Palo Verde Nuclear
Generating Station

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10 CFR 50.90
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102-04554-WEI/SAB/RKB
April 4, 2001

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

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station (PVNGS)**
Units 1, 2, and 3
Docket No. STN 50-528/529/530
Proposed Amendments to Technical Specification 3.3.12, Boron Dilution Alarm System (BDAS), and Technical Specification 3.9.2, Refueling Operations – Nuclear Instrumentation

Pursuant to 10 CFR 50.90, Arizona Public Service Company (APS) hereby requests amendments to Technical Specification (TS) 3.3.12, Boron Dilution Alarm System (BDAS), and TS 3.9.2, Refueling Operations – Nuclear Instrumentation, for each PVNGS Unit. The proposed amendments would provide clear OPERABILITY requirements for the BDAS in MODE 6 and ensure that appropriate monitoring of the reactor coolant system (RCS) boron concentration is implemented should the BDAS be declared inoperable.

Specifically, the proposed amendment would add MODE 6 Applicability to TS 3.3.12 for the BDAS. In addition, the proposed amendment would add a note to the Actions of TS 3.9.2 which directs the operator to enter the applicable Conditions and Required Actions of TS 3.3.12 in the event that the BDAS is made inoperable by inoperable startup range monitors (SRMs). Finally, the proposed amendment would delete the TS 3.9.2 Required Action B.2.

The revised Technical Specifications will ensure that the BDAS is maintained OPERABLE in MODE 6 to alert operators in the control room of an inadvertent RCS boron dilution event. In addition, the proposed amendment will ensure that in the event that BDAS is declared inoperable in MODE 6, either directly or indirectly due to inoperable SRMs, that the appropriate Actions are taken with the correct Completion Times. In the interim, PVNGS has implemented administrative controls to ensure that the BDAS is demonstrated OPERABLE at the required frequency during MODE 6, and that the appropriate actions are taken should the BDAS be declared inoperable. The revised TS

A001

Bases are also provided (see enclosure 2) as supporting information to facilitate the approval of the TS changes.

The BDAS is part of the excore nuclear instrumentation system which receives neutron flux signals from the SRMs to detect a possible inadvertent boron dilution event while in the hot standby, hot shutdown, cold shutdown and refueling modes of operation. The BDAS contains decision-making logic that monitors the startup channels' neutron flux count rates. If neutron flux indications increase to equal to or greater than the variable count rate alarm setpoint, the alarm signals are initiated to the plant annunciator system. The plant annunciator system would then alert the operator to a possible inadvertent boron dilution event.

The issue of the BDAS being OPERABLE in MODE 6 has been documented and evaluated in accordance with the PVNGS corrective action program. As part of the corrective action, PVNGS performed a review of the applicable design and licensing documentation for the BDAS. This review included the PVNGS Updated Final Safety Analysis Report (UFSAR) Chapter 7 description of the BDAS, the Chapter 15 safety analysis of the inadvertent boron dilution event (ID), and a review of the applicable sections of the PVNGS Safety Analysis Basis Document (SABD). The review determined that in MODE 6, the BDAS is required to be OPERABLE in order to provide the operator with enough time to take prompt action to mitigate a possible boron dilution event and return to criticality. In the event that the BDAS is declared inoperable, the RCS boron concentration must be monitored at very specific frequencies, which have been analyzed and documented in the Core Operating Limits Report (COLR), to ensure that the operator is alerted to a possible ID with sufficient time to terminate the event prior to a complete loss of subcriticality.

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 Amendment
D. Safety Analysis for the Proposed Technical Specification Amendment
E. No Significant Hazards Consideration Determination
F. Environmental Consideration
G. Marked-up Technical Specification Pages
H. Retyped Technical Specification Pages

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 NRC review and approval by March 31, 2002. In addition, APS requests 45 days to implement the approved Technical Specification amendment upon receiving NRC approval.

