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SUBJECT: Application for amends to Licenses NPF-1, NPF-51 & NPF-74,      D

proposing TS Figure 3.2-1, reactor coolant cold leg temp vs      S

core power level, of TS 3.2.6, reactor coolant cold leg temp      S

for units & TS 3.1.1.4, min temp for criticality.

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**Arizona Public Service Company**

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**102-02829-WFC/RAB/GEC**

**February 18, 1994**

**WILLIAM F. CONWAY  
EXECUTIVE VICE PRESIDENT  
NUCLEAR**

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
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Washington, DC 20555

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2, and 3  
Docket Nos. STN 50-528/529/530  
Proposed Amendment to Units 1 and 3 Technical Specification  
FIGURE 3.2-1; and Units 1, 2, and 3 Technical Specification  
SECTION 3/4.1.1.4, and BASES 3/4.1.1.4  
File: 94-005-419.05**

Pursuant to 10 CFR 50.90, Arizona Public Service Company submits herewith a proposed amendment to Technical Specification (TS) Figure 3.2-1, Reactor Coolant Cold Leg Temperature vs Core Power Level, of TS 3.2.6, Reactor Coolant Cold Leg Temperature for Units 1 and 3; and TS 3.1.1.4, Minimum Temperature for Criticality, the associated Surveillance Requirement in TS 4.1.1.4, and the associated bases in TS BASES 3/4.1.1.4, Minimum Temperature for Criticality for Units 1, 2, and 3. This proposed amendment is requested to allow Palo Verde Units 1 and 3 to operate at 100 percent full power under a reduced temperature regimen. The amendment will also allow all three units to operate in a reduced temperature regimen without the need to perform a continuing 30 minute surveillance at a temperature (557°F) not supported by the safety analysis. The change to TS Figure 3.2-1, Reactor Coolant Cold Leg Temperature vs Core Power Level, is not being requested for Unit 2 at this time due to continuing analysis arising from steam generator tube plugging in that unit.

Operation of the units is currently restricted by an administratively imposed ten degree reduction in the reactor coolant cold leg temperature which results in a reduced core power level (unit operations are currently restricted to 85 percent power, which is less than the 90 percent reactor power level restriction imposed by TS Figure 3.2-1).

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Proposed Amendment to Technical Specifications  
Page 2

102-02829-WFC/RAB/GEC  
February 18, 1994

The Plant Review Board and Offsite Safety Review Committee have reviewed and approved the proposed amendment. Pursuant to 10 CFR 50.91(b)(1), a notification of this request, including the no significant hazards consideration determination, is being provided to the Arizona Radiation Regulatory Agency (ARRA) by copy of this letter.

Provided in the enclosure to this letter are the following:

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

Should you have any questions, please contact Richard A. Bernier at (602) 393-5882.

Sincerely,



WFC/RAB/GEC/rv

Enclosure

cc: K. E. Perkins, Jr.  
K. E. Johnston  
B. E. Holian  
A. V. Godwin (ARRA)



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

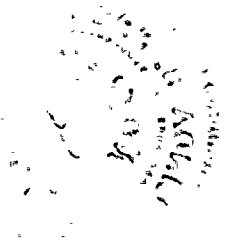
Sworn To Before Me This 18 Day Of February, 1994.

Linda Spell  
Notary Public

My Commission Expires

March 31, 1996







**ENCLOSURE**

**PROPOSED AMENDMENT TO TECHNICAL SPECIFICATION**

**FIGURE 3.2-1 FOR UNITS 1 AND 3; AND SECTION 3/4.1.1.4,**

**AND BASES 3/4.1.1.4 FOR UNITS 1, 2, AND 3**



A. DESCRIPTION OF THE PROPOSED AMENDMENT

The Palo Verde Nuclear Generating Station (PVNGS) units are currently operating at a reduced cold leg temperature ( $T_{cold}$ ) administratively imposed due to concerns regarding potential steam generator tube degradation. The 10°F cold leg temperature reduction results in a power reduction to 85% power.

In order PVNGS Units 1 and 3 to return to full power operation with a reduced  $T_{cold}$ , and to avoid operating within a continuous surveillance requirement condition in Units 1, 2, and 3, changes are required to two separate Technical Specifications and to one section of the Technical Specification (TS) BASES.

Arizona Public Service Company (APS) proposes to modify TS Figure 3.2-1, "REACTOR COOLANT COLD LEG vs CORE POWER LEVEL," of TS 3/4.2.6, "REACTOR COOLANT COLD LEG TEMPERATURE," for Units 1 and 3 to include the cold leg temperature between 552°F and 562°F at core power levels between 90 percent and 100 percent within the AREA OF ACCEPTABLE OPERATION.

