Palo Verde Nuclear
Generating Station

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10 CFR 50.90
10 CFR 50.91

102-04506-CDM/SAB/JAP
December 1, 2000

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-37
Washington, DC 20555-0001

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket Nos. STN 50-528/529/530
Request for Amendment to Technical Specifications
2.1 and 3.3.1 – Minimum Departure from
Nucleate Boiling Ratio (DNBR)

Pursuant to 10 CFR 50.90, Arizona Public Service Company (APS) requests an amendment to Technical Specifications (Safety Limit) 2.1.1.1 and (Instrumentation) 3.3.1, Table 3.3.1-1, Departure from Nucleate Boiling Ratio (DNBR), for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3. The proposed amendment would change the DNBR limit from "≥ 1.30" to "≥ 1.34". This change will accommodate increased DNBR sensitivity to uncertainties in inlet flow to the hot assembly and adjacent assemblies.

Provided in Enclosure 1 to this letter are the following sections which support the proposed Technical Specification amendment:

A. Description of the Proposed Technical Specification Amendment
B. Purpose of the Technical Specification
C. Need for the Technical Specification Amendment
D. Safety Analysis for the Proposed Technical Specification Amendment

A001

E. No Significant Hazards Consideration Determination
F. Environmental Consideration
G. Marked-up Technical Specification Page
H. Retyped Technical Specification Page

In accordance with the PVNGS Quality Assurance Program, the Plant Review Board and Offsite Safety Review Committee have reviewed and concurred with this proposed amendment. By copy of this letter this request is being forwarded to the Arizona Radiation Regulatory Agency (ARRA) pursuant to 10 CFR 50.91(b)(1).

APS requests that the enclosed Technical Specification amendment request be reviewed and approved by August 1, 2001. The proposed amendment is structured such that it will become effective in each Unit for operating cycle 11. Operating cycle 11 begins in the Spring 2002 for Unit 2, in Fall 2002 for Unit 1, and in Spring 2003 for Unit 3.

No commitments are being made to the NRC by this letter.

Should you have any questions, please contact Scott A. Bauer at (623) 393-5978.

Sincerely,

David D Mauldin

CDM/SAB/JAP/kg

Enclosure

cc: E. W. Merschoff
J. N. Donohew
J. H. Moorman
A. V. Godwin (ARRA)

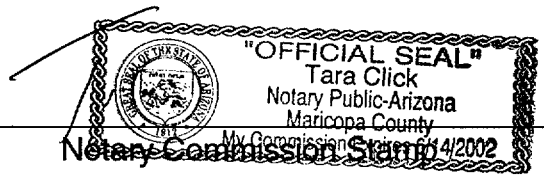
STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, David Mauldin, represent that I am Vice President Nuclear Engineering and Support, Arizona Public Service Company (APS), that the foregoing document has been signed by me on behalf of APS with full authority to do so, and that to the best of my knowledge and belief, the statements made therein are true and correct.

David Mauldin

Sworn To Before Me This 1st Day Of December, 2000.

Notary Public



Notary Commission Stamp

ENCLOSURE 1

Proposed Amendment to Units 1, 2 and 3 Technical Specifications 2.1.1.1 and 3.3.1, Table 3.3.1-1 Departure from Nucleate Boiling Ratio (DNBR)

A. DESCRIPTION OF THE PROPOSED TECHNICAL SPECIFICATION AMENDMENT

The proposed Technical Specification (TS) amendment will change the value for Departure from Nucleate Boiling Ratio (DNBR) from "≥ 1.30" to "≥ 1.34" in the Safety Limits Section 2.1.1.1 and Table 3.3.1-1 in Reactor Protection System (RPS) Instrumentation – Operating of Section 3.3.1 of the Palo Verde Nuclear Generating Station (PVNGS) Technical Specifications for Units 1, 2, and 3.