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,

WEI/SAB/RKB/kg

Enclosures

cc:	E. W. Merschoff	[Region IV Administrator]	(all w/ enclosures)
	J. N. Donohew	[NRR Project Manager]	
	J. H. Moorman	[Sr. Resident Inspector]	
	A. V. Godwin	[ARRA]	

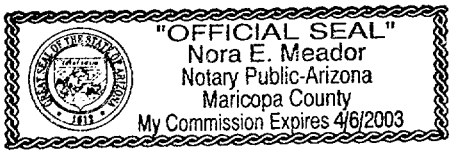
STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, W. E. Ide, represent that I am Vice President – Nuclear Production, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, and that to the best of my knowledge and belief, the statements made therein are true and correct.

W. E. Ide

Sworn To Before Me This 3rd Day Of April, 2001.

Notary Public



Notary Commission Stamp

ENCLOSURE 1

PROPOSED AMENDMENT TO

TECHNICAL SPECIFICATION 3.3.12,

BORON DILUTION ALARM SYSTEM

AND

TECHNICAL SPECIFICATION 3.9.2,

REFUELING OPERATIONS – NUCLEAR INSTRUMENTATION

A. DESCRIPTION OF THE PROPOSED TECHNICAL SPECIFICATION AMENDMENT

The Applicability of Technical Specification (TS) 3.3.12, "Boron Dilution Alarm System (BDAS)," is being changed to add MODE 6 to the current MODES 3, 4 and 5 Applicability. The current Required Actions and Completion Times of TS 3.3.12 satisfy the safety analysis requirements for the inadvertent deboration event while in MODES 3 through 6 in the event that one or both of the BDAS channels are inoperable. Therefore, changes to the Required Actions and Completion Times of TS 3.3.12 are not necessary for this proposed amendment.

A Note is being added to the Actions section of TS 3.9.2, "Refueling Operations - Nuclear Instrumentation," to ensure that the operator is aware of the interrelationship between the startup range monitors (SRMs) and the BDAS, and that the Actions of TS 3.3.12 continue to apply when the BDAS is made inoperable due to inoperable SRMs. In addition, TS 3.9.2, Required Action B.2, is being deleted. This action directs the monitoring of the reactor coolant system boron concentration if both SRMs are inoperable. However, since two inoperable SRMs will render the corresponding BDAS channels inoperable, TS 3.3.12, Required Action B.1 would also be applicable. Therefore, Required Action B.2 of TS 3.9.2 is considered redundant. The decision to retain TS 3.3.12, Required Action B.1 as opposed to TS 3.9.2, Required Action B.2 was made due to the Required Action B.1 Completion Times being governed by the inadvertent deboration event (ID) safety analysis, whereas the Completion Times of TS 3.9.2, Required Action B.2 are not directly related to the ID safety analysis and may not, under certain circumstances, be sufficient to meet the safety analysis.

B. PURPOSE OF THE TECHNICAL SPECIFICATION

The BDAS is part of the excore nuclear instrumentation system and receives neutron flux signals from the startup channels (i.e. startup range monitors - SRMs) to detect a possible inadvertent boron dilution event while in the hot standby, hot shutdown, cold shutdown and refueling modes of operation. The BDAS uses the SRM channels as detection instrumentation and contains decision-making logic that monitors the startup channel's neutron flux count rates. If neutron flux indications increase to equal to or greater than the variable count rate alarm setpoint, the alarm signals are initiated to the plant annunciator system. The plant annunciator system would then alert the operator to a possible inadvertent boron dilution event. As designed, an inoperable SRM will render the corresponding BDAS channel inoperable. However, the converse is not true (i.e. an inoperable BDAS channel will not result in an inoperable SRM).

The purpose of Technical Specification (TS) 3.9.2 is to ensure that the startup range monitors (SRMs) are OPERABLE in MODE 6 (e.g. during core alterations or movement of irradiated fuel assemblies in containment) to monitor core reactivity conditions.

In addition, the purpose of TS 3.3.12 is to ensure that the boron dilution alarm system (BDAS) is OPERABLE, and to provide for adequate reactor coolant boron concentration monitoring in the event that the BDAS is inoperable, in order to alert the operator of a possible inadvertent boron dilution event with sufficient time to terminate the event.

C. NEED FOR THE AMENDMENT

The proposed amendments to TS 3.9.2 and TS 3.3.12 are needed to ensure that adequate reactor coolant system boron concentration monitoring is available in MODE 6 to provide the operator with timely indication of a possible inadvertent deboration event.

