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102-08533-CDH/MSC  
December 7, 2022

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

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station Units 1, 2, and 3  
Docket Nos. STN 50-528, 50-529, and 50-530  
Renewed Operating License Number NPF-41, NPF-51, and NPF-74  
Application to Revise Technical Specifications to Adopt TSTF-107-  
A, Separate Control Rods that are Untrippable versus Inoperable**

Pursuant to 10 CFR 50.90, Arizona Public Service Company (APS) is submitting a request for an amendment to the Technical Specifications (TS) for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3.

APS requests changes to the TS that clarify requirements for Limiting Condition for Operation (LCO) 3.1.5, *Control Element Assembly (CEA) Alignment*, Conditions A, C and D. Specifically, the proposed changes conform with Revision 4 of Technical Specification Task Force (TSTF)-107-A, *Separate Control Rods that are Untrippable versus Inoperable*, and, additionally, modify Condition B to provide an action for limited duration loss of some position indication for multiple CEAs, in lieu of LCO 3.0.3 entry.

The enclosure provides a description and assessment of the proposed changes. Attachment 1 to the enclosure provides the existing TS pages marked up to show the proposed changes. Attachment 2 to the enclosure provides revised (re-typed) TS pages. Attachment 3 to the enclosure provides marked up TS Bases pages to show the proposed changes. The changes to the TS Bases are provided for information only.

A pre-submittal meeting for TSTF-107-A was held between APS and the NRC staff on October 27, 2022. Approval of the proposed amendment is requested by December 7, 2023. Once approved, the amendment will be implemented within 90 days.

PVNGS has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

In accordance with the PVNGS Quality Assurance Program, the Plant Review Board has reviewed and approved the license amendment request (LAR). By copy of this letter,

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the LAR is being forwarded to the Arizona Department of Health Services – Bureau of Radiation Control in accordance with 10 CFR 50.91(b)(1).

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

Should you need further information regarding this letter, please contact Matthew S. Cox, Licensing Department Leader, at (623) 393-5753.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: December 7, 2022  
(Date)

Sincerely,

**Harbor, Cary**  
**(Z16762)**

Digitally signed by  
Harbor, Cary (Z16762)  
Date: 2022.12.07  
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CDH/MSC/cr

Enclosure: Description and Assessment of Proposed License Amendment

cc:	S. A. Morris	NRC Region IV Regional Administrator
	D. J. Galvin	NRC NRR Project Manager for PVNGS
	L. N. Merker	NRC Senior Resident Inspector for PVNGS
	B. Goretzki	Arizona Department of Health Services – Bureau of Radiation Control

**ENCLOSURE**

**Description and Assessment of Proposed License  
Amendment**

**Enclosure**

**Description and Assessment of Proposed License Amendment**

**Subject:** Application to Revise Technical Specifications to Adopt TSTF-107-A, Revision 4, *Separate Control Rods that are Untrippable versus Inoperable*

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**ATTACHMENTS:**

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2. Proposed Technical Specification Changes (Re-Typed)
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**Description and Assessment of Proposed License Amendment**

**1.0 SUMMARY DESCRIPTION**

Arizona Public Service Company (APS) is requesting a license amendment to the Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2 and 3 Technical Specifications (TS). The proposed amendment would modify the TS by making various clarifying changes.

APS requests changes to the TS that clarify requirements for Limiting Condition for Operation (LCO) 3.1.5, *Control Element Assembly (CEA) Alignment*, Conditions A, C and D. Specifically, the proposed changes conform with Revision 4 of TSTF-107-A, *Separate Control Rods that are Untrippable versus Inoperable* (Reference 6.1), and, additionally, modify Condition B to provide an action for limited duration loss of some position indication for multiple CEAs, in lieu of LCO 3.0.3 entry.

**2.0 DETAILED DESCRIPTION**

- 2.1 LCO 3.1.5, *Control Element Assembly (CEA) Alignment*, Conditions A, C and D, to adopt TSTF-107-A, Revision 4.

2.1.1 Description of the Proposed Change

The proposed change clarifies the LCO 3.1.5, by separating the LCO description into two parts, consistent with TSTF-107-A (Reference 6.1) and the current approved Combustion Engineering (CE) Standard Technical Specifications (STS)(NUREG-1432, Revision 5). This is a format change only with no change in text. The proposed changes also revise PVNGS TS 3.1.5, Conditions A, C and D to clarify the actions with regard to CEA misalignments. These changes are needed to correct an ambiguity regarding CEAs that are inoperable, as compared to being out of alignment.

Specifically, the existing PVNGS TS 3.1.5 Conditions A and D use the wording 'trippable and misaligned' which is imprecise since the power reduction of REQUIRED ACTION A.1 and D.1 is necessary to address the misalignment regardless of whether the CEA is trippable or untrippable. Thus, a change in wording is needed to remove 'trippable and' such that misaligned CEAs require entry into Conditions A and D and completion of their respective REQUIRED ACTION. The proposed change to Condition C replaces the word 'untrippable' with the word 'inoperable.' This change addresses CEAs that may be trippable but slow and are thus inoperable. The specific CEA misalignment values are not being changed by this license amendment request.

