ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9012040223 DOC.DATE: 90/11/20 NOTARIZED: YES DOCKET #
FACIL:STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
AUTH.NAME AUTHOR AFFILIATION
CONWAY,W.F. Arizona Public Service Co. (formerly Arizona Nuclear Power
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Application for amends to Licenses NPF-41,NPF-51 & NPF-74, revising TS Surveillance Requirement 4.4.1.4.1.2.

DISTRIBUTION CODE: A061D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 8+6
TITLE: OR/Licensing Submittal: Loss of Residual Heat Removal (RHR) GL-87-12

NOTES:STANDARDIZED PLANT 05000528
Standardized plant. 05000529
Standardized plant. 05000530

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD5 LA	1	0	PD5 PD	1	1
	PETERSON,S.	1	1	TRAMMELL,C.	1	1
INTERNAL:	ACRS	6	6	NRR BALUKJIAN,H	2	2
	NRR TRAMMELL,C	1	1	NRR/DOEA/OTSB11	1	1
	NRR/DST 8E2	1	1	OC/LFMB	1	0
	OGC/HDS1	1	0	REG FILE 01	1	1
	RES/DSIR/EIB	1	1			
EXTERNAL:	NRC PDR	1	1	NSIC	1	1
NOTES:		1	1			

R I D S / A D D S

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 22 ENCL 19

AA2

Arizona Public Service Company
P.O. BOX 53999 • PHOENIX, ARIZONA 85072-3999

WILLIAM F. CONWAY
EXECUTIVE VICE PRESIDENT
NUCLEAR

161-03607-WFC/JST

November 20, 1990

Docket Nos. STN 50-528/529/530

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
(Units 1, 2, and 3) Technical Specification Amendment Request
Sections 3/4.4 and 3/4.9
File: 90-056-026

This letter requests an amendment to the PVNGS 1, 2, and 3 Technical Specification Surveillance Requirements 4.4.1.4.1.2, 4.4.1.4.2, 4.9.8.1, and 4.9.8.2. The proposed change would modify the minimum shutdown cooling flow specifications for Modes 5 and 6. The revised minimum flow specification would meet the design requirements of the shutdown cooling system for protection against a boron dilution event and provide an increased operating margin between the minimum flow requirements and the onset of air entrainment in the shutdown cooling suction nozzles during reactor coolant system reduced inventory operation. The proposed amendment is submitted in response to the "Programmed Enhancements" Section of Generic Letter No. 88-17, "Loss of Decay Heat Removal."

Arizona Public Service respectfully requests that this amendment be approved prior to the Unit 1 surveillance outage, scheduled to begin January 12, 1991, to support steam generator eddy current testing. Steam generator eddy current testing requires installation of the steam generator nozzle dams and lowering of reactor vessel water level to approximately mid-loop during the nozzle dams installation (approximately 2 to 3 days). If this amendment were not approved, and the additional safety margin between the onset of air entrainment and minimum Technical Specification flow requested in this amendment was not available prior to the beginning of the outage, APS would off load the core prior to mid-loop operation. Core off load would result in an additional 35 days being added to the outage schedule and substantial financial impact.

A061
1/1

Enclosed with this amendment request are:

A. Description of Amendment Request
B. Purpose of the Technical Specification
C. Need for the Technical Specification Change
D. Basis for No Significant Hazards Consideration
E. Safety Analysis of the Proposed Change Request
F. Environmental Impact Consideration Determination
G. Revised Technical Specification Change Pages

Pursuant to 10 CFR 50.91(b)(1) a copy of this request has been forwarded to the Arizona Radiation Regulatory Agency.

If there are any questions concerning this request, please contact Mr. Michael E. Powell at (602) 340-4981.

Sincerely,

WFCmw

WFC/JST/jle

Attachments

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

161-03607-WFC
November 20, 1990

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, W. F. Conway, represent that I am Executive Vice President - Nuclear, 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 and correct.

W F Conway
W. F. Conway

Sworn To Before Me This 20 Day Of November, 1990.

Dora E. Meador
Notary Public

My Commission Expires

My Commission Expires April 6, 1991

A. Description of Amendment Request

This amendment request proposes changes to Surveillance Requirements 4.4.1.4.1.2, 4.4.1.4.2, 4.9.8.1, and 4.9.8.2 for minimum shutdown cooling flow in Modes 5 and 6. The current Surveillance Requirements verify, at least once per 12 hours, that at least one shutdown cooling loop is in operation with a flow rate of greater than or equal to 4000 gallons per minute (gpm). The proposed change would require this minimum flow rate to be greater than or equal to 3780 gpm (indicated).

Changes to the Bases Sections 3/4.4.1 and 3/4.9.8 are also proposed to reflect the revised flowrate. Attachment G contains the revised Technical Specification change pages.

B. Purpose of the Technical Specification

The purpose of Surveillance Requirements 4.4.1.4.1.2 and 4.4.1.4.2 (applicable in Mode 5 with and without reactor coolant loops filled) is to ensure adequate shutdown cooling loop flow while on shutdown cooling for decay heat removal. This minimum flow requirement also provides adequate flow to ensure mixing, prevent stratification, and produce gradual reactivity changes during boron concentration reductions in the Reactor Coolant System.

