10 CFR 50.90

Palo Verde Nuclear Generating Station

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102-05533-CDM/SAB/RKR
July 20, 2006

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

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket Nos. STN 50-528/529/530
Request for Amendment Technical Specifications
3.1.6 "Shutdown Control Element Assembly (CEA)
Insertion Limits"

Dear Sirs:

Pursuant to 10 CFR 50.90, Arizona Public Service Company (APS) hereby requests an amendment to the Facility Operating Licenses for PVNGS Units 1, 2, and 3. This proposed amendment would revise Technical Specification (TS) 3.1.6 "Shutdown Control Element Assembly (CEA) Insertion Limits." The current condition for TS 3.1.6 requires the position of the Shutdown CEAs to be ≥144.75 inches withdrawn. Through evaluation it has been determined that this limit is non-conservative. This proposed amendment would change this limit to ≥147.75 inches withdrawn. This limit has been administratively implemented.

Enclosure 1 is the notarized affidavit. Enclosure 2 provides a description and assessment of the proposed Technical Specification changes. Enclosure 3 provides the existing TS pages marked up to show the proposed changes. Enclosure 4 provides the revised (retyped) TS pages. Enclosure 5 provides the existing TS Bases pages marked up to reflect the proposed change.

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 approval of the enclosed LAR by June 1, 2007. APS requests to implement the proposed amendment within 90 days of approval.

No commitments are being made to the NRC by this letter. Should you have any questions, please contact Thomas N. Weber at (623) 393-5764.

Sincerely,

CDM/SAB/RKR/gt

Enclosures:

1. Notarized affidavit
2. Arizona Public Service Company's Evaluation of the LAR
3. Marked-up Technical Specification Pages for LCO 3.1.6 – Shutdown Control Element Assembly (CEA) Insertion Limits
4. Retyped Technical Specification Pages for LCO 3.1.6 – Shutdown Control Element Assembly (CEA) Insertion Limits
5. Marked-up Technical Specification Bases Pages for Shutdown Control Element Assembly (CEA) Insertion Limits

cc:	B. S. Mallett	NRC Region IV, Regional Administrator
	M. B. Fields	NRC NRR Project Manager for PVNGS
	G. G. Warnick	NRC Senior Resident Inspector for PVNGS
	A. V. Godwin	ARRA
	T. Morales	ARRA

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

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

David Mauldin

Sworn To Before Me This 20th Day Of July, 2006.

Notary Public

OFFICIAL SEAL
Cassandre Justiss
NOTARY PUBLIC - STATE of ARIZONA
MARICOPA COUNTY
MY COMM. EXPIRES October 30, 2006

Notary Commission Stamp

ENCLOSURE 2

Arizona Public Service Company's Evaluation

Subject: **Request for Amendment Technical Specifications 3.1.6 – Shutdown Control Element Assembly (CEA) Insertion Limits**

1.0 DESCRIPTION

This license amendment request (LAR) is to amend Operating Licenses NPF-41, NPF-51, and NPF-74 for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3, respectively. The proposed change would revise Technical Specification (TS) 3.1.6 "Shutdown Control Element Assembly (CEA) Insertion Limits." The current condition for TS Limiting Condition for Operation (LCO) 3.1.6 requires the position of the Shutdown CEAs to be ≥144.75 inches withdrawn while in Mode 1 and Mode 2 with any regulating CEA not fully inserted. Through evaluation it has been determined that this limit is non-conservative.

2.0 PROPOSED CHANGE

The proposed change would revise PVNGS Operating Licenses NPF-41, NPF-51, and NPF-74 Technical Specifications (TS