As a matter of historical context, NUREG-1432, Revision 1, formed the basis for the PVNGS transition to the Improved Technical Specification (ITS) in License Amendment (LA) 117, in May 1998 (Reference 6.2). At the time PVNGS transitioned to the ITS, TSTF-107-A had not been developed. Additionally, TSTF-107-A did not reflect the adoption of TSTF-143-A, *Consolidate Specification 3.1.5 Actions to Restore Misaligned CEAs*, Revision 0, which combined LCO 3.1.5 Conditions. At the time of the APS request to transition to the new CE STS (NUREG-

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1432, Revision 1), APS requested to incorporate TSTF-143-A into PVNGS TS 3.1.5, as follows:

“ITS 3.1.5 Actions provide separate Actions/Conditions (A, B, and C) for regulating CEAs, shutdown CEAs, and part length CEAs. Also, ITS 3.1.5 Required Actions contain specific details on how to restore CEA group alignment. NRC approved TSTF-143 combines the three separate Actions/Conditions into one Action/Condition. This change is also consistent with the current licensing basis (see CTS [current Technical Specification] 3.1.3.1 Action c). The TSTF also changes the Required Actions to "Restore CEA alignment" rather than provide the details on how to restore CEA group alignment. This change is consistent with the LCO requirements and relocates the specific details for restoring CEA group alignment to the Bases. This change is also consistent with the NUREG philosophy to move details on how to accomplish a requirement into the Bases. Additionally, this change to the Required Actions makes Condition A, B, and C the same, which allows them to be consolidated into one action. ITS 3.1.5 and Bases have been revised to incorporate this generic TSTF.”

This explains why the current PVNGS TS 3.1.5 Conditions are different than the TSTF-107-A markup pages with regard to the combination of Conditions. Finally, LA 152 (Reference 6.3) and LA 179 (Reference 6.4) documented the APS transition from part-length CEAs to part-strength CEAs and full-length CEAs to full-strength CEAs. LA 152 (Reference 6.3) which states in part:

“The two designs [i.e., part-length CEAs and part-strength CEAs] are geometrically very similar and contain essentially the same amount and type of neutron absorber in the lower half of the CEA assemblies, which is the region inserted into the reactor core during normal operations.”

“The name for full-length CEAs will be changed to full-strength CEAs for terminology consistency only, with no changes being made to the design or operation of the full-length CEAs.”

#### 2.1.2 Reason for the Proposed Change

The proposed changes to TS LCO 3.1.5, Conditions A, C and D are clarifications that are more precise in their meaning, are editorial in nature and are similar to the approved CE STS. The proposed changes are consistent with TSTF-107-A (Reference 6.1), with minor variations.

The PVNGS TS 3.1.5 for *Control Element Assembly (CEA) Alignment*, contains Conditions A through D, whereas TSTF-107-A (Reference 6.1) has similar actions that are designated as Conditions A through E. The current CE STS have similar Actions but are designated as Conditions A and B. APS is not proposing to change the current PVNGS TS 3.1.5 Condition designations.

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PVNGS TS 3.1.5 Conditions B and D are different than the CE STS and TSTF-107-A (Reference 6.1), in that Condition B addresses CEA position indication, which is not specifically addressed in the CE STS or TSTF-107-A, and PVNGS TS 3.1.5 Condition D directs opening of the reactor trip breakers if two or more CEAs are misaligned by more than the specified limit. The more restrictive PVNGS Condition D was part of the APS adoption of the CE STS, Revision 1, in License Amendment 117, dated May 20, 1998 (Reference 6.2), which states in part, at page 55 of the Safety Evaluation:

"The plant-specific analysis for multiple misaligned CEAs indicates that two or more CEAs misaligned more than 9.9 inches could result in a situation outside the design basis. The appropriate action for multiple CEA misalignments is to open the trip breakers immediately ..."

APS is not proposing to change this more restrictive Condition D Required Action.

- 2.2 LCO 3.1.5, *Control Element Assembly (CEA) Alignment*, Condition B, to provide an action for limited duration loss of some position indication for multiple CEAs, in lieu of LCO 3.0.3 entry. This is a variation from TSTF-107-A.

### 2.2.1 Description of the Proposed Change

The proposed change is to TS 3.1.5, Condition B, that applies to the situation in which one CEA in a group has only one OPERABLE position indicator. Specifically, the proposed change modifies the wording of the existing Condition B to expand the scope from "one CEA per CEA group" to "one or more CEAs." The initial required completion time of 6-hours for the Required Actions remains unchanged.

### 2.2.2 Reason for the Proposed Change

TS 3.1.5, Condition B, is not contained in TSTF-107-A or the CE STS, it is a PVNGS specific Condition. Condition B was introduced as a remnant of the original PVNGS TS, which were based upon the old CE STS (NUREG-0212), as part of the transition to the CE STS, Revision 1, as part of License Amendment 117, dated May 20, 1998 (Reference 6.2).

At the time of conversion, the TS Bases for the CE STS, Revision 1, stated, with regard to Surveillance Requirement (SR) 3.1.5.2:

"OPERABILITY of at least two CEA position indicator channels is required to determine CEA positions, and thereby ensure compliance with the CEA alignment and insertion limits. The CEA full in and full out limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions."