Currently, the PVNGS Technical Specifications (TS) do not contain any explicit requirements for BDAS operability in MODE 6. The proposed amendments will add MODE 6 Applicability to Technical Specification (TS) 3.3.12, Boron Dilution Alarm System (BDAS); add a Note to TS 3.9.2, Refueling Operations – Nuclear Instrumentation, indicating that TS 3.3.12 is applicable when an inoperable startup range monitor (SRM) makes the BDAS inoperable; and eliminate Required Action B.2 of TS 3.9.2.

Prior to the conversion to the Improved Standard Technical Specifications (ITS), MODE 6 Applicability for the BDAS was present in TS 3.1.2.7, Boron Dilution Alarms. In converting to the ITS, Arizona Public Service Company (APS) intended to relocate the MODE 6 Applicability for the BDAS into the refueling section of the ITS, specifically TS 3.9.2. However, it was later identified, after the implementation of the ITS, that TS 3.9.2 did not clearly identify the requirement for the BDAS to be OPERABLE in MODE 6. In addition, the new TS 3.9.2 Required Actions and Completion Times for when the BDAS was inoperable did not, under all possible operating conditions, satisfy the inadvertent deboration (ID) safety analysis for chemical surveillance of reactor coolant system (RCS) boron concentration. In evaluating this condition, APS determined the best solution would be to return the MODE 6 Applicability for the BDAS to TS 3.3.12 (TS 3.1.2.7 prior to the implementation of ITS). In doing so, administrative changes to TS 3.9.2 would be necessary to ensure effective implementation of the change.

The change in the Applicability of TS 3.3.12 provides clear BDAS operability requirements in MODE 6. This change serves to make the Technical Specifications consistent with the acceptance criteria of NUREG 0800, Standard Review Plan, Section 15.4.6, Chemical and Volume Control System Malfunction that Results in a Decrease in Boron Concentration in the Reactor Coolant (PWR), and existing analyses contained in the PVNGS Updated Final Safety Analysis Report (UFSAR), Section 15.4.6, Inadvertent Deboration. Administrative controls are currently in place to require BDAS operability in MODE 6, and to perform the necessary monitoring of RCS boron concentration in the event that BDAS is declared inoperable.

Because an inoperable SRM will render its associated BDAS channel inoperable, and because the safety analysis for the ID event has specific RCS boron monitoring requirements when the BDAS is inoperable, the change to the TS 3.9.2 Actions is needed to direct the actions of TS 3.3.12 to be taken. The change to delete TS 3.9.2, Required Action B.2 is necessary to eliminate conflicting actions between TS 3.9.2 and TS 3.3.12. This change will ensure that the Required Actions and Completion Times for RCS boron concentration monitoring, in the event that the BDAS is inoperable, are consistent with the safety analysis and the acceptance criteria of NUREG 0800, which in turn serves to ensure that the operator is alerted to a possible ID in sufficient time to terminate the event.

D. SAFETY ANALYSIS OF THE PROPOSED TECHNICAL SPECIFICATION AMENDMENT

NUREG 0800, Standard Review Plan (SRP), Section 15.4.6 requires the analysis of an inadvertent deboration (ID) of the reactor coolant system (i.e. the unplanned addition of positive reactivity to the reactor core). Operator action is required in order to stop the unplanned dilution. Therefore, the criterion of primary concern for this event is the amount of time remaining after the operator is alerted to the event and before a complete loss of subcriticality (i.e., the core becomes critical or supercritical). Analysis of this event in MODE 6 is necessary due to the changing core reactivity conditions that exist during core alterations and refueling. For MODE 6, the SRP considers acceptable the ability to identify the event and alert the operator 30 minutes prior to a loss of subcriticality.

Arizona Public Service Company's (APS) safety analysis for Palo Verde Nuclear Generating Station (PVNGS) is documented in the Updated Final Safety Analysis Report (UFSAR), Section 15.4.6, Inadvertent Deboration. The ID event is analyzed only with respect to the time available for operator corrective action prior to the loss of subcriticality. Fuel integrity is not considered to be challenged by this event.

