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SUBJECT: Discusses action taken by APS re Completion of Programmed Enhancement(1)(b) of Generic Ltr 88-17 "Loss of Decay Heat Removal."

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WILLIAM F. CONWAY
EXECUTIVE VICE PRESIDENT
NUCLEAR

161-04033-WFC/GEC

July 2, 1991

Docket No. STN 50-528/529/530

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-37
Washington, D. C. 20555

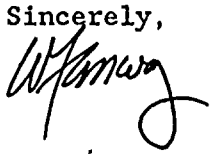
Reference: Letter from D. B. Karner (APS) to the NRC Document Control Desk, dated February 6, 1989; Subject: Response to Programmed Enhancement Items of Generic Letter 88-17

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Completion of Programmed Enhancement (1)(b) of Generic Letter 88-17
"Loss of Decay Heat Removal"
File: 91-056-026

The enclosure to this letter discusses the action taken by Arizona Public Service Company (APS) to complete the response to programmed enhancement (1)(b) discussed in the attachment to Generic Letter 88-17. The initial response to this programmed enhancement was included in the referenced letter.

Sincerely,



Enclosure

WFC/GEC/gec

cc: J. B. Martin (all w/enclosure)
D. H. Coe
A. H. Gutterman
A. C. Gehr

A061
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Enclosure to letter "Completion of Programmed Enhancement (1)(b) of Generic Letter 88-17 'Loss of Decay Heat Removal'"

Programmed Enhancement (1)(b)

In response to Programmed Enhancement (1)(b), Arizona Public Service Company (APS) stated it would perform an engineering study to evaluate potential methods of providing an additional means of core exit temperature indication during all shutdown cooling system (SDCS) operations (i.e., with the reactor vessel head installed or removed and with the reactor coolant system (RCS) filled or in a reduced inventory condition). This engineering study was completed.

The engineering study reviewed the existing methods of determining core exit temperature. Two independent temperature measurements representative of the core exit are normally available at PVNGS. These independent temperature measurements are provided by multiple (minimum of two with the vessel head installed) core exit thermocouples which are installed as part of the qualified safety parameter display system (QSPDS). These core exit temperature indications are available when the vessel head is installed. When the reactor vessel head is removed, the core exit thermocouple probes are withdrawn to the seal table and are not in service. APS procedures require at least two core exit thermocouples be available for indication prior to reduced inventory operation with the reactor vessel head in place. An additional temperature measurement, which is independent from the thermocouples and which is available with the reactor vessel head installed or removed and with the RCS filled or in a reduced inventory condition, is provided by monitoring the shutdown cooling heat exchanger inlet temperature which is available to provide indication of core exit temperature at all times during SDCS operation.

The engineering study proposed a method of monitoring core exit temperature when the vessel head is removed and the core exit thermocouples are no longer available. This method involved temporarily installing four thermocouple rigs during certain times when the head is removed and fuel is in the vessel that would provide local indication and a high temperature alarm in containment to indicate loss of decay heat removal. No other alternatives for monitoring core exit temperature with the vessel head removed were discussed in the engineering study. This proposed modification was reviewed by the Operations, Engineering, and Nuclear Licensing Departments to determine its efficacy. This review determined that the drawbacks to installation of the thermocouple rigs far outweighed the minimal benefit.

Drawbacks to the proposed modification included increased radiation exposure during the installation and removal of the thermocouple rigs and the impracticality of using the rigs during fuel movement (the installed rigs would interfere with refueling operations [movement of the refueling machine mast] and result in an unsafe condition).

The minimal safety benefit derives from the short time that the proposed thermocouple rigs could effectively be used to monitor core exit temperature. During normal refueling activities, following head removal and placement of the refueling cavity seal ring, the water level is raised to 23 feet above the fuel

Enclosure to letter "Completion of Programmed Enhancement (1)(b) of Generic Letter 88-17 'Loss of Decay Heat Removal'"

as the upper guide structure assembly is removed from the vessel. This evolution normally requires less than one day to complete. The water level is normally maintained at least 23 feet above the fuel during refueling operations, and a loss of shutdown cooling with this large volume of water is not an immediate safety concern as there is a significant amount of time available to restore shutdown cooling or provide makeup water prior to approaching core uncovery. Due to the significant impact on movement of the refueling machine mast, the proposed thermocouple rigs could not be in place during fuel movement. The effective time would, therefore, be limited to those times when the water level is less than 23 feet above the fuel. The only time that this condition would exist is during operation with a reduced RCS inventory (mid-loop operation) in MODE 6 (Refueling); thus, the time period during which a loss of shutdown cooling is safety significant and the thermocouple rig would be available to provide independent core exit temperature indication is very minimal.

Due to the small safety benefit, increased radiation exposure during installation and removal of the thermocouple rig, the significant potential for the rig interfering with refueling operations, and the minimal time period when the thermocouple rig would be available to effectively provide independent core exit temperature indication, APS determined this modification would not be installed. The PVNGS design conforms to the recommendations in programmed enhancement (1)(b) of Generic Letter 88-17 in that two independent temperature measurements representative of the core exit (monitoring the two core exit thermocouples) are available whenever the reactor vessel head is located on top of the reactor vessel. In addition, the PVNGS design responds to the suggestion in programmed enhancement (1)(b) of Generic Letter 88-17 in that a temperature measurement representative of the core exit (monitoring the shutdown cooling heat exchanger inlet temperature) is provided at all times during shutdown cooling system operation. This engineering study completes PVNGS actions for Programmed Enhancement Item (1)(b).