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APS requested, at the time, to retain a Condition for CEA position indication from the original TS 3.1.3.2, *Position Indicator Channels – Operating*, to address the TS Bases SR 3.1.5.2 statement that two CEA position indicator channels were required to determine CEA position, stating, in part:

“NUREG [1432] 3.1.5 includes an SR for CEA position indicator channels, but does not include any specific actions if they are inoperable. The actions in the NUREG [1432] for a misaligned CEA are not appropriate or easily used for inoperable CEA position indicator channels. The Bases for SR 3.1.5.2 states that this indication is required to ensure compliance with the CEA alignment and insertion limits. If an indicator channel was inoperable, LCO 3.0.3 or the actions for a CEA misaligned or outside its insertion limits would have to be entered. This is overly restrictive, since one channel of indication would still be available and the actual CEA position could be verified. Therefore, Palo Verde considers the current licensing basis to be appropriate for this condition. Therefore, ITS 3.1.5 Action B has been added to provide actions for inoperable CEA position indicator channels. ITS 3.1.5 has been changed to reflect the current licensing basis.”

The PVNGS TS, at the time, which formed the basis for the current licensing basis, only provided a condition for a maximum of one CEA per CEA group having only one CEA position indicator channel operable; hence, the current Condition B limitation.

The NRC staff, in License Amendment 117 (Reference 6.2), documented the approval of the APS request with issuance of LCO 3.1.5, Condition B.

The proposed change provides a TS LCO Condition that applies to the situation in which more than one CEA in a group has only one OPERABLE position indicator. Specifically, in the unlikely event of a loss of either the Channel 'C' (PNC-D27) or Channel 'D' (PND-D28) 120 VAC vital instrument bus, either 67 (PNC) or 22 (PND) CEAs are reduced from three OPERABLE position indicator channels to one OPERABLE position indicator channel. LCO 3.1.5, Condition B, as currently written, is not applicable.

As LCO 3.1.5, Condition B, is not met, and an associated ACTION is not currently provided for more than one CEA per CEA Group, LCO 3.0.3 is entered to place the unit outside the mode of applicability of LCO 3.1.5 (Modes 1 and 2).

An LCO 3.0.3 entry causing unit shutdown is not the most appropriate action, as there is risk of inadvertent challenges to safety systems during an orderly shutdown. With more than one CEA in a group having only one operable position indicator channel, each of the CEAs still have at least one operable position indicator channel. Entry into LCO 3.0.3 should not be required for situations involving only a loss of redundancy



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while maintaining operability of the required feature that verifies initial conditions on one train/channel. A loss of all position indicator channels for any CEA would still require entry into LCO 3.0.3.

It is recognized that a similar request was made by APS during the processing of LA 152 (Reference 6.3) and withdrawn, due to time constraints. However, APS indicated that the request could be re-submitted. This application is consistent with the APS intent to clarify LCO 3.1.5, Condition B.

**3.0 TECHNICAL EVALUATION**

- 3.1 LCO 3.1.5, *Control Element Assembly (CEA) Alignment*, Conditions A, C and D, to adopt TSTF-107-A, Revision 4.

Pursuant to 10 CFR 50.36(c)(2), the TS contain limiting conditions for operation, which represent "the lowest functional capability or performance levels of equipment required for safe operation of the facility." The specific criterion applicable to LCO 3.1.5 is that CEA alignment and CEA OPERABILITY satisfy Criteria 2 and 3 of 10 CFR 50.36 (c)(2)(ii), which is that they are a "...process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis..." and "...part of the primary success path" ... "to mitigate a design basis accident..."

The changes to the LCO for 3.1.5 are format changes with no change in the meaning of the text. The proposed changes to Conditions A, C and D are needed to correct an ambiguity regarding CEAs that are inoperable, as compared to being out of alignment. These proposed changes are clarifications that are more precise in their meaning, are editorial in nature and are similar to the approved CE STS. The specific CEA misalignment values are not being changed by this license amendment request.

- 3.2 LCO 3.1.5, *Control Element Assembly (CEA) Alignment*, Condition B, to provide an action for limited duration loss of some position indication for multiple CEAs, in lieu of LCO 3.0.3 entry.

Pursuant to 10 CFR 50.36(c)(2), the TS contain limiting conditions for operation, which represent "the lowest functional capability or performance levels of equipment required for safe operation of the facility." The specific criterion applicable to LCO 3.1.5 is that CEA alignment and CEA OPERABILITY satisfy Criteria 2 and 3 of 10 CFR 50.36 (c)(2)(ii), which is that they are a "...process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis..." and "...part of the primary success path" ... "to mitigate a design basis accident..."

The proposed change is to TS 3.1.5, Condition B, that applies to the situation in which one CEA in a group has only one OPERABLE position indicator. Specifically, the proposed change modifies the wording of the existing Condition B to be less restrictive by expanding the scope from

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"one CEA per CEA group" to "one or more CEAs." The initial required completion time of 6-hours for the Required Actions remains unchanged, as it is viewed as sufficient, since one channel of CEA position indication remains to verify the initial conditions of the accident analysis.

As described in the TS Bases for TS 3.1.5, Condition B:

"At least two of the following three CEA position indicator channels shall be OPERABLE for each CEA:

- a. CEA Reed Switch Position Transmitter (RSPT 1) with the capability of determining the absolute CEA positions within 5.2 inches,
- b. CEA Reed Switch Position Transmitter (RSPT 2) with the capability of determining the absolute CEA positions within 5.2 inches, and
- c. The CEA pulse counting position indicator channel. ...