The PVNGS safety analysis takes credit for the boron dilution alarm system (BDAS) in MODES 3, 4, 5, and 6 as the primary means to detect a possible ID and to alert the operator. However, if the BDAS is inoperable, the safety analysis prescribes reactor coolant system (RCS) boron concentration monitoring frequencies which would detect the ID and alert the operator in the required time to take action prior to the complete loss of subcriticality. The analysis considers operating parameters such as MODE, K_{eff}, control element assembly configuration, and the number of operating charging pumps to determine (1) the appropriate BDAS setpoints, and (2) the appropriate RCS boron concentration monitoring frequencies when BDAS is out of service, thus ensuring the operator will have a minimum of 30 minutes prior to a complete loss of subcriticality to take the necessary action to terminate the ID event. The monitoring frequencies resulting from this analysis, which ensure PVNGS meets the acceptance criteria of the SRP, are documented in the Core Operating Limits Report (COLR) for each PVNGS Unit.

The proposed amendment would change the Applicability of TS 3.3.12, "Boron Dilution Alarm System (BDAS)," to add MODE 6 to the current MODES 3, 4 and 5 Applicability. This change is consistent with the PVNGS safety analysis since the BDAS is considered the primary means for detecting and alerting the operator of an ID event. The BDAS is designed to detect a boron dilution event and alert the operator more than 30 minutes prior to a complete loss of subcriticality to allow the operator sufficient time to take action to terminate the event.

Additionally, a Note is being added to the Actions section of TS 3.9.2, "Refueling Operations - Nuclear Instrumentation," to inform the operator that TS 3.3.12 is also applicable since an inoperable SRM will render the corresponding BDAS channel inoperable. The addition of this Note will ensure that should one or both SRMs be declared inoperable, thus rendering the corresponding BDAS channel(s) inoperable, the appropriate Actions of TS 3.3.12, which satisfy the PVNGS safety analysis for the ID event, will be entered.

Finally, TS 3.9.2 Required Action B.2 is being deleted to eliminate a conflict between TS 3.9.2 and 3.3.12. This action directs the monitoring of the reactor coolant system boron concentration if both SRMs are inoperable. However, since an inoperable SRM will render the corresponding BDAS channel inoperable, and the proposed amendment is also adding a Note to TS 3.9.2 which states that TS 3.3.12 is applicable when the BDAS is made inoperable by the SRMs, TS 3.3.12, Required Action B.1 would also be entered. TS 3.3.12, Action B.1 directs the monitoring of RCS boron concentration if both BDAS channels are inoperable, but with monitoring frequencies different from TS 3.9.2. Therefore, Required Action B.2 of TS 3.9.2 and TS 3.3.12 Required Action B.1 are conflicting. The decision to eliminate TS 3.9.2, Required Action B.2 versus TS 3.3.12, Required Action B.1 was made since the latter action will ensure that the RCS boron concentration will be monitored at a frequency which will detect a possible ID event in time to allow the operator the minimum time required by the SRP and PVNGS safety analysis to take the necessary action to terminate the event.

These changes ensure that the TS actions are consistent with the PVNGS safety analyses for the RCS deboration event, which has previously been reviewed and approved by the NRC staff and is described in UFSAR Section 15.4.6. As a result, this amendment will not change, degrade or prevent actions described or assumed in any accident. Nor will it alter any assumptions previously made in evaluating radiological consequences or affect any fission product barriers. The proposed amendment does not increase any challenges to safety systems. Therefore, this proposed amendment would not increase or have any impact on the consequences of events described and evaluated in Chapters 6 or 15 of the PVNGS UFSAR.

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; (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 changes to Technical Specifications 3.3.12 and 3.9.2 do not significantly increase the probability or consequences of an accident previously evaluated in the Updated Final Safety Analysis Report (UFSAR). The proposed amendment would add MODE 6 Applicability to TS 3.3.12 for the BDAS. In addition, the proposed amendment would add a note to the Actions of TS 3.9.2 which directs the operator to enter the applicable Conditions and Required Actions of TS 3.3.12 in the event that the BDAS is made inoperable by inoperable startup range monitors (SRMs). Finally, the proposed amendment would delete the TS 3.9.2 Required Action B.2.