B. PURPOSE OF THE TECHNICAL SPECIFICATION

The purpose of the DNBR Safety Limit Section 2.1.1.1 is to ensure that the minimum DNBR is not less than the safety analyses limit. This safety limit will prevent overheating of the fuel cladding and possible cladding perforation, which would result in the release of fission products to the reactor coolant. Restricting fuel operation to within the nucleate boiling regime where the heat transfer coefficient is large and the cladding surface temperature is slightly above the coolant saturation temperature prevents overheating of the fuel cladding. The upper boundary of the nucleate boiling regime is termed "departure from nucleate boiling" (DNB). At this point, there is a sharp reduction of the heat transfer coefficient, which would result in higher cladding temperatures and the possibility of cladding failure. Operating above the DNBR Safety Limit will prevent DNB (at a 95% probability with 95% confidence) and thus prevent overheating of the fuel cladding and the adverse consequences.

The Limiting Safety System Setting (LSSS) for Low DNBR, as specified in Table 3.3.1-1 of Limiting Condition for Operation (LCO) 3.3.1, is a RPS trip setpoint. The Core Operating Limit Supervisory System (COLSS) Power Operating Limit (POL) is an alarm limit on the maximum steady state core power level. The alarm is based on maintaining COLSS calculated DNBR a pre-determined amount above the DNBR Safety Limit. The Low DNBR RPS trip setpoint in conjunction with the COLSS POL, prevents the DNBR in the limiting coolant channel in the core from violating the DNBR Safety Limit during design basis Anticipated Operational Occurrences (AOO). Operating below the COLSS POL ensures the Low DNBR RPS trip setpoint will protect the core from damage due to the occurrence of locally saturated conditions in the limiting (hot) channel during the worst AOO. Thus, the Low DNBR RPS trip setpoint in conjunction with the COLSS POL prevents overheating of the fuel cladding during normal and anticipated operation.

C. NEED FOR THE TECHNICAL SPECIFICATION AMENDMENT

The DNBR Safety Limit and the Low DNBR RPS trip setpoint will be increased from "≥ 1.30" to "≥ 1.34" beginning with Unit 2 operating cycle 11 (Spring 2002) as well as in operating cycle 11 for Units 1 and 3 (Fall of 2002 and Spring of 2003, respectively). This change will accommodate increased DNBR sensitivity to uncertainties in inlet flow

to the hot assembly and adjacent assemblies. This increased sensitivity is attributed to the flatter power distributions of the more efficient present day erbium core designs.

D. SAFETY ANALYSIS FOR THE PROPOSED TECHNICAL SPECIFICATION AMENDMENT

The DNBR Safety Limit (TS 2.1.1.1) and the Low DNBR RPS trip setpoint (TS 3.3.1, Table 3.3.1-1) will be increased from "≥ 1.30" to "≥ 1.34". This change will accommodate increased DNBR sensitivity to uncertainties in inlet flow to the hot assembly and adjacent assemblies. This increased sensitivity is attributed to the flatter power distributions of the more efficient present day erbium core designs.

This increased DNBR sensitivity to inlet flow was first encountered in Unit 1 Cycle 7. The NRC Safety Evaluation (issued May 26, 1994 for PVNGS Units 1, 2, and 3) for the present DNBR limit (≥ 1.30) states, "Uncertainties in inlet flow to the hot assembly and adjacent assemblies can be accounted for statistically by either increasing DNBR [Limit] or applying a thermal margin penalty [to the COLSS and Core Protection Calculators (CPCs)] using approved [Statistical Combination of Uncertainties] SCU methods." The approved SCU methods are described in, "Modified Statistical Combination of Uncertainties," CEN-356(V)-P-A Revision 01-P-A, May 1988 and "System 80^{TM} Inlet Flow Distribution," Supplement 1-P to Enclosure 1-P to LD-82-054, February 1993 (Methodology for Specification 3.2.4, DNBR and 3.2.5 Axial Shape Index), as listed in Technical Specification 5.6.5.b.4. At that time it was decided to account for the increased DNBR sensitivity by applying a thermal margin penalty to COLSS and CPCs. This approach was also used for the subsequent fuel cycles in Units 1, 2, and 3.

