was being started up from cold conditions, the moderator temperature was approximately 280°F and the reactor pressure was approximately 40 psig. The drywell temperature near the reference legs was approximately 90°F. While the reactor pressure was being increased through that range, the GEMAC (narrow range, cold reference leg) indicators exhibited a mismatch between channels A and B, which have different reference legs. The mismatch reached a maximum of about 27 inches before beginning to decrease and vanish as the reactor pressure increased. This event was reported in BFRO 50-296/85006. It was later determined that the instruments associated with the channel A reference leg were in error while those in channel B were correct. The Yarway level instruments (accident range, heated reference leg) were not affected. It was determined that the error was likely to have been caused by decrease in the water level in the channel A reference leg. Among the possible causes of this water level decrease were introduction of air into the sensing line and leakage of water from a small crack found in the sensing line.

In the November 1985 event, a mismatch between GEMAC instruments of approximately four inches was observed during cold shutdown conditions. The reactor moderator temperature was about 150°F with the vessel at atmospheric pressure and the drywell temperature was 80-90°F. It was determined that this event was most likely caused by evaporative loss of water from the reference legs during the extended cold shutdown conditions compounded by an additional loss of water during performance of a surveillance test on the instruments connected to the reference legs.

The concerns addressed in Generic Letter 84-23 deal with the redundancy and reliability of water level instrumentation to detect inadequate core cooling. Of major interest is drywell temperature effects upon the fluid in the reference columns during accident or degraded transient events. High drywell temperature can cause errors in water level indication due to decreasing water density in the reference legs. It can also render heated leg instruments inoperable if accompanied by a subsequent rapid depressurization and associated flashing in the reference leg. The modification to meet the requirements of Generic Letter 84-23 involves rerouting of the reference legs to minimize vertical runs inside the drywell and thus limit the adverse effect that any drywell temperature/reactor pressure situations could have on the instruments to that which is acceptable for monitoring adequate core cooling.

Because the water level mismatch events on BFN unit 3 did not occur in association with high drywell temperature (80-90°F as opposed to 130-150°F normal temperature) or reactor depressurization (pressure was stable or increasing), there is no question that they are not related to the phenomena addressed by Generic Letter 84-23.

Justification for Deferral of Generic Letter 84-23 Modifications

In order to address NUREG-0737, Item II.F.2, Inadequate Core Cooling Instrumentation, the BWR Owners' Group (BWROG) performed studies establishing that, for a BWR, water level instruments are the primary instruments for detection of inadequate core cooling. After NRC concurrence with that position, the BWROG performed studies identifying conditions during which water level instruments may be unable to detect inadequate core cooling (which form the basis for Generic Letter 84-23) and prepared Emergency Procedure Guidelines (EPGs) to call out specific operator actions in the event these conditions occur. BFN has taken action to address this problem by implementing Emergency Operating Instructions (EOIs) which follow the EPGs, and has committed to perform further modification to eliminate the problem. By following the EOIs, the operator can ensure adequate core cooling for all design basis events. The modification goes a step further by eliminating the need for operator action. Therefore, there is no undue risk to the public health and safety caused by the delay in implementing this modification.

Summary

TVA has performed comprehensive investigations into the water level instrument problems encountered in 1985 and has determined that they are not a factor in prioritizing the water level instrument modification for unit 2 startup. It is recognized that the mismatch problem may be incidentally corrected in the process of performing the modification.