Additionally, the Upper Electrical Limit (UEL) CEA reed switches provide an acceptable indication of CEA position for a fully withdrawn condition."

The unlikely single failure that would currently result in more than one CEA per group having only one OPERABLE position indicator channel would be a result of the loss of a vital instrument bus, specifically PNC-D27 or PND-D28. The table below provides the effects on CEA indication channels due to a loss of each vital instrument bus.

Vital Bus De-energized	Number of CEAs with Lost Indication		
	RSPT #1	RSPT#2	Pulse Counter
PNA-D25 (Channel A)	22	Not Affected	Not Affected
PNB-D26 (Channel B)	67	Not Affected	Not Affected
PNC-D27 (Channel C)	Not Affected	67	67
PND-D28 (Channel D)	Not Affected	22	22

As shown above, a loss of Channel 'C' or Channel 'D' results in a loss of CEA position indication that is beyond the scope currently addressed by Condition 'B' of TS 3.1.5, since more than one CEA per group will have only one operable position indication channel.

Upon a loss of any of the above vital instrument buses, the operating crew would enter abnormal operating procedure 40AO-9ZZ13, *Loss of Class Instrument or Control Power*. The applicable section directs declaring Control Element Assembly Calculator (CEAC) 1 inoperable (for loss of either PNA-D25 or PNB-D26), or CEAC 2 inoperable (for loss of either PNC-D27 or PND-D28).

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LCO 3.3.3, *Control Element Assembly Calculators (CEACs)*, Condition A, would be entered, and 40ST-9ZZ23, *CEA Position Data Log*, would be performed every 4 hours to verify the indicated position of each full- and part-strength CEA is within 6.6 inches of all other CEAs in its group and restore the CEAC to OPERABLE status within 7 days.

In addition, the loss of any vital instrument bus requires entry into LCO 3.8.9, *Distribution Systems – Operating*, Condition B, which specifies no more than two hours (or in accordance with the Risk Informed Completion Time Program) to restore the bus to OPERABLE. In the event the bus cannot be restored to OPERABLE, then LCO 3.8.9, *Distribution Systems – Operating*, Condition E, requires that the Unit be in Mode 3 within 6 hours.

In the past, the largest vulnerability for loss of vital instrument bus at PVNGS was a loss of an inverter, particularly for Unit 1 that did not have a static transfer switch to maintain the vital instrument bus energized on a loss of normal (inverter) power supply. The static transfer switch is designed to automatically transfer the normal (inverter) power supply to the backup voltage regulator (regulating transformer) in the event of loss of normal power supply. To address this vulnerability and equipment obsolescence, the Class 1E instrument AC Power (PN) System inverters were replaced in the recent past (circa 2019 for all three units), and additional fully qualified swing inverters installed, to provide greater reliability for the vital instrument busses. The inverters included a static transfer switch and a manual switch to allow automatic and manual transfer of power to the voltage regulators. The likelihood, therefore, of the postulated failure of any vital instrument bus is not great, but with the improved design, the ability to restore normal (inverter) power in a timely manner is improved. Operations crews, in the initial phases of the postulated scenario of a loss of a vital instrument bus, are better focused on restoration of the affected bus and instrumentation rather than being distracted by initial planning for a unit shutdown required by LCO 3.0.3.

The LCO operability requirements for CEA position indicator channels remain unchanged (i.e., at least two position indicator channels for each CEA).

This change addresses the lack of an existing ACTION for conditions in which more than one CEA per group has only one OPERABLE position indicator channel. With no associated ACTION, entry into LCO 3.0.3 is required. From an operational risk perspective, however, providing an allowance to enter LCO 3.1.5, Condition B, to restore the CEA indicator channel is preferable to entering LCO 3.0.3, which would require shutdown to Mode 3 within 7 hours, and may require CEA manipulations during the power reduction.

When the vital instrument bus is restored, the CEA position indicator channels should also be restored. The proposed Required Action Completion Time of 6-hours serves as the initial limit to the amount of

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time the unit is operated with only one CEA position indicator channel for one or more CEA(s).

A modification is in progress in each of the PVNGS units that will further reduce the likelihood of a loss of CEA position indication. This modification will ensure that the pulse counter indication would not reset on loss of either the Channel 'C' (PNC-D27) or Channel 'D' (PND-D28) 120 VAC vital instrument bus, thus retaining the pulse counts and providing greater confidence that at least two position indications would remain available. This modification has been installed in Unit 3 and is expected to be complete in the Fall Outage for Units 1 and 2 in 2023 and 2024, respectively.

CEA position is an input to a number of Updated Final Safety Analysis Report (UFSAR) Chapter 15 events involving reactor transients. The events that formed the bases for the LCOs on CEA alignment (LCO 3.1.5) and CEA Insertion Limits (LCOs 3.1.6, 3.1.7, and 3.1.8) are CEA misalignment (both static misalignment and uncontrolled withdrawal), CEA drop, and CEA ejection. These analyses are not based upon explicit assumptions regarding CEA position indication. The availability of position indication is, however, assumed since indication is necessary to ensure the CEAs are maintained within the specified initial conditions (LCO limits for alignment and group insertion). The scenario associated with this proposed change involves loss of two of the three available position indicator channels for one or more CEA(s).