A new DNBR limit (≥ 1.34) has been calculated. Implementing the new DNBR limit will move the accounting for the increased DNBR sensitivity to inlet flow from a thermal margin penalty on COLSS and CPCs to an increase in the DNBR limit. The new limit calculation statistically took into account the more adverse DNBR sensitivity to inlet flow. The calculation was performed such that it has a high probability of covering all future cycle designs. This calculation was done in a joint effort between Arizona Public Service Company (APS) and Combustion Engineering Nuclear Power (CE). This change will modify the reload safety analysis and setpoint design bases, making them less confusing and simplifying the reload process with respect to the DNBR limit (since the Safety Limit and effective Low DNBR RPS trip setpoint will be the same again) to avoid possible future errors.

E. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

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 this amendment request follows:

Standard 1 -- Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

No. The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The purpose of the proposed Technical Specification (TS) amendment is to provide a revised Departure from Nucleate Boiling Ratio (DNBR) Safety Limit (TS Section 2.1.1.1) and Low DNBR Reactor Protective System (RPS) trip setpoint (TS Limiting Condition for Operation (LCO) 3.3.1, Table 3.3.1-1).

The proposed TS amendment involves increasing the DNBR Safety Limit and Low DNBR RPS trip setpoint limit from "≥ 1.30" to "≥ 1.34". Changing this limit in and of itself will not alter the physical characteristics of any component involved in the initiation of an accident. Thus, the proposed change does not involve a significant increase in the probability of an accident previously evaluated.

The Core Operating Limit Supervisory System (COLSS) Power Operating Limit (POL) is an alarm limit on the maximum steady state core power level. The alarm is based on maintaining COLSS calculated DNBR a pre-determined amount above the DNBR Safety Limit. The Low DNBR RPS trip setpoint in conjunction with the COLSS POL, prevents the DNBR in the limiting coolant channel in the core from violating the DNBR Safety Limit during design basis Anticipated Operational Occurrences (AOO). Operating below the COLSS POL ensures the Low DNBR RPS trip setpoint will protect the core from damage due to the occurrence of locally saturated conditions in the limiting (hot) channel during the worst AOO. Thus, during normal and anticipated operation the Low DNBR RPS trip setpoint in conjunction with the COLSS POL prevents overheating of the fuel cladding and subsequent cladding perforation that would release fission products to the reactor coolant.

This change will accommodate increased DNBR sensitivity to uncertainties in inlet flow to the hot assembly and adjacent assemblies. This increased sensitivity is attributed to the flatter power distributions of the more efficient present day erbium core designs.

More adverse DNBR sensitivity to inlet flow was first encountered in Unit 1 Cycle 7. At that time the increased DNBR sensitivity was accounted for statistically by applying a thermal margin penalty to Core Operating Limit Supervisory System (COLSS) and Core Protection Calculators (CPCs) using approved Statistical Combination of Uncertainties (SCU) methods. This approach was also used for the subsequent cycles in all units up until the present. The NRC Safety Evaluation (issued May 26, 1994 for Palo Verde Nuclear Generating Stations (PVNGS) Units 1, 2, and 3) for the present "≥ 1.30" DNBR limit states, "Uncertainties in inlet flow to the hot assembly and adjacent assemblies can be accounted for statistically by either increasing DNBR or applying a thermal margin penalty using approved SCU methods."