APS also proposes to modify TS 3/4.1.1.4, "MINIMUM TEMPERATURE FOR CRITICALITY," and BASES 3/4.1.1.4, "MINIMUM TEMPERATURE FOR CRITICALITY," to allow the minimum temperature for criticality to be established at 545°F, rather than the current value of 552°F, to establish the surveillance temperature at 552°F, rather than the current 557°F, and clarify the BASES for this TS.

The proposed change is acceptable since:

- a. The existing Unit 1 and 3 safety analyses remain valid for inclusion of cold leg temperatures between 552°F and 562°F at core power levels between 90 percent and 100 percent within the AREA OF ACCEPTABLE OPERATION of TS Figure 3.2-1. This area, currently outside of the AREA OF ACCEPTABLE OPERATION of TS Figure 3.2-1, therefore, can be incorporated within the AREA OF ACCEPTABLE OPERATION as shown in proposed TS Figure 3.2-1.
- b. The proposed BASES for the minimum temperature for criticality is valid for operation with the cold leg temperature greater than or equal to 545°F.
- c. APS has evaluated the effect of the 10°F temperature reduction on plant equipment and concluded that PVNGS Units 1 and 3 will remain in compliance with all applicable industry and regulatory requirements.



**B. PURPOSE OF THE TECHNICAL SPECIFICATION**

The following design basis is imposed on the reactor coolant cold leg temperature (TS BASES 3/4.2.6, Units 1 and 3):

This specification is provided to ensure that the actual value of the reactor coolant cold leg temperature is maintained within the range of values used in the safety analysis.

The following design bases are currently imposed on the minimum temperature for criticality (TS BASES 3/4.1.1.4, Units 1, 2, and 3):

This limitation is required to ensure (1) the moderator temperature coefficient is within its analyzed temperature range, (2) the protective instrumentation is within its normal operating range, and (3) consistency with the FSAR safety analysis. TS BASES 3/4.1.1.4 will be revised as described in paragraph D.2, below.

**C. NEED FOR THE TECHNICAL SPECIFICATION AMENDMENT**

Operation of the PVNGS units is currently restricted by an administratively imposed ten degree reduction in the reactor coolant cold leg temperature imposed due to concerns regarding potential steam generator tube degradation, including primary water stress corrosion cracking, at normal operating temperatures associated with 100% power. PVNGS unit operations are currently restricted to 85 percent power, which is less than the 90 percent reactor power level restriction imposed by TS Figure 3.2-1.

Establishing a minimum temperature for criticality at 545°F for all three units, and modifying TS Figure 3.2-1 for Units 1 and 3 to allow operation at 100 percent power with a reduced cold leg temperature, will allow operation of Units 1 and 3 at full power, and allow all three units to operate under a 10°F  $T_{cold}$  reduction without being in a 30 minute surveillance requirement. Unit 1 will be capable of returning to full power upon issuance of the TS amendment. Unit 3 will be capable of returning to full power at the completion of the upcoming refueling outage (currently scheduled to finish about the end of this May).

**D. SAFETY ANALYSIS OF THE PROPOSED TECHNICAL SPECIFICATION AMENDMENT**

The changes to PVNGS Units 1 and 3 TS Figure 3.2-1, and Units 1, 2, and 3 TS 3/4.1.1.4, and TS BASES 3/4.1.1.4, are based on the need to return Units 1



and 3 to full power operation with a 10°F reduction in the cold leg temperature, and the need to operate all three units at a 10°F  $T_{cold}$  reduction without being in a 30 minute surveillance requirement, and are supported by appropriate safety analyses.

1. REACTOR COOLANT COLD LEG TEMPERATURE vs. CORE POWER LEVEL -- TS 3.2.6

All Updated Final Safety Analysis Report (UFSAR) events were reviewed to evaluate the effects of including cold leg temperatures between 552°F and 562°F at core power levels between 90 percent and 100 percent within the AREA OF ACCEPTABLE OPERATION of TS Figure 3.2-1. The following UFSAR events were identified as requiring potential reanalysis to evaluate the impact of the 10°F  $T_{hot}$  reduction:

- Control Element Assembly Ejection
- Uncontrolled Control Element Assembly Withdrawal at Power
- Loss of Condenser Vacuum
- Loss of Coolant Accident (LOCA) - Small Break LOCA
- Loss of Coolant Accident - Large Break LOCA

In addition, the following Special Event was reanalyzed:

- Main Steam Line Break with Induced Multiple Steam Generator Tube Rupture.