When LCO requirements are not met, it is acknowledged that operation may be outside the initial conditions of the safety analysis, and the duration of this operation is limited by the compensatory measures and time constraints established by the associated TS Conditions and Required Actions. With more than one CEA in a group having only one OPERABLE position indicator channel, each of the CEAs still have at least one OPERABLE position indicator channel to confirm the required LCO initial conditions.

## 4.0 REGULATORY EVALUATION

### 4.1 Precedent

None, however, this change is consistent with TSTF-107-A, *Separate Control Rods that are Untrippable versus Inoperable*, (Reference 6.1) and are similar to the CE STS.

### 4.2 No Significant Hazards Consideration

Arizona Public Service Company (APS) is requesting an amendment to Renewed Facility Operating Licenses NPF-41, NPF-51, and NPF-74 for Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2 and 3, respectively. The proposed amendment would modify Technical Specifications (TS) by making various clarifications. Specifically, APS requests changes to the TS that clarify requirements for Limiting Condition for Operation (LCO) 3.1.5, *Control Element Assembly (CEA)*

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*Alignment*, Conditions A through D. Specifically, the proposed changes conform with TSTF-107-A, *Separate Control Rods that are Untrippable versus Inoperable*, and, additionally, provide an action for limited duration loss of some position indication for multiple CEAs, in lieu of LCO 3.0.3 entry.

APS has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, *Issuance of amendment*, as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

**Response: No.**

The proposed changes revise Technical Specification (TS) 3.1.5, Conditions A, C and D to clarify the actions with regard to CEA misalignments. These changes are needed to correct an ambiguity regarding CEAs that are inoperable, as compared to being out of alignment. Specifically, the existing Conditions A and D use the wording 'trippable and misaligned' which is incorrect since the power reduction of REQUIRED ACTION A.1 and D.1 is necessary to address the misalignment regardless of whether the CEA is trippable or untrippable. The proposed change to Condition C replaces the word 'untrippable' with the word 'inoperable.' This change addresses CEAs that may be trippable but slow, and thus inoperable. These proposed changes are clarifications that are more precise in their meaning, are editorial in nature and are similar to the NRC approved Combustion Engineering (CE) Standard Technical Specifications (STS) (NUREG-1432).

The proposed change to TS 3.1.5, Condition B, addresses a condition when only one position indication channel is operable for one or more CEAs. This change does not permit routine operation with less than two operable CEA position indicator channels. When LCO requirements are not met, 10 CFR 50.36(c)(2) indicates that licensees are to "shutdown the reactor or follow any remedial actions permitted by the technical specifications until the condition can be met." This change modifies an existing Condition and reduces the potential for unnecessary reactor shutdowns with their inherent operational risks. With more than one CEA in a group having only one OPERABLE position indicator channel, each of the CEAs still have at least one OPERABLE position indicator channel to confirm the required LCO initial conditions. The duration of this operation is limited by the compensatory measures and time constraints established by the proposed TS Conditions and Required Actions.

Therefore, these changes do not involve a significant increase in the probability or consequence of an accident previously evaluated.

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2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

**Response: No.**

The proposed changes revise TS 3.1.5, Conditions A, C and D to clarify the actions with regard to CEA misalignments. These changes are needed to correct an ambiguity regarding CEAs that are inoperable, as compared to being out of alignment. These proposed changes are clarifications that are more precise in their meaning, are editorial in nature and are similar to the NRC approved CE STS (NUREG-1432).

The proposed change to TS 3.1.5, Condition B, addresses a condition when only one position indication channel is operable for one or more CEAs. This change does not permit routine operation with less than two operable CEA position indicator channels. The operability requirements for CEA position indicator channels remains unchanged (at least two position indicator channels for each CEA). With more than one CEA in a group having only one OPERABLE position indicator channel, each of the CEAs still have at least one OPERABLE position indicator channel to confirm the required LCO initial conditions. The duration of this operation is limited by the compensatory measures and time constraints established by the proposed TS Conditions and Required Actions.

The design function or operation of the components involved are not affected and there is no physical alteration of the plant (i.e., no new or different type of equipment will be installed). No credible new failure mechanisms, malfunctions, or accident initiators not considered in the design and licensing bases are introduced. The changes do not alter assumptions made in the safety analysis.

Therefore, these changes do not involve a significant increase in the probability or consequence of an accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

**Response: No.**

The proposed changes revise TS 3.1.5, Conditions A, C and D to clarify the actions with regard to CEA misalignments. These changes are needed to correct an ambiguity regarding CEAs that are inoperable, as compared to being out of alignment. These proposed changes are clarifications that are more precise in their meaning, are editorial in nature and are similar to the NRC approved CE STS (NUREG-1432).

The proposed change to TS 3.1.5, Condition B, addresses a condition when only one position indication channel is operable for one or more CEAs. This change does not permit routine operation with less than two operable CEA position indicator channels. The LCO

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operability requirements for CEA position indicator channels remains unchanged (at least two position indicator channels for each CEA).