The boron dilution alarm system (BDAS) and chemical monitoring of the reactor coolant system (RCS) boron concentration are established in the MODE 6 inadvertent deboration analysis in UFSAR Section 15.4.6 to alert the operator of a boron dilution event at least 30 minutes prior to a loss of subcriticality. The BDAS and RCS boron monitoring are not accident initiators. The proposed changes will ensure that the assumptions of UFSAR Section 15.4.6, for mitigating an inadvertent deboration event, are met. In addition, the proposed changes do not alter the design or configuration of the plant but establish requirements for operating the plant as analyzed and designed. The amendment does not physically affect the operability or availability of the boron dilution alarm system (BDAS), but ensures it is available as required or that sufficient actions are taken if it becomes inoperable. Furthermore, the inadvertent deboration event analysis does not involve dose consequences since the acceptance criteria is to provide operator notification at least 30 minutes prior to the loss of subcriticality such that the operator may terminate the event before criticality is achieved and the RCS and fuel clad boundaries are challenged. Therefore, the proposed amendment to TS 3.3.12 and TS 3.9.2 does not involve a significant increase in the probability or 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 amendment to Technical Specifications 3.3.12 and 3.9.2 does not create the possibility of an accident of a new or different kind from any accident previously evaluated. The proposed amendment would add MODE 6 Applicability to TS 3.3.12 for the BDAS. In addition, the proposed amendment would add a note to the Actions of TS 3.9.2 which directs the operator to enter the applicable Conditions and Required Actions of TS 3.3.12 in the event that the BDAS is made inoperable by inoperable startup range monitors (SRMs). Finally, the proposed amendment would delete the TS 3.9.2 Required Action B.2. The proposed changes do not alter the design or configuration of the plant but establish requirements for operating the plant as analyzed and designed.

In MODE 6, the BDAS and the startup range monitors (SRM) are the primary means to monitor reactivity changes during core alterations and to alert the operator of a boron dilution event in time to prevent a loss of subcriticality. Chemical sampling to monitor RCS boron concentration is used when the BDAS is unavailable. Accidents involving reactivity anomalies are evaluated in UFSAR Section 15.4, Reactivity and Power Distribution Anomalies. Inadvertent deboration is described in UFSAR Section 15.4.6 as requiring the BDAS or chemical sampling of the RCS boron concentration to alert the operator at least 30 minutes prior to the loss of subcriticality in MODE 6. The proposed changes to TS 3.3.12 and 3.9.2 will require the BDAS to be OPERABLE in MODE 6 or perform RCS boron concentration monitoring if the BDAS is inoperable.

The BDAS and RCS boron concentration monitoring are means to detect a boron dilution event. The proposed changes ensure this detection occurs as required. The proposed amendment does not physically affect the response or operation of the plant. Therefore, the proposed changes do 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 changes to Technical Specifications 3.3.12 and 3.9.2 do not involve a significant reduction in a margin of safety. The proposed amendment would add MODE 6 Applicability to TS 3.3.12 for the BDAS. In addition, the proposed amendment would add a note to the Actions of TS 3.9.2 which directs the operator to enter the applicable Conditions and Required Actions of TS 3.3.12 in the event that the BDAS is made inoperable by inoperable startup range monitors (SRMs). Finally, the proposed amendment would delete the TS 3.9.2 Required Action B.2. These changes ensure the adequate detection of a boron dilution event.

The current Technical Specification 3.3.12 satisfies the inadvertent deboration safety analysis requirements to have the BDAS OPERABLE in MODES 3, 4 and 5. In accordance with UFSAR Section 15.4.6, Inadvertent Deboration, the same requirements

and actions apply for MODE 6. Therefore, it is proposed that MODE 6 Applicability for the BDAS be added to TS 3.3.12. In addition, the Action section of TS 3.9.2 would be modified with a note to ensure the safety analysis assumptions are satisfied in MODE 6, since the SRM must be OPERABLE for the corresponding BDAS channel to be OPERABLE. Technical Specification Bases 3.3.12 and UFSAR Section 15.4.6 indicate that the BDAS is necessary to alert the operator of an inadvertent deboration event at least 15 minutes before the reactor loses subcriticality in MODE 3, 4 and 5. UFSAR Section 15.4.6 also indicates that 30 minutes is required in MODE 6. These criteria are in agreement with the guidance of NUREG 0800, Standard Review Plan. Therefore, the margin of safety being considered for this proposed amendment is the 30 minutes before the loss of subcriticality that the operator must be notified within in the event of a boron dilution event. The proposed changes to TS 3.3.12 and TS 3.9.2 will require the BDAS to be OPERABLE in MODE 6 and, if the BDAS is inoperable, will require that the RCS boron concentration be monitored at pre-analyzed frequencies via chemical sampling in order to satisfy the 30 minute acceptance criteria. Finally, the proposed change also serves to clarify that an inoperable SRM will cause the corresponding BDAS channel to be inoperable, thus requiring action in accordance with TS 3.3.12, in addition to TS 3.9.2. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