The proposed TS amendment change for DNBR Safety Limit and Low DNBR RPS trip setpoint limit (≥ 1.34) was calculated using approved SCU methods to statistically include the above described increased DNBR sensitivity. This new DNBR limit was calculated such that it has a high probability of covering all future cycle designs. Thus, this change involves moving the existing increased inlet flow uncertainty penalty from a thermal margin penalty contained in COLSS and CPCs to an increase in the DNBR Safety Limit and Low DNBR RPS trip setpoint limit. The DNBR Safety Limit and Low DNBR RPS trip setpoint increases from "≥ 1.30" to "≥ 1.34" due to this change. The COLSS and CPCs would respond similarly with the increased inlet flow uncertainty penalty located in either the COLSS and CPCs or in the DNBR Safety Limit. The proposed amendment changes only the location of the increased inlet flow uncertainty penalty and does not impact the operation of the plant. The core power distribution during all phases of normal and anticipated operational occurrences will remain bounded by the initial conditions assumed in Chapter 15 of the Palo Verde Nuclear Generating Station (PVNGS) UFSAR. Thus, the proposed change does not involve a significant increase in the consequences of an accident previously evaluated.

Standard 2 -- Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

No. The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

This change does not alter the physical design of any System, Structure, or Component (SSC) of the plant.

The change involves increasing the DNBR Safety Limit and the Low DNBR RPS trip setpoint from "≥ 1.30" to "≥ 1.34" and decreasing the corresponding DNBR thermal margin penalty factors in COLSS and CPC in a compensating manner. Changing these limits and penalty factors will not alter the physical or functional characteristics of any component in the plant. These changes will not affect any safety-related equipment used in the mitigation of anticipated operational occurrences or design basis accidents.

Thus, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Standard 3 -- Does the proposed change involve a significant reduction in a margin of safety?

No. The proposed change does not involve a significant reduction in a margin of safety.

The DNBR Safety Limit specified in Section 2.1.1.1 and the Low DNBR RPS trip setpoint specified in Table 3.3.1-1 of LCO 3.3.1 of PVNGS Technical Specifications ensure that operation of the reactor does not result in a departure from nucleate boiling during normal operation and design basis anticipated operational occurrences. Therefore, operating consistent with the increased DNBR Safety Limit and Low DNBR RPS trip setpoint will ensure that no anticipated operational occurrence will result in core conditions below the specified DNBR Safety Limit and no postulated accident exceeds the site boundary dose limits. The UFSAR Chapter 15 analysis remains bounding and the margins of safety will be maintained because the COLSS and the CPC overall uncertainty factors will be calculated and implemented consistent with the increased DNBR Safety Limit of "$\geq$ 1.34". Therefore, this change to TS Section 2.1.1.1 and Table 3.3.1-1 of LCO 3.3.1 does not involve a significant reduction in a margin of safety.

Based on the responses to these three criteria, Arizona Public Service Company (APS) has concluded that the proposed amendment involves no significant hazards consideration.

F. ENVIRONMENTAL CONSIDERATION

APS has determined that the proposed amendment involves no changes in the amount or type of effluent that may be released offsite, and results in no increase in individual or cumulative occupational radiation exposure. As described above, the proposed Technical Specification amendment involves no significant hazards consideration and, as such, meets the eligibility criteria for categorical exclusion set forth in 10CFR 51.22(c)(9).

G. MARKED-UP TECHNICAL SPECIFICATION PAGES

Units 1, 2, and 3; Pages 2.0-1, 2.0-2 and 3.3.1-10

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 In MODES 1 and 2, Departure from Nucleate Boiling Ratio (DNBR) shall be maintained ~~at ≥ 1.3.~~ **as follows:**

≥ 1.3 (through operating cycle 10)

≥ 1.34 (operating cycle 11 and later)

2.1.1.2 In MODES 1 and 2, the peak Linear Heat Rate (LHR) (adjusted for fuel rod dynamics) shall be maintained at ≤ 21.0 kW/ft.

2.1.2 Reactor Coolant System (RCS) Pressure SL

In MODES 1, 2, 3, 4, and 5, the RCS pressure shall be maintained at ≤ 2750 psia.

