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STOLZ,J.F. Operating Reactors Branch 4

SUBJECT: Responds to NRC 810505 ltr requesting certain actions be taken & info provided re occurrence of natural circulation cooldown. Detailed demonstration not necessary, due to low likelihood of such occurrence.

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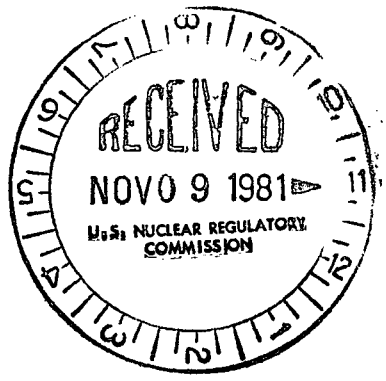
November 5, 1981



Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. J. F. Stolz, Chief
Operating Reactors Branch No. 4

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Sir:

By letter dated May 5, 1981, the NRC Staff requested certain actions be taken and information be provided regarding the occurrence of natural circulation cooldown. The following is the Duke Power Company response for Oconee Nuclear Station.

For the Oconee units, the need to utilize natural circulation cooldown is not anticipated to occur. In the event of a system perturbation or accident other than a small break LOCA requiring cold shutdown, the plant would be shut down by normal means using forced circulation by the reactor coolant pumps (RCP). It is highly unlikely that all RCPs would be inoperable due to alternate power sources available from offsite power sources and the onsite emergency power source, Keowee hydrostation, as well as the fact that necessary support systems such as cooling water and seal water are accessible and could be restored to operable status if they fail. Under these latter conditions, with the RCPs secured, the plant is designed to be maintained at hot shutdown conditions. Upon restoration of the RCP support systems, the normal cooldown procedure would be used to shut down the plant, if shutdown were still required. In the event of a small break LOCA, the Loss of Reactor Coolant procedure provides adequate guidance for safely cooling down the plant under conditions requiring reactor coolant pump trip.

If a controlled natural circulation cooldown were required, the rate of cooldown would be governed by the rate of cooldown of the pressurizer. The Oconee design incorporates an auxiliary pressurizer spray line which can be aligned to the normal makeup system. The plant cooldown would then be controlled by control of the secondary system and rate of heat removal via the steam generators and cooldown of the pressurizer. Any voiding in the reactor vessel head or top of the hot leg would be indicated by increase in pressurizer level and other plant instrumentation. Through experience

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and training, the Oconee operations are aware of the potential for void formation in the RCS and the actions necessary to control the plant properly.

It should be noted that the issue of void formation was addressed by IE Bulletins 79-05A, -05B. Copies of the Duke responses to items 3 and 1 of these two bulletins are attached.

Although an event requiring natural circulation cooldown is not anticipated, it has been decided to develop a procedure for this evolution. Existing Oconee procedures for Unit Shutdown, Loss of Reactor Coolant Flow, and Planned Initiation of Natural Circulation have been reviewed. The procedure for natural circulation cooldown being developed will address initiation and verification of natural circulation cooling, prevention and mitigation of primary void formation, and unit cooldown via natural circulation. When completed this procedure will, in conjunction with existing procedures, provide the operators with adequate guidance to conduct an orderly and safe natural circulation cooldown with appropriate concern for void formation. Operator training will include the additional procedural guidance and will provide the operators with the necessary understanding of natural circulation cooldown and primary void prevention and mitigation. Existing procedures will be cross-referenced to the new procedure as appropriate.

In summation, it is considered that a detailed demonstration to assure that natural circulation cooldown will not result in voiding is unnecessary, due to the low likelihood that such an evolution would be required. However, operating experience has shown that cooldown using natural circulation can be a practical evolution in the presence of procedures and training. Therefore, natural circulation cooldown procedures will be developed to augment existing procedures in mitigation of void formations to assure proper control of the plant. Our recent experience combined with that of the industry will serve as the basis in developing the procedure and the accompanying modifications to our training program. The secondary side cooldown capability has been evaluated as detailed in Duke letter dated April 3, 1981. Sufficient capability does exist to support both the normal cooldown method and the controlled natural circulation cooldown method.