Following is a summary, by accident category, of the results of the reviews and reanalyses:

INCREASE IN HEAT REMOVAL BY THE SECONDARY SYSTEM

Moderate Frequency Events

The moderate frequency events in this category were reviewed to determine if the reduction in  $T_{cold}$  would negatively impact these analyses. These analyses used  $T_{cold}$  temperatures ranging from 550°F to 572°F. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the Design Basis Events (DBE) and reanalysis is not required.

Infrequent Events

The existing analyses for the events in this category with loss of offsite power used 550°F as the value for  $T_{cold}$ ; therefore, the





reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

#### Limiting Fault Events

The steam line break events use maximum values for  $T_{cold}$  to maximize the consequences of these events. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

### DECREASE IN HEAT REMOVAL BY THE SECONDARY SYSTEM

#### Moderate Frequency and Infrequent Events

The Loss of External Load event is bounded by the consequences of a Loss of Condenser Vacuum event. The Loss of External Load event is limiting for setting core protection calculator (CPC) coefficients. These coefficients have been demonstrated to exhibit little sensitivity to a reduction in  $T_{cold}$  as determined by an evaluation that investigated the impact over a varying range (from 550°F to 570°F) of  $T_{cold}$ ; therefore, the reduction in  $T_{cold}$ , as proposed, has no negative effect on the DBE and reanalysis is not required.

The Loss of Condenser Vacuum event is affected by a reduction in  $T_{cold}$  and was reanalyzed in support of the proposed temperature reduction. This event was reanalyzed with a  $T_{cold}$  of 550°F. The negative impact of the lower inlet temperature was offset by using a revised pressurizer surge line geometric K factor of 3.0 (0.9 of excess conservatism was removed). The most positive moderator temperature coefficient (MTC) values allowed by the Limiting Condition For Operation conditions from 90-100% power were used. The resultant peak reactor coolant system (RCS) pressure (of 2740 psia) remains bounded by the value reported in the PVNGS UFSAR of 2743 psia. Based on the reanalysis, the proposed reduction in RCS temperatures is acceptable for these events. NOTE: Cycle specific analysis will be performed for all units following NRC approval of the pending TS amendment for pressurizer safety valve and main steam safety valve setpoint tolerances.

#### Limiting Fault Events

The feedwater pipe break events in this category are more limiting using maximized values of  $T_{cold}$ . The existing analyses utilize 570°F for the value of  $T_{cold}$ . For these events, using higher values for  $T_{cold}$



is more limiting. Therefore, the reduction in  $T_{\text{cold}}$ , as proposed, has no effect on the DBE and reanalysis is not required.

## DECREASE IN REACTOR COOLANT FLOWRATE

### Moderate Frequency and Infrequent Events

Events in this category were reviewed and the existing analyses used a value for  $T_{\text{cold}}$  of 550°F, which is bounding. Therefore, the reduction in  $T_{\text{cold}}$ , as proposed, has no effect on the DBE and reanalysis is not required.

### Limiting Fault Events

The single reactor coolant pump rotor seizure with loss of offsite power, and reactor coolant pump shaft break with loss of offsite power events in this category were reviewed and the existing analyses used a value for  $T_{\text{cold}}$  of 550°F, which is bounding. Reanalysis was not required. Therefore, the reduction in  $T_{\text{cold}}$ , as proposed, is acceptable.

## REACTIVITY AND POWER DISTRIBUTION ANOMALIES

### Moderate Frequency and Infrequent Events

The subcritical, low, and high power control element assembly (CEA) withdrawal events were reviewed and the existing analyses used a maximum value for  $T_{\text{cold}}$  of 570°F. For these events, using higher values for  $T_{\text{cold}}$  is more limiting. Therefore, the reduction in  $T_{\text{cold}}$ , as proposed, has no adverse effect on the DBE, and reanalysis is not required.

The CEA drop events were reviewed and the current analyses for these events use partial derivatives to directly convert the physics-generated distortions into margin requirements. Therefore, the results of these analyses are independent of the value of  $T_{\text{cold}}$ . Consequently, the reduction in  $T_{\text{cold}}$ , as proposed, has no effect on the DBE and reanalysis is not required.