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 TS 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

Attachment 1: Units 1, 2, and 3; Pages 3.3.12 – 1 and 3.9.2 – 1

H. RETYPED TECHNICAL SPECIFICATION PAGES

Attachment 2: Units 1, 2, and 3; Pages 3.3.12 – 1 and 3.9.2 – 1

ATTACHMENT 1

Marked-up Pages

Technical Specifications 3.3.12 and 3.9.2

Pages 3.3.12-1 and 3.9.2-1

Palo Verde Nuclear Generating Station

Units 1, 2 and 3

LDCR 00-T007

3.3 INSTRUMENTATION

3.3.12 Boron Dilution Alarm System (BDAS)

LCO 3.3.12 Two channels of BDAS shall be OPERABLE.

APPLICABILITY: MODES 3, 4 ~~and 5~~ 5 and 6.

---NOTE---
Required in MODE 3 within 1 hour after the neutron flux is within the startup range following a reactor shutdown.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required channel inoperable.	A.1	Determine the RCS boron concentration.	Immediately AND At the monitoring Frequency specified in the CORE OPERATING LIMITS REPORT
B. Two required channels inoperable.	B.1	Determine the RCS boron concentration by redundant methods.	Immediately AND At the monitoring frequency specified in the CORE OPERATING LIMITS REPORT

(continued)

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

LCO 3.9.2 Two startup range monitors (SRMs) shall be OPERABLE.

APPLICABILITY: MODE 6.

INSERT A

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required SRM inoperable.	A.1 Suspend CORE ALTERATIONS. AND A.2 Suspend positive reactivity additions.	Immediately Immediately
B. Two required SRMs inoperable.	B.1 Initiate action to restore one SRM to OPERABLE status. ~~AND~~ ~~B.2 Perform SR 3.9.1.1.~~	Immediately ~~4 hours~~ ~~AND~~ ~~Once per 12 hours thereafter~~

Insert A

----------NOTE---------

Enter applicable Conditions and Required Actions of LCO 3.3.12, "Boron Dilution Alarm System (BDAS)" for BDAS made inoperable by SRMs.

ATTACHMENT 2

Retyped Pages

Technical Specifications 3.3.12 and 3.9.2

Pages 3.3.12-1 and 3.9.2-1

Palo Verde Nuclear Generating Station

Units 1, 2 and 3

3.3 INSTRUMENTATION

3.3.12 Boron Dilution Alarm System (BDAS)

LCO 3.3.12 Two channels of BDAS shall be OPERABLE.

APPLICABILITY: MODES 3, 4, 5 and 6.

----------NOTE----------
Required in MODE 3 within 1 hour after the neutron flux is within the startup range following a reactor shutdown.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required channel inoperable.	A.1 Determine the RCS boron concentration.	Immediately AND At the monitoring Frequency specified in the CORE OPERATING LIMITS REPORT
B. Two required channels inoperable.	B.1 Determine the RCS boron concentration by redundant methods.	Immediately AND At the monitoring frequency specified in the CORE OPERATING LIMITS REPORT

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time not met.	C.1 Suspend all operations involving positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.3.12.1	----------NOTE---------- Not required to be performed until 1 hour after neutron flux is within the startup range. ---------- Perform CHANNEL CHECK.	12 hours
SR 3.3.12.2	----------NOTE---------- Not required to be performed until 72 hours after neutron flux is within the startup range. ---------- Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.12.3	----------NOTE---------- Neutron detectors are excluded from CHANNEL CALIBRATION. ---------- Perform CHANNEL CALIBRATION.	18 months

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

LCO 3.9.2 Two startup range monitors (SRMs) shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTIONS

