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SUBJECT: Forwards description of plant design characteristics & responses to items discussed in Generic Ltr 88-03.

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May 27, 1988

Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Station P1-137
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Reference: Generic Letter 88-03 Resolution of Generic Safety Issue 93, "Steam Binding of Auxiliary Feedwater Pumps" dated February 17, 1988 to All Licensees, Applicants for Operating Licenses, and Holders of Construction Permits for PWRs

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station
Units 1, 2 and 3
Generic Letter 88-03 Steam Binding of
Auxiliary Feedwater Pumps
File: 88-005-026; 88-010-026

The referenced letter requested confirmation that procedures discussed in the Generic Letter 88-03 are in place and will be maintained. Attached please find a description of PVNGS design characteristics and responses to the items discussed in the Generic Letter.

Very truly yours,

E. E. Van Brunt, Jr.
Executive Vice President
Project Director

EEVB/JMQ/pvk

cc: J. B. Martin (all w/attach)
E. A. Licitra
A. C. Gehr
T. J. Polich

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1/1

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Executive Vice President Project Director of Arizona Nuclear Power Project, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt

Edwin E. Van Brunt, Jr.

Sworn to before me this 27th day of May, 1988.

Irene C. Clawson

Notary Public

My Commission Expires:

My Commission Expires Nov. 12, 1988

ATTACHMENT

GENERIC LETTER 88-03
STEAM BINDING OF AUXILIARY FEEDWATER PUMPS

PVNGS Design Characteristics

The contributing factors to steam binding of the Auxiliary Feedwater (AFW) pumps are leaking valves that allow high temperature water to backflow into lower pressure areas and flash into steam, and when this occurs in the AFW pump, it renders the pump inoperable. The problem is further complicated when the system has multiple pumps that share common suction, recirculation or discharge piping and can potentially disable all pumps resulting in a common mode failure and loss of all safety-grade forced cooling for the steam generator.

The Palo Verde design does not rely solely on check valves for separation of the Seismic Category I pumps from the steam generators, but has a normally closed gate valve and a normally closed globe valve in addition to three check valves. The gate valve would prevent significant backflow and the globe valve would provide additional protection.

The Palo Verde design has completely separate suction and recirculation lines for each of the three pumps. This design significantly reduces the potential for inoperable pumps since it eliminates shared piping which can transmit steam and hot water between pumps, resulting in a common mode failure. The two Seismic Category I pumps are cross-tied to allow either pump to feed either or both steam generators, and the pumps are separated by the gate/globe valve combination on each cross-tie line. These are effective in preventing transmission between the two trains. The Non-Seismic Category I AFW pump has no common piping with the Seismic Category I AFW pumps.

The Non-Seismic Category I pump is more susceptible to backflow from the Main Feedwater (MFW) because the separation is made by two check valves, however, the design of the recirculation line aids in avoiding steam binding. The recirculation line is a vertical riser two feet downstream of the pump discharge which allows any warmer backflow to rise into the recirculation piping, avoiding the pump casing. The recirculation line is open to the condensate storage tank while the pump suction is isolated by two normally closed butterfly valves and is an effective dead leg.

NRC Action Items

1. Maintain procedures to monitor fluid conditions within the AFW system each shift during times when the system is required to be operable. This monitoring should ensure that fluid temperature at the AFW pump discharge is maintained at about ambient levels.

PVNGS Response

In order to assure that the Non-Seismic Category I pump is not disabled, temperature indicators were added to the pump discharge piping to provide indication of backflow and procedures were modified to include temperature monitoring once per shift.

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The discharge gate valves on the Seismic Category I pumps close on limit switches and prevent significant backflow. In the unlikely event that steam binding should occur, temperature indicators added to the pumps discharge piping will provide indication of backflow. Procedures have been modified to include temperature monitoring once per shift.

NRC Action Item

2. Maintain procedures for recognizing steam binding and for restoring the AFW system to operable status, should steam binding occur.

PVNGS Response

Procedures for the Non-Seismic Category I pump have been revised to include identification of steam binding from increasing pipe temperature due to possible backleakage. Also procedures have been revised for restoring the AFW system to operable status should steam binding occur.

Similarily, the procedures affecting the Seismic Category I pumps have been revised.

Summary

No further actions are proposed to be taken to prevent inoperable AFW pumps due to steam binding. The installed temperature indicating tape on the pumps' discharge piping will continue to be monitored and the procedures remain in place to vent the pumps should an increased temperature be indicated.

1. Staff to perform the requested confirmation and follow up actions - 22 manhours.

2. Staff time to prepare requested documentation - 25 manhours.