The proposed changes do not adversely affect existing plant safety margins, or the reliability of the equipment assumed to operate in the safety analysis. As such, there are no changes being made to safety analysis assumptions, safety limits, or limiting safety system settings that would adversely affect plant safety as a result of the proposed changes. The changes modify existing Conditions and reduce the potential for unnecessary reactor shutdowns with their inherent operational risks. Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above, APS concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

4.3 Conclusion

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

**5.0 ENVIRONMENTAL EVALUATION**

The proposed changes would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, *Standards for Protection Against Radiation*, or would change an inspection or surveillance requirement. However, the proposed changes do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed changes.

**Enclosure**

**Description and Assessment of Proposed License Amendment**

**6.0 REFERENCES**

- 6.1 TSTF-107-A, *Separate Control Rods that are Untrippable versus Inoperable*, Revision 4
- 6.2 License Amendment 117 transmitted by NRC Letter dated May 20, 1998, Subject: Conversion to Improved Technical Specifications for the Palo Verde Nuclear Generating Station, Unit No. 1 (TAC No. M96672), Unit No. 2 (TAC No. M96673), and Unit No. 3 (TAC No. M96674) (ADAMS Accession Number ML021720060)
- 6.3 License Amendment 152 transmitted by NRC Letter dated March 23, 2004, Subject: Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Issuance of Amendments on Replacement of Part-Length Control Element Assemblies (TAC Nos. MC0870, MC0871, and MC0872) (ADAMS Accession Numbers ML040860573 and ML040850316)
- 6.4 License Amendment 179 transmitted by NRC Letter dated September 10, 2010, Subject: Palo Verde Nuclear Generating Station, Units 1,2, and 3 Issuance of Amendments RE: Administrative Changes to Facility Operating Licenses and Technical Specifications (TAC Nos. N1E2587, ME2588, and ME2589) (ADAMS Accession Number ML101260211)



**ATTACHMENT 1:**

**Proposed Technical Specification Changes (Mark-Up)**

**Changed Page(s)**

3.1.5-1

3.1.5-2

3.1 REACTIVITY CONTROL SYSTEMS

3.1.5 Control Element Assembly (CEA) Alignment

LCO 3.1.5 All full strength CEAs shall be OPERABLE. ~~and all full strength and part strength CEAs shall be aligned to within 6.6 inches (indicated position) of all other CEAs in their respective groups.~~

AND

All full strength and part strength CEAs shall be aligned to within 6.6 inches (indicated position) of all other CEAs in their respective groups

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. One or more CEAs <del>trippable and</del> misaligned from its group by &gt; 6.6 inches and ≤ 9.9 inches.</p> <p><u>OR</u></p> <p>One CEA <del>trippable and</del> misaligned from its group by &gt; 9.9 inches.</p>	<p>A.1 Reduce THERMAL POWER in accordance with the limits in the COLR.</p> <p><u>AND</u></p> <p>A.2 Restore CEA alignment.</p>	<p>1 hour</p> <p>2 hours</p>

(continued)

## ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Only one CEA position indicator channel OPERABLE for one <del>CEA per CEA group</del> or <u>more CEAs</u> .	B.1 Restore at least two position indicator channels to OPERABLE status.  <u>OR</u>  B.2 Verify the CEA Group(s) with the inoperable position indicators are fully withdrawn or fully inserted while maintaining the insertion limits of LCO 3.1.6, LCO 3.1.7 and LCO 3.1.8.	6 hours          6 hours  <u>AND</u>  Once per 12 hours thereafter.
C. Required Action and associated Completion Time of Condition A or B not met  <u>OR</u>  One or more full strength CEAs <del>untrippable</del> <u>inoperable</u> .	C.1 Be in MODE 3.	6 hours
D. Two or more CEAs <del>trippable and</del> misaligned from their group by > 9.9 inches.	D.1 Open the reactor trip breakers.	Immediately

**ATTACHMENT 2:**

**Proposed Technical Specification Changes (Re-Typed)**

**Changed Page(s)**

3.1.5-1

3.1.5-2

3.1 REACTIVITY CONTROL SYSTEMS

3.1.5 Control Element Assembly (CEA) Alignment

LCO 3.1.5 All full strength CEAs shall be OPERABLE.

AND

All full strength and part strength CEAs shall be aligned to within 6.6 inches (indicated position) of all other CEAs in their respective groups

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. One or more CEAs misaligned from its group by &gt; 6.6 inches and ≤ 9.9 inches.</p> <p><u>OR</u></p> <p>One CEA misaligned from its group by &gt; 9.9 inches.</p>	<p>A.1 Reduce THERMAL POWER in accordance with the limits in the COLR.</p> <p><u>AND</u></p> <p>A.2 Restore CEA alignment.</p>	<p>1 hour</p> <p>2 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>B. Only one CEA position indicator channel OPERABLE for one or more CEAs.</p>	<p>B.1 Restore at least two position indicator channels to OPERABLE status.</p> <p><u>OR</u></p> <p>B.2 Verify the CEA Group(s) with the inoperable position indicators are fully withdrawn or fully inserted while maintaining the insertion limits of LCO 3.1.6, LCO 3.1.7 and LCO 3.1.8.</p>	<p>6 hours</p> <p>6 hours</p> <p><u>AND</u></p> <p>Once per 12 hours thereafter.</p>
<p>C. Required Action and associated Completion Time of Condition A or B not met</p> <p><u>OR</u></p> <p>One or more full strength CEAs inoperable.</p>	<p>C.1 Be in MODE 3.</p>	<p>6 hours</p>
<p>D. Two or more CEAs misaligned from their group by &gt; 9.9 inches.</p>	<p>D.1 Open the reactor trip breakers.</p>	<p>Immediately</p>

