OCT 26 1982

Docket Nos. 50-259
50-260
and 50-296

Mr. Hugh G. Parris
Manager of Power
Tennessee Valley Authority
500 A Chestnut Street, Tower II
Chattancoga, Tennessee 37401

Dear Mr. Parris:

Subject: NUREG-0737 Item II.K.3.21, Restart of Core Spray and Low-Pressure Coolant-Injection Systems

Re: Browns Ferry Nuclear Plant, Units 1, 2 & 3

Reference: Letter D. B. Waters (BWR Owners Group) to Darrell G. Eisenhut (NRC), BWROG-80-12, December 29, 1980

We have reviewed your response dated December 23, 1980, to NUREG-0737 Item II.K.3.21 in which you referenced the BWR Owners Group position (referenced letter) as applicable to your plant. We have completed our review of the BWR Owners Group response to Item II.K.3.21, and agree with the Owners Group position that logic modifications for LPCI and low-pressure core spray are unwarranted.

Our Safety Evaluation is enclosed. This completes our review of NUREG-0737 Item II.K.3.21 for your plant.

Sincerely,

Original signed by
D. B. Vassallo

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Enclosure: As stated

cc: See next page

Distribution:	Docket File	NRC PDR	LPDR	ORB#2 Rdg	D. Eisenhut	NSIC
J. Heltemes	S. Norris	R. Clark	OELD	I&E-1	ACRS-10	Gray
ORAB	V. Rooney	M. Hodges	G. Meyer			

OFFICE	DL:ORB#2	DL:ORB#2	DL:ORB#2				
SURNAME	SNorris	RClark	DVassallo				
DATE	10/21/82	10/22/82	10/26/82				

Mr. Hugh G. Parris

cc:

H. S. Sanger, Jr., Esquire
General Counsel
Tennessee Valley Authority
400 Commerce Avenue
E 11B 33C
Knoxville, Tennessee 37902

Mr. Ron Rogers
Tennessee Valley Authority
400 Chestnut Street, Tower II
Chattanooga, Tennessee 37401

Mr. Charles R. Christopher
Chairman, Limestone County Commission
P. O. Box 188
Athens, Alabama 35611

Ira L. Myers, M.D.
State Health Officer
State Department of Public Health
State Office Building
Montgomery, Alabama 36104

Mr. H. N. Culver
249A HBD
400 Commerce Avenue
Tennessee Valley Authority
Knoxville, Tennessee 37902

U. S. Environmental Protection
Agency
Region IV Office
Regional Radiation Representative
345 Courtland Street
Atlanta, Georgia 30308

Resident Inspector
U. S. Nuclear Regulatory Commission
Route 2, Box 311
Athens, Alabama 35611

Mr. John F. Cox
Tennessee Valley Authority
W9-D 207C
400 Commerce Avenue
Knoxville, Tennessee 37902

George Jones
Tennessee Valley Authority
P. O. Box 2000
Decatur, Alabama 35602

Mr. Oliver Havens
U.S. Nuclear Regulatory Commission
Reactor Training Center
Osborne Office Center, Suite 200
Chattanooga, Tennessee 37411

James P. O'Reilly
Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION FOR ITEM II.K.3.21 OF NUREG-0737, RESTART OF CORE SPRAY AND LOW PRESSURE COOLANT-INJECTION

Author: M. W. Hodges

Requirement as stated in NUREG-0737

The core-spray and low-pressure coolant-injection (LPCI) system flow may be stopped by the operator. These systems will not restart automatically on loss of water level if an initiation signal is still present. The core spray and LPCI system logic should be modified so that these systems will restart, if required, to assure adequate core cooling. Because this design modification affects several core-cooling modes under accident conditions, a preliminary design should be submitted for staff review and approval prior to making the actual modification.

Evaluation

The intent of this requirement was to assure adequate water delivery to the core if an operator should manually terminate LPCI or core spray and subsequently fail to restart a system, if required. The licensee referenced as applicable for the Browns Ferry Nuclear Plant Units 1, 2 & 3, the BWR Owners Group position for Item II.K.3.21. The response of the BWR Owners Group to Section II.K.3.21 is given in a letter report to Darrell G. Eisenhut (NRC) from D. B. Waters (BWR Owners Group), dated December 29, 1980.

The essence of the Owners Group position with respect to BWR's, other than BWR 5's and BWR 6's is that automation of the restart of LPCI and core spray (or low pressure core spray) will result in a net decrease in safety because of the complexity of the logic required.

High drywell pressure and low reactor water level are the key accident-related parameters that govern operation of the BWR emergency core cooling systems (ECCS). The occurrence of either or both of these signals is taken as an indication that a loss of coolant-accident (LOCA) has occurred. This combination provides diversity of initiating signals but the control systems hardware does not discriminate between signals generated by the drywell pressure sensors and those produced by the reactor water level instruments. There are many accident sequences for which one or both of the ECCS initiation signals will persist for long periods of time.

With the present logic, the reactor operators can, at any time, stop any BWR ECCS even if a LOCA signal is present. This provides the plant operators with flexibility for dealing with unforseen but credible conditions requiring a particular system to be shut down. Examples would be equipment difficulties involving gross seal leakage, breaks in ECCS piping, failed ECCS pump motors and load shedding for other post-LOCA operations. This flexibility would still be needed for the automated system but the automation would increase the complexity of the required logic. With increased complexity there is an attendant reduced system reliability and restricted operating flexibility in dealing with unanticipated events. In this case the increased complexity results in a net decrease in safety.

Another problem in providing automatic restart of LPCI and low pressure core spray exists, in that much of the equipment from the residual heat removal (RHR) system used for the LPCI/ECCS mode is also used for cooling the suppression pool. Cooling the suppression pool becomes necessary because many BWR transient and accident events involve significant release of reactor system energy to the suppression pool which increases the pool temperature and containment pressure. Control of these temperature/pressure conditions is achieved by manually

placing the LPCI/RHR system in the suppression pool cooling mode, and rejecting heat to the ultimate heat sink via the emergency service water system. Any scheme to provide automatic restart of the ECCS system would either have to bypass the LPCI system after it has been assigned to the suppression pool cooling function or automatically realign the equipment to the LPCI mode.

Conclusion

We conclude that automation of the restart of LPCI and low pressure core spray will result in a net decrease in safety because of the complexity of the logic required.

We concur with the Owners Group that logic modifications to the LPCI and low pressure core spray system are not warranted for this plant.