The purpose of Surveillance Requirements 4.9.8.1 and 4.9.8.2 (applicable in Mode 6) is to ensure there is adequate shutdown cooling flow to provide (1) sufficient cooling capacity to remove decay heat and maintain the water in the reactor pressure vessel below 135 degrees Fahrenheit as required during Mode 6, (2) sufficient coolant circulation is maintained through the reactor core to minimize the effects of a boron dilution incident and prevent boron stratification, and (3) the Temperature Differential across the core will be maintained at less than 75 degrees Fahrenheit during Mode 6.

C. Need for the Technical Specification Change

PVNGS is proposing this amendment in accordance with the Programmed Enhancement Section of Generic Letter No. 88-17 to provide additional margin between the minimum flow requirements for shutdown cooling and the onset of vortex formation in the shutdown cooling suction nozzles during reduced reactor coolant system inventory operation. The formation of vortexes in the shutdown cooling nozzles has the potential to air bind the shutdown cooling pump and heat exchanger thus rendering the system inoperable. The reactor coolant system is drained to mid-loop during the installation of Steam Generator nozzle dams. The installation of these dams permits work and inspections to be performed on the Steam Generators without defueling. Entrainment of air in the shutdown cooling system has been observed at flows above 4100 gpm. The current minimum flow of 4000 gpm allows only a 100 gpm band in which to operate the shutdown cooling system between the current upper flow limit and the Technical Specification minimum flow. The minimum flow proposed by this amendment (3780 gpm indicated) would increase this margin to 320 gpm and continue to provide adequate mixing of boron in the RCS. This change would improve the safety of the shutdown cooling system by allowing operation substantially below the flowrate of incipient air entrainment, minimizing the possibility of air binding the shutdown cooling system (SDCS), and still providing adequate flow for decay heat removal and mixing of boron.

The proposed minimum flow of 3780 gpm (indicated) is above the region where a system flow instability has been observed. The observed phenomenon, which occurs while operating the Low Pressure Safety Injection Pump (LPSI) in the 2800 to 3400 gpm range, is an acoustic rumble which results from recirculation flow in the pump inlet piping. The effects of this are increased pump vibration which if allowed to occur long enough would reduce the life of pump and motor. APS is continuing to study this phenomena and methods of eliminating it.

D. Basis for No Significant Hazards Consideration

The commission has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92. A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with a proposed amendment would not: (1) Involve a significant increase in the probability or consequences of an accident previously evaluated: or (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) Involve a significant reduction in a margin of safety.

A discussion of these standards, as they relate to the amendment, follows:

Standard 1 - Involves a significant increase in the probability or consequences of an accident previously evaluated.

The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated but actually enhances the safety of operation of the shutdown cooling system. Lowering the shutdown cooling flow during reduced reactor coolant system inventory operation improves the margin between the required minimum flow and the formation of vortexes in the shutdown cooling suction nozzles. The formation of these vortexes has the potential of air binding the shutdown cooling heat exchanger and pumps of the operating shutdown cooling train.

The boron dilution event was analyzed by ABB-Combustion Engineering to determine if the new flowrates would provide adequate time for operator recognition and correction prior to criticality. The results are as follows:

> The limiting (most rapid) case which was analyzed for PVNGS was the case of a dilution during Beginning of Core (BOC), Mode 5 drained conditions, at the maximum charging flow rate. Based upon the RCS volume which was assumed (including one train of SDCS) at these conditions, and the time associated with circulation of the RCS at an actual flow of 3400 gpm, the analysis shows that the mixing time is short relative to the time to criticality therefore the dilution would proceed smoothly. It is concluded that there will be sufficient time to recognize and control the dilution before the core reached critical. The case of Mode 5, RCS not drained (with all other conditions the same) and Mode 6 cases are bounded by the limiting case of drained conditions in Mode 5. Therefore a shutdown cooling system flowrate of 3400 gpm is

acceptable in Modes 5 and 6 with respect to a postulated boron dilution event. This evaluation has completed verification according to the C-E QADM.

Standard 2 - Create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed reduced shutdown cooling flow changes the allowable flow to a value which does not affect the capability to detect and take corrective action for a boron dilution incident while on shutdown cooling. The ability of the shutdown cooling system to remove decay heat and maintain RCS temperature is controlled by operators who vary flow through the shutdown cooling heat exchanger to maintain the specified mode temperature requirements. The proposed minimum flow decreases the possibility of air binding the shutdown cooling system when at mid-loop by minimizing operation with flowrates which could induce significant air entrainment in the shutdown cooling system. The reduced flow does not affect operation of the shutdown cooling system nor involve any system configuration changes. Thus no possibility of a new or different kind of accident from any accident previously evaluated is created.

Standard 3 - Involve a significant reduction in a margin of safety.

The reduction in the minimum flow requirements does not reduce the margin of safety associated with the operation of the shutdown cooling system. The system will still perform within its design bases. The proposed flow will increase the margin of safety by allowing operation of the system further away from the flowrates which produce significant air entrainment in the shutdown cooling system. This minimizes the possibility of rendering one train of shutdown cooling inoperable due to air binding of the pumps or heat exchanger.