**ATTACHMENT 3:**

**Revised Technical Specification Bases Changes  
(Page Markups – For Information)**

**Changed Page**

B 3.1.5-1  
B 3.1.5-4  
B 3.1.5-5  
B 3.1.5-7  
B 3.1.5-8

## B 3.1 REACTIVITY CONTROL SYSTEMS

### B 3.1.5 Control Element Assembly (CEA) Alignment

#### BASES

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**BACKGROUND** The OPERABILITY (~~i.e. e.g.~~, trippability) of the shutdown and regulating CEAs is an initial assumption in all safety analyses that assume CEA insertion upon reactor trip. Maximum CEA misalignment is an initial assumption in the safety analyses that directly affects core power distributions and assumptions of available SDM.

The applicable criteria for these reactivity and power distribution design requirements are 10 CFR 50, Appendix A, GDC 10 and GDC 26 (Ref. 1) and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Cooled Nuclear Power Plants" (Ref. 2).

Mechanical or electrical failures may cause a CEA to become inoperable or to become misaligned from its group. CEA inoperability or misalignment may cause increased power peaking, due to the asymmetric reactivity distribution and a reduction in the total available CEA worth for reactor shutdown. Therefore, CEA alignment and operability are related to core operation in design power peaking limits and the core design requirement of a minimum SDM. If a CEA(s) is discovered to be immovable but remains trippable and aligned, the CEA is considered to be OPERABLE. At anytime, if a CEA(s) is immovable, a determination of the trippability (OPERABILITY) of that CEA(s) must be made, and appropriate action taken.

Limits on CEA alignment and ~~operability~~ OPERABILITY have been established, and all CEA positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved.

CEAs are moved by their control element drive mechanisms (CEDMs). Each CEDM moves its CEA one step (approximately  $\frac{3}{4}$  inch) at a time, but at varying rates (steps per minute) depending on the signal output from the Control Element Drive Mechanism Control System (CEDMCS).

(continued)



## BASES

APPLICABLE  
SAFETY  
ANALYSES  
(continued)

The twelve finger and subgroup drops cause larger distortions than the four finger drops. With CEACS In Service (IS), the subgroup and twelve finger rod drops will result in a penalty factor such that a CPC trip will occur if SAFDLs are approached. The four finger CEA drop is protected by the thermal margin reserved in COLSS or CPC DNBR limit lines (COLR figures 3.2.4-2 for CEACs IS and 3.2.4-3 for CEACs OOS) when COLSS is Out of Service (OOS). With CEACs OOS, CPCs will not penalize DNB nor LPD when CEAs are misaligned; therefore, additional thermal margin is required to be preserved due to the larger radial power distortion associated with twelve finger and subgroup drops. The most rapid approach to the DNBR SAFDL or the fuel centerline melt SAFDL is caused by a single full strength CEA drop with CEACS IS and either a twelve finger or subgroup drop with CEACS OOS.

In the case of the full strength CEA drop, a prompt decrease in core average power and a distortion in radial power are initially produced, which when conservatively coupled result in local power and heat flux increases, and a decrease in DNBR. A part strength CEA drop would cause a similar reactivity response although with less of a magnitude due to the full strength CEAs having a more significant reactivity worth.

With CEACS OOS, a twelve finger and subgroup drop will result in greater radial power distortion. To accommodate the greater distortion without a reactor trip, increased thermal margin is required to be preserved.

With CEACS IS, as the twelve finger drop is detected, core power and an appropriately augmented power distribution penalty factor are supplied to the CPCs. CPCs will trip if required to prevent SAFDLs from being exceeded. For plant operation within the DNBR and local power density (LPD) LCOs, DNBR and LPD trips can normally be avoided on a dropped 4-finger CEA since CEACs do not penalize DNBR or LPD for a four finger CEA drop.

With CEACS IS and a subgroup drop, a distortion in power distribution, and a decrease in core power are produced. As the position of the dropped CEA subgroup is detected, an appropriate power distribution penalty factor is supplied to the CPCs, and a reactor trip signal on low DNBR is generated when necessary.

CEA alignment ~~satisfies~~ limits and OPERABILITY requirements satisfy Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii).

(continued)

## BASES

## LCO

The limits on part strength, shutdown, and regulating CEA alignments ensure that the assumptions in the safety analysis will remain valid. The requirements on CEA OPERABILITY ensure that upon reactor trip, the CEAs will be available and will be inserted to provide enough negative reactivity to shut down the reactor. The CEA OPERABILITY requirements ~~also (i.e., trippability) are separate from the alignment requirements which~~ ensure that the CEA banks maintain the correct power distribution and CEA alignment. The CEA OPERABILITY requirement is satisfied provided the CEA will fully insert in the required CEA drop time assumed in the safety analysis. CEA control malfunctions that result in the inability to move a CEA (e.g., CEA lift coil failures), but do not impact trippability, do not result in CEA inoperability.