---NOTE---
Enter applicable Conditions and Required Actions of LCO 3.3.12, "Boron Dilution Alarm System (BDAS)" for BDAS made inoperable by SRMs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required SRM inoperable.	A.1 Suspend CORE ALTERATIONS. AND A.2 Suspend positive reactivity additions.	Immediately Immediately
B. Two required SRMs inoperable.	B.1 Initiate action to restore one SRM to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.2.1	Perform CHANNEL CHECK.	12 hours
SR 3.9.2.2	----------NOTE---------- Neutron detectors are excluded from CHANNEL CALIBRATION. ---------- Perform CHANNEL CALIBRATION.	18 months

ENCLOSURE 2

REVISED TECHNICAL SPECIFICATION BASES

B3.3.12 and B3.9.2

PALO VERDE NUCLEAR GENERATING STATION

UNITS 1, 2 AND 3

LDCR 00-B017

B 3.3 INSTRUMENTATION

B 3.3.12 Boron Dilution Alarm System (BDAS)

BASES

BACKGROUND

The Boron Dilution Alarm System (BDAS) alerts the operator of a boron dilution event in MODES 3, 4, ~~and 5~~ 5 and 6. The boron dilution alarm is received at least 15 minutes prior to criticality to allow the operator to terminate the boron dilution.

In Modes 3-5 and at least 30 minutes prior to criticality in Mode 6

In MODES 1 and 2 protection for a boron dilution event is addressed by LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation-Operating." In MODES 3 and 4 with the CEAs withdrawn, LCO 3.3.2, " Reactor Protective System (RPS) Instrumentation-Shutdown," provides protection. ~~In MODE 6 protection for a boron dilution event is addressed by LCO 3.9.2, "Refueling Operations - Nuclear Instrumentation."~~

The BDAS utilizes two channels that monitor the startup channel neutron flux indications. If the neutron flux signals increase to the calculated alarm setpoint a control room annunciation is received. The setpoint is automatically lowered to a fixed amount above the current flux level signal. The alarm setpoint will only follow decreasing or constant flux levels, not increasing levels. Two channels of BDAS must be OPERABLE to provide single failure protection and to facilitate detection of channel failure by providing CHANNEL CHECK capability.

APPLICABLE SAFETY ANALYSES

The BDAS channels are necessary to monitor core reactivity changes. They are the primary means for detecting and triggering operator actions to respond to boron dilution events initiated from conditions in which the RPS is not required to be OPERABLE.

The OPERABILITY of BDAS channels is necessary to meet the assumptions of the safety analyses to mitigate the consequences of an inadvertent boron dilution event as described in the UFSAR, Chapter 15 (Ref. 1).

The BDAS channels satisfy Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

(continued)

LDCR 00-B017

BASES (continued)

LCO

The LCO on the BDAS channels ensures that adequate information is available to mitigate the consequences of a boron dilution event.

A minimum of two BDAS channels are required to be OPERABLE. Because the BDAS utilizes the excore startup channel instrumentation as its detection system the OPERABILITY of the excore startup channel is also part of the OPERABILITY of the BDAS.

APPLICABILITY

The BDAS must be OPERABLE in MODES 3, 4, and 5 because the safety analysis assumes this alarm will be available in these MODES to alert the operator to take action to terminate the boron dilution. In MODES 1 and 2, and in MODES 3, 4, and 5, with the RTCBs shut and the CEAs capable of withdrawal, the logarithmic power monitoring channels are addressed as part of the RPS in LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation–Operating" and LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation-Shutdown".

The requirements for source range neutron flux monitoring in MODE 6 are addressed in LCO 3.9.2, "Nuclear Instrumentation." The excore startup channels provide neutron flux coverage extending an additional one to two decades below the logarithmic channels for use during shutdown and refueling, when neutron flux may be extremely low.

The Applicability is modified by a Note that the BDAS is required in MODE 3 within 1 hour after the neutron flux is within the startup range following a reactor shutdown. This allows the neutron flux level to decay to a level within the range of the excore startup channels and for the operator to initialize the BDAS.