2.2 SL Violations

2.2.1 If SL 2.1.1.1 or SL 2.1.1.2 is violated, restore compliance and be in MODE 3 within 1 hour.

2.2.2 If SL 2.1.2 is violated:

2.2.2.1 In MODE 1 or 2, restore compliance and be in MODE 3 within 1 hour.

2.2.2.2 In MODE 3, 4, or 5, restore compliance within 5 minutes.

2.2.3 Within 1 hour, notify the NRC Operations Center, in accordance with 10 CFR 50.72.

2.2.4 Within 24 hours, notify the Director, Operations and Vice President, Nuclear Production.

2.0 SLs

2.2.5 Within 30 days of the violation, a Licensee Event Report (LER) shall be prepared pursuant to 10 CFR 50.73. The LER shall be submitted to the NRC and the Director, Operations and Vice President, Nuclear Production.

2.2.6 Operation of the unit shall not be resumed until authorized by the NRC.

Table 3.3.1-1 (page 3 of 3)
Reactor Protective System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
14. Local Power Density – High(b)	1,2	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.7 SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.11 SR 3.3.1.12 SR 3.3.1.13	≤ 21.0 kW/ft
15. Departure From Nucleate Boiling Ratio (DNBR) – Low(b)	1,2	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.7 SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.11 SR 3.3.1.12 SR 3.3.1.13	~~≥ 1.30~~ ≥ 1.3 (through operating cycle 10) ≥ 1.34 (operating cycle 11 and later)

(b) Trip may be bypassed when logarithmic power is < 1E-4% NRTP. Bypass shall be automatically removed when logarithmic power is ≥ 1E-4% NRTP.

H. RETYPED TECHNICAL SPECIFICATION PAGE

Units 1, 2, and 3; Pages 2.0-1, 2.0-2 and 3.3.1-10

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 In MODES 1 and 2, Departure from Nucleate Boiling Ratio (DNBR) shall be maintained as follows:

≥ 1.3 (through operating cycle 10)

≥ 1.34 (operating cycle 11 and later)

2.1.1.2 In MODES 1 and 2, the peak Linear Heat Rate (LHR) (adjusted for fuel rod dynamics) shall be maintained at ≤ 21.0 kW/ft.

2.1.2 Reactor Coolant System (RCS) Pressure SL

In MODES 1, 2, 3, 4, and 5, the RCS pressure shall be maintained at ≤ 2750 psia.

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2.2.1 If SL 2.1.1.1 or SL 2.1.1.2 is violated, restore compliance and be in MODE 3 within 1 hour.

2.2.2 If SL 2.1.2 is violated:

2.2.2.1 In MODE 1 or 2, restore compliance and be in MODE 3 within 1 hour.

2.2.2.2 In MODE 3, 4, or 5, restore compliance within 5 minutes.

2.2.3 Within 1 hour, notify the NRC Operations Center, in accordance with 10 CFR 50.72.

2.2.4 Within 24 hours, notify the Director, Operations and Vice President, Nuclear Production.

(continued)

2.2.5 Within 30 days of the violation, a Licensee Event Report (LER) shall be prepared pursuant to 10 CFR 50.73. The LER shall be submitted to the NRC and the Director, Operations and Vice President, Nuclear Production.

2.2.6 Operation of the unit shall not be resumed until authorized by the NRC.

Table 3.3.1-1 (page 3 of 3)
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14. Local Power Density – High(b)	1,2	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.7 SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.11 SR 3.3.1.12 SR 3.3.1.13	≤ 21.0 kW/ft
15. Departure From Nucleate Boiling Ratio (DNBR) – Low(b)	1,2	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.7 SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.11 SR 3.3.1.12 SR 3.3.1.13	≥ 1.3 (through operating cycle 10) ≥ 1.34 (operating cycle 11 and later)

(b) Trip may be bypassed when logarithmic power is < 1E-4% NRTP. Bypass shall be automatically removed when logarithmic power is ≥ 1E-4% NRTP.

PACKAGE DIVIDER