The requirement is to maintain the CEA alignment to within 6.6 inches between any CEA and all other CEAs in its group.

Failure to meet the requirements of this LCO may produce unacceptable power peaking factors, DNBR, and LHRs, or unacceptable SDMs, all of which may constitute initial conditions inconsistent with the safety analysis.

## APPLICABILITY

The requirements on CEA OPERABILITY and alignment are applicable in MODES 1 and 2 because these are the only MODES in which neutron (or fission) power is generated, and the OPERABILITY (~~e.g.i.e.~~, trippability) and alignment of CEAs have the potential to affect the safety of the plant. In MODES 3, 4, 5, and 6, the alignment limits do not apply because the reactor is shut down and not producing fission power. In the shutdown modes, the OPERABILITY of the shutdown and regulating CEAs has the potential to affect the required SDM, but this effect can be compensated for by an increase in the boron concentration of the RCS. See LCO 3.1.2, "SHUTDOWN MARGIN (SDM) - Reactor Trip Breakers Closed," for SDM in MODES 3, 4, and 5, and LCO 3.9.1, "Boron Concentration," for boron concentration requirements during refueling.

## ACTIONS

A.1 and A.2

~~A CEA may become misaligned, yet remain trippable. In this condition, the CEA can still perform its required function of adding negative reactivity should a reactor trip be necessary.~~

If one or more CEAs (regulating, shutdown, or part strength) are misaligned by 6.6 inches and  $\leq 9.9$  inches ~~but trippable~~, or one CEA misaligned by  $> 9.9$  inches ~~but trippable~~, continued operation in MODES 1 and 2 may continue, provided, within 1 hour, the power is reduced in accordance with the limits in the COLR, and within 2 hours CEA alignment is restored. Regulating and part strength

(continued)

## BASES

ACTIONS  
(continued)B.1 and B.2

At least two of the following three CEA position indicator channels shall be OPERABLE for each CEA:

- a. CEA Reed Switch Position Transmitter (RSPT 1) with the capability of determining the absolute CEA positions within 5.2 inches,
- b. CEA Reed Switch Position Transmitter (RSPT 2) with the capability of determining the absolute CEA positions within 5.2 inches, and
- c. The CEA pulse counting position indicator channel.

If only one CEA position indicator channel is OPERABLE for one ~~CEA per CEA Group~~ or more CEAs, continued operation in MODES 1 and 2 may continue, provided, within 6 hours, at least two position indicator channels are returned to OPERABLE status; or within 6 hours and once per 12 hours, verify that the CEA group with the inoperable position indicators are either fully withdrawn or fully inserted while maintaining the insertion limits of LCO 3.1.6, LCO 3.1.7 and LCO 3.1.8. CEAs are fully withdrawn when the requirements of LCO 3.1.6 and 3.1.7 are met.

Additionally, the Upper Electrical Limit (UEL) CEA reed switches provide an acceptable indication of CEA position for a fully withdrawn condition.

C.1

If a Required Action or associated Completion Time of Condition A or Condition B is not met, or if one or more regulating or shutdown CEAs are ~~untrippable (immovable as a result of excessive friction or mechanical interference or known to be untrippable)~~ inoperable, the unit is required to be brought to MODE 3. By being brought to MODE 3, the unit is brought outside its MODE of applicability.

When a Required Action cannot be completed within the required Completion Time, a controlled shutdown should be commenced. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems. Reducing THERMAL POWER in accordance with the Abnormal Operating procedures ensures acceptable power distributions are maintained. The specified ramp rate is intended to ensure DNBR SAFDLs are not challenged.

(continued)

## BASES

## ACTIONS

C.1 (continued)

~~If a full strength CEA is untrippable, it is not available for reactivity insertion during a reactor trip. With an untrippable CEA, meeting the insertion limits of LCO 3.1.6, "Shutdown Control Element Assembly (CEA) Insertion Limits," and LCO 3.1.7, "Regulating Control Element Assembly (CEA) Insertion Limits," does not ensure that adequate SDM exists. Therefore, the plant must be shut down in order to evaluate the SDM required boron concentration and power level for critical operation. Continued operation is allowed with untrippable part strength CEAs if the alignment and insertion limits are met.~~

Continued operation is not allowed with one or more full ~~length~~ strength CEAs ~~untrippable~~ inoperable. This is because ~~these cases are it is~~ indicative of a loss of SDM and power distribution, ~~and a loss of safety function, respectively.~~

D.1

Continued operation is not allowed in the case of more than one CEA misaligned from any other CEA in its group by > 9.9 inches. For example, two CEAs in a group misaligned from any other CEA in that group by > 9.9 inches, or more than one CEA group that has a least one CEA misaligned from any other CEA in that group by > 9.9 inches. This is indicative of a loss of power distribution and a loss of safety function, respectively. Multiple CEA misalignments are outside of the CPC/CEAC design basis and, for some CEA combinations, will not result in automatic protective action. Therefore, with two or more CEAs misaligned more than 9.9 inches, this is a situation outside the design basis and immediate action would be required to prevent any potential fuel damage. Immediately opening the reactor trip breakers minimizes these effects.

(continued)