(continued)

B 3.9 REFUELING OPERATIONS

B 3.9.2 Nuclear Instrumentation

BASES

BACKGROUND

The Startup Channel Neutron Flux Monitors or Startup Range Monitors (SRMs) ~~and the associated Boron Dilution Alarm System (BDAS)~~ are used during core alterations or movement of irradiated fuel assemblies in containment to monitor the core reactivity condition. The installed SRMs are part of the Excore Nuclear Instrumentation System. These detectors are located external to the reactor vessel and detect neutrons leaking from the core. The use of portable detectors is permitted, provided the LCO requirements are met.

The installed SRMs are BF3 detectors operating in the proportional region of the gas filled detector characteristic curve. The detectors monitor the neutron flux in counts per second. The instrument range covers five decades of neutron flux (1E+5 cps) with a 5% instrument accuracy. The detectors also provide continuous visual indication in the control room and an audible indication in the control room and containment. An audible BDAS alarm alerts operators to a possible dilution accident. The excore startup channels are designed in accordance with the criteria presented in Reference 1.

APPLICABLE SAFETY ANALYSES

Two OPERABLE SRMs and from associated BDAS are required to provide a signal to alert the operator to unexpected changes in core reactivity ~~such as by~~ a boron dilution accident ~~or an improperly loaded fuel assembly~~. The safety analysis of the uncontrolled boron dilution accident is described ~~in~~ Reference 2. The analysis of the uncontrolled boron dilution accident shows that normally available ~~SHUTDOWN MARGIN~~ would be reduced, but there is sufficient time for the operator to take corrective actions.

reactor subcriticality

The SRMs satisfy Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

LCO

This LCO requires two SRMs OPERABLE to ensure that redundant monitoring capability is available to detect changes in core reactivity.

(continued)

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BASES

APPLICABILITY

In MODE 6, the SRMs must be OPERABLE to determine changes in core reactivity. There is no other direct means available to check core reactivity levels.

INSERT A →

~~In MODES 3, 4, and 5, the installed source range detectors and circuitry are required to be OPERABLE by LCO 3.3.12, "Boron Dilution Alarm System (BDAS)".~~

ACTIONS

A.1 and A.2

With only one SRM OPERABLE, redundancy has been lost. Since these instruments are the only direct means of monitoring core reactivity conditions, CORE ALTERATIONS and positive reactivity additions must be suspended immediately. Performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

INSERT B →

B.1

With no SRM OPERABLE, action to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, action shall be continued until an SRM is restored to OPERABLE status.

~~B.2~~

With no SRM OPERABLE, there is no direct means of detecting changes in core reactivity. However, since CORE ALTERATIONS and positive reactivity additions are not to be made, the core reactivity condition is stabilized until the SRMs are OPERABLE. ~~This stabilized condition is determined by performing SR 3.9.1.1 to verify that the required boron concentration exists~~.

INSERT C →

~~The Completion Time of 4 hours is sufficient to obtain and analyze a reactor coolant sample for boron concentration. The Frequency of once per 12 hours ensures that unplanned changes in boron concentration would be identified. The 12 hour Frequency is reasonable, considering the low probability of a change in core reactivity during this period.~~

(continued)

Insert A

The requirements for the associated Boron Dilution Alarm System (BDAS) operability in MODE 6 are contained in LCO 3.3.12, "Boron Dilution Alarm System." LCO 3.3.12 also covers SRM and BDAS operability requirements for MODES 3, 4 and 5.

Insert B

With one required SRM channel inoperable, the associated BDAS is also inoperable. Action A.1 of LCO 3.3.12 requires the RCS boron concentration to be determined immediately and at the applicable monitoring frequency specified in the COLR Section 3.3.12 in order to satisfy the requirements of the inadvertent deboration safety analysis. The monitoring frequency specified in the COLR ensures that a decrease in the boron concentration during a boron dilution event will be detected with sufficient time for termination of the event before the reactor achieves criticality. The boron concentration measurement and the OPERABLE BDAS channel provide alternate methods of detection of boron dilution.

Insert C

This stabilized condition is verified by performing Action B.1 of LCO 3.3.12 which requires RCS boron concentration to be determined by redundant methods immediately and at the monitoring frequency specified in the COLR Section 3.3.12. This action satisfies the requirements of the inadvertent deboration safety analysis. RCS boron concentration sampling by redundant methods ensures a boron dilution will be detected with sufficient time to terminate the event before the reactor achieves criticality.