The proposed change matches one of the examples given in 51 FR 7751 of amendments that do not involve a significant hazards consideration. Specifically, the proposed amendment is a change resulting from the application of a small refinement of a previously used calculational model or design method. In this case, the lower minimum flow requirements were the result of a reanalysis of the boron dilution event by ABB-Combustion Engineering. This reanalysis demonstrated the proposed minimum flowrates presented in this amendment request meet the requirements of the original analysis.

E. Safety Analysis of the Proposed Change Request

The proposed Technical Specification change will not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the Final Safety Analysis Report (UFSAR). The proposed amendment does not make changes to the design of the facility. The effects of the amendment are lower minimum flow requirements for shutdown cooling operation. The design bases of the shutdown cooling system are not affected by this change.

The proposed Technical Specification change will not create the possibility of an accident or malfunction of equipment of a different type than any evaluated previously in the UFSAR. This change will minimize the possibility of a loss of shutdown cooling event by increasing the margin between the onset of significant air entrained flow and the minimum required flow for shutdown cooling. There are no equipment changes proposed in this amendment nor any change in the operation of shutdown cooling system other than a change to the Technical Specification minimum flowrate in Modes 5 and 6.

The proposed Technical Specification change will not reduce the margin of safety as defined in the basis for any Technical Specification. The bases for Surveillance Requirements 4.4.1.4.1.2, 4.4.1.4.2, 4.9.8.1, and 4.9.8.2 have been reviewed. The requirements stated in the bases sections are still met with the proposed minimum flowrates. The requirement for removal of decay heat is controlled by the operators who maintain RCS temperature by varying the amount of flow bypassing the shutdown cooling heat exchanger. The requirements for boron mixing are also satisfied with the proposed flowrate. Thus the proposed minimum flowrates do not reduce the margin of safety as defined in the bases for these Technical Specifications.

The proposed amendment to reduce the minimum flow for these Surveillance Requirements has been evaluated by ABB-Combustion Engineering (NSSS vendor) to ensure adequate circulation is maintained to minimize the effects of a boron dilution event and prevent boron stratification. The basis for the 23 minute loop circulation time criteria in the Technical Specification Bases is derived from a concern for avoiding a boron dilution event. A calculation was performed which developed acceptable accident mitigation under the following assumptions:

- The SDCS operates in one RCS loop while the other RCS loop is static (i.e., only one train of the SDCS is in operation);
- The SDCS is in operation at 4000 gpm;
- The RCS is full;
- The fuel in the core is at beginning of core life.

Inherent to the calculation are assumptions regarding fluid mixing within the RCS. At 4000 gpm a full RCS (90,000 gal) will be completely circulated within 23 minutes. This RCS circulation time was determined to be acceptable because it was significantly less than the approximately one hour minimum time for loss of shutdown margin in UFSAR Section 15.4.6. The RCS circulation time at the proposed flowrate of 3400 gpm (actual) is 27 minutes which is also significantly less than the minimum time to loss of shutdown margin. Thus the proposed flowrate of 3400 gpm (actual) would not affect the ability of an operator to recognize and curtail a boron dilution event prior to loss of shutdown margin.

The requirements to remove decay heat are controlled by the operators who must ensure there is sufficient flow through the shutdown cooling heat exchanger to maintain the temperature requirements of the applicable mode. The control of RCS temperature while on shutdown cooling at Palo Verde is accomplished by controlling the amount of flow bypassing the shutdown cooling heat exchanger

and not by maintaining a minimum system flowrate. Thus the requirement to maintain a minimum system flow is only for prevention of a boron dilution event and does not directly relate to decay heat removal.

ABB-Combustion Engineering has performed a study to determine the minimum flows necessary to maintain RCS temperature at less than 135 degrees Fahrenheit in Mode 6 and concluded that 3400 gpm (actual) will accomplish this 12 days after shutdown with a 105 degree fahrenheit cooling water inlet temperature. In Mode 5, 3400 gpm (actual) will maintain the RCS less than 200 degrees Fahrenheit 10 hours after reactor shutdown. These calculations assume worst case cooling water inlet conditions and conservative heat exchanger fouling factors, the current capability of the shutdown cooling system is in excess of these assumptions.

F. Environmental Impact Consideration Determination

The proposed change request does not involve an unreviewed environmental question because operation of PVNGS Units 1, 2, and 3 in accordance with this change would not:

1. Result in a significant increase in any adverse environmental impact previously evaluated in the Final Environmental Statement (FES) as modified by the staff's testimony to the Atomic Safety and Licensing Board, Supplements to the FES, Environmental Impact Appraisals, or in any decisions of the Atomic Safety Licensing Board: or

2. Result in a significant change in effluents or power levels; or

3. Result in matters not previously reviewed in the licensing basis for PVNGS which may have a significant environmental impact.

G. Revised Technical Specification Change Pages

See attached pages as typical for each unit. Deletions are noted by strikeout and additions are highlighted and in bold italic print.