The single CEA withdrawal events were reviewed and while reanalysis of some of these events above 90% power is required, acceptable results are assured by COLSS database and/or addressable constant changes (this is consistent with normal practices for each refueling). No changes to COLSS are expected



for Unit 1 due to credit taken for negative MTC. Changes may be required for Unit 3, but will be incorporated into the standard reload setpoint process. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

The reactor power cutback events in this category were reviewed and the analyses used a value for  $T_{cold}$  of 565°F. Since the analyses are initiated from conditions specified in the technical specifications (limiting condition for operation), the reduction in  $T_{cold}$  would have no impact on the results. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

The part length control element assembly drop events in this category were reviewed and the analyses used values for  $T_{cold}$  of 550°F and 570°F at 50 percent power which resulted in the most limiting conditions. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

The startup of inactive reactor coolant pump events were reviewed and the manner in which the analysis is performed is not dependent on the value of  $T_{cold}$  and has no impact on the results. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

The boron dilution events were reviewed and the manner in which the analysis is performed is not dependent on the value of  $T_{cold}$  and has no impact on the results. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

#### Limiting Fault Events

The CEA ejection events were reviewed and while reanalysis of some of these events above 90% power is required, acceptable results are assured by COLSS database and/or addressable constant changes (this is consistent with normal practices for each refueling). No changes to COLSS are expected for Unit 1 due to credit taken for negative MTC. Changes may be required for Unit 3, but will be incorporated into the standard reload setpoint process. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.



## INCREASE IN REACTOR COOLANT SYSTEM INVENTORY

### Moderate Frequency Events

The inadvertent operation of the emergency core cooling system event was reviewed and the manner in which the analysis is performed is not dependent on the value of  $T_{cold}$  and has no impact on the results. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

### Infrequent Events

The chemical and volume control system malfunction with loss of offsite power event was reviewed and the manner in which the analysis is performed is not dependent on the value of  $T_{cold}$  and has no impact on the results. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

## DECREASE IN REACTOR COOLANT SYSTEM INVENTORY

### Moderate Frequency Events

The inadvertent opening of a pressurizer safety valve and the letdown line break events were reviewed and the manner in which the analysis is performed is not dependent on the value of  $T_{cold}$  and has no impact on the results. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

### Infrequent Events

The steam generator tube rupture events in this category are more limiting using maximized values of  $T_{cold}$  due to a higher steaming rate and a resultant increase in time to isolate the affected steam generator. These factors yield more limiting results with maximum values of  $T_{cold}$  and bound the initially higher primary to secondary flow rate. Therefore, the reduction in  $T_{cold}$ , as proposed, has no adverse effect on the DBE (results are actually more conservative) and reanalysis is not required.

## MISCELLANEOUS EVENTS

The asymmetric steam generator transient events were reviewed and the manner in which the analysis is performed is not dependent on





the value of  $T_{cold}$  and has no impact on the results. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

The pressurizer spray malfunction events were reviewed and the manner in which the analysis is performed is not dependent on the value of  $T_{cold}$  and has no impact on the results. Therefore, the reduction in  $T_{cold}$ , as proposed, has no effect on the DBE and reanalysis is not required.

#### MAIN STEAM LINE BREAK WITH INDUCED MULTIPLE STEAM GENERATOR TUBE RUPTURE

This event was originally analyzed for a  $T_{cold}$  of 570°F for a main steam line break with 1 to 4 double-ended guillotine tube ruptures. The event was reanalyzed for a  $T_{cold}$  of 550°F and 540°F. The results demonstrate that the PVNGS administrative limits for primary iodine activity will ensure that the dose consequences remain bounded by the acceptance criteria for the lower core inlet temperatures.

##### Administrative Limits

The current administrative limits for:

- (1) Equilibrium Specific Activity Limit, Dose Equivalent Iodine-131 of 0.6  $\mu\text{Ci/gm}$ , and
- (2) Spiked Specific Activity Limit, Dose Equivalent Iodine-131 of 12  $\mu\text{Ci/gm}$ ,

will remain in effect until the concerns regarding steam generator tube integrity, as initially documented in NUREG 1477 (Draft, June 1, 1993), are resolved.

#### LOCA

Cycle specific LOCA evaluations were performed for Unit 2, cycle 5. These evaluations included a reduction in  $T_{cold}$  of 10°F. The resultant peak clad temperature remains less than the current analysis of record limit of 2091°F, and the licensing basis limit of 2200°F. Based on the results of the Unit 2 evaluation and the similarity among the units, a 10°F reduction in  $T_{cold}$  would be acceptable for Units 1 and 3.



Analysis limits are assured by slight adjustments in the KW/ft peak linear heat rate margin.

Units 1 and 3 are currently not challenging their steam generator tube plugging limits.

Additionally, the following TS sections were reviewed and found not to require changes:

2.2.1 REACTOR TRIP SETPOINTS,

3/4.3.2 ENGINEERED SAFETY FEATURES ACTUATION  
SYSTEM INSTRUMENTATION,

3/4.7.1.1 TURBINE CYCLE - SAFETY VALVES, AND

3/4.1.3.4 CEA DROP TIME.