I declare under penalty of perjury that the statements set forth herein are true and correct to the best of my knowledge, executed on November 5, 1981.

Very truly yours,

William O. Parker, Jr.

RLG/php
Attachments

ITEM 3

Review the actions required by your operating procedures for coping with transients and accident, with particular attention to:

a. Recognition of the possibility of forming voids in the primary coolant system large enough to compromise the core cooling capability, especially natural circulation capability.

b. Operator action required to prevent the formation of such voids.

c. Operator action required to ensure continued core cooling in the event that such voids were formed.

Response

The following emergency procedures have been reviewed and revised to include actions required to cope with primary coolant system voids:

EP/0/A/1800/08	Steam Supply System Rupture
EP/0/A/1800/04	Loss of Reactor Coolant

A graph of the properties of water and saturated steam has been added to the above listed procedures. The unit computer is available to provide the operator with saturation temperature versus pressure information. Also, a computer program has been established to allow the operator to read selected incore thermocouples for core temperature.

The above procedures have been revised to assure the operator is made aware of:

(a) The possibility of void formation by emphasizing the operator's need to check for saturation or near saturation conditions in the reactor coolant system.

(b) The action required to prevent void formation by checking reactor coolant pressure and temperature following reactor trip to ensure that there is at least 50°F subcooling of the reactor coolant.

(c) The requirement to assure core cooling in the event of void formation by the operation of at least one reactor coolant pump per loop and the continuation of HPI operation as described in the response to Item 4.

Operations personnel have been instructed on these procedural changes. Licensed shift personnel will be sent to the Babcock and Wilcox training simulator, which has been programmed to demonstrate the events of the Three Mile Island event, for training expeditiously consistent with scheduling constraints.

DUKE POWER COMPANY
OCONEE NUCLEAR STATION

Response to IE Bulletin 79-05B
Items 1, 2, 4 and 6

ITEM 1

Develop procedures and train operation personnel on methods of establishing and maintaining natural circulation. The procedures and training must include means of monitoring heat removal efficiency by available plant instrumentation. The procedures must also contain a method of assuring that the primary coolant system is subcooled by at least 50°F before natural circulation is initiated.

In the event that these instructions incorporate anticipatory filling of the OTSG prior to securing the reactor coolant pumps, a detailed analysis should be done to provide guidance as to the expected system response. The instructions should include the following precautions:

a. maintain pressurizer level sufficient to prevent loss of level indication in the pressurizer;

b. assure availability of adequate capacity of pressurizer heaters, for pressure control and maintain primary system pressure to satisfy the subcooling criterion for natural circulation;

c. maintain pressure - temperature envelope within Appendix G limits for vessel integrity.

Procedures and training shall also be provided to maintain core cooling in the event both main feedwater and auxiliary feedwater are lost while in the natural circulation core cooling mode.

RESPONSE:

Emergency Procedure EP/0/A/1800/6 (Loss of Reactor Coolant Flow) has been revised to give operators additional guidelines to use in assuring that natural circulation has been established and is being maintained. Heat removal efficiency is monitored by reactor coolant system (RCS) and steam system instrumentation (e.g., RCS pressure, differential hot leg/cold leg temperature, RCS average temperature, incore thermocouple, temperature steam generator level, steam pressure, steam generator feedwater flow). The procedure has also been revised to assure that the RCS is subcooled at least 50°F before initiating natural circulation.

A new procedure, OP/0/A/1102/16 (Planned Initiation of Natural Circulation) has been issued and approved to establish natural circulation in a pre-planned mode that incorporates anticipatory fill of the secondary side of the steam generators prior to securing the reactor coolant pumps. This procedure incorporates precautions a through c above.