## 2. MINIMUM TEMPERATURE FOR CRITICALITY -- TS 3/4.1.1.4

The BASES for existing TS 3/4.1.1.4 are: (1) the moderator temperature coefficient is within its analyzed temperature range, (2) protective instrumentation is within its normal operating range, and (3) consistency with the FSAR safety analysis.

TS 3.1.1.3 states that the MTC shall be within the area of Acceptable Operation specified in the Core Operating Limits Report. The applicability of this TS is MODES 1 and 2 (with  $K_{eff}$  greater than or equal to 1.0). The associated surveillance requirements define when the MTC is to be determined. If the requirement of TS 3.1.1.3 is met, then the MTC related basis of TS 3.1.1.4 is also satisfied. At the beginning of core life (at hot zero power), MTC is the limiting consideration. MTC was analyzed and found to be within acceptable limits at 545°F for Unit 3 Cycle 5. The Unit 1, Cycle 5 MTC was not reanalyzed as it is currently negative and also acceptable at 545°F.

Neutron signal strength has been predicted analytically to be reduced by approximately 12 percent with moderator temperatures reduced from 565°F to 545°F. The excores and start-up instrumentation have been determined to be capable of accommodating a 12 percent reduction. A 10°F  $T_{hot}$  reduction will result in an approximately 6 percent reduction in neutron signal strength. The protective instrumentation required for Modes 1 and 2 is not limited by the temperature range of  $T_{cold}$ . In addition, the reactor protection system and emergency safety features actuation system have no



assumptions regarding the range of  $T_{cold}$ . The CPCs have a trip range of 505°F to 590°F, and would generate an out-of-range trip for temperatures less than 505°F. Therefore, the protective instrumentation does not preclude reducing the minimum temperature for criticality.

The UFSAR safety analysis applies to TS 3.2.6, Reactor Coolant Cold Leg Temperature. Minimum temperature for criticality TS 3.1.1.4 is redundant to TS 3.2.6, Reactor Coolant Cold Leg Temperature, which is applicable in MODES 1 and 2 with  $K_{eff}$  less than or equal to 1.

Therefore, reduction of the minimum temperature for criticality to 545°F, with the surveillance TS 4.1.1.4(b) requirement set at 552°F, is supported by the analyses. This would establish the surveillance requirement for the minimum temperature for criticality at the lower limit of the  $T_{cold}$  vs Power envelope (TS 3.2.6), which is similar to the San Onofre Nuclear Generating Station TS requirement.

The PVNGS reactor vessel minimum reference temperature - nil ductility temperature ( $RT_{NDT}$ ) is bounded by 525°F. APS evaluated the effect of the 10°F temperature reduction on plant equipment and concluded that PVNGS Units 1, 2, and 3 will remain in compliance with all applicable industry and regulatory requirements.

Further, APS is revising the BASES for the minimum temperature for criticality to delete redundant requirement (3), consistency with the FSAR safety analysis, and replace it with new requirements: (3) a minimum temperature is provided for special test exception 3/4.10.4, and (4) the reactor vessel is above its minimum  $RT_{NDT}$  temperature. These changes are in line with the reasons for specification 3/4.1.1.4.

#### **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 a 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 -- Involve a significant increase in the probability or consequences of an accident previously evaluated.



This amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated. The analyses performed confirmed that the existing safety analysis for cycle 5 of all three PVNGS units remains valid for a 10°F reduction in RCS temperature.

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

This amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated. The analyses performed demonstrated that the current licensing basis analyses results remain valid with a 10°F reduction in RCS temperature, and that the safety system settings remain unchanged.

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

This amendment request will not involve a significant reduction in a margin of safety. There is no reduction in the margin of safety since the changes apply only to the reactor coolant cold leg temperature and the minimum temperature for criticality, the safety analyses have been reevaluated (and reperfomed where necessary) using the new temperature, and the results remain valid. All other safety limits and safety system settings remain unchanged. Therefore, there is no reduction in any margin of safety.

**F. ENVIRONMENTAL IMPACT CONSIDERATION DETERMINATION**

APS has determined that the proposed amendment involves no change in the amount or type of effluent that may be released offsite, and that there is no increase in individual or cumulative occupational radiation exposure. As such, operation of PVNGS Units 1, 2, and 3, in accordance with the proposed amendment, does not involve an unreviewed environmental safety question.

**G. MARKED-UP TECHNICAL SPECIFICATION PAGES**

Units 1 and 3 pages 3/4 1-5, 3/4 2-8, and B 3/4 1-1a; and Unit 2 pages 3/4 2.8 and B 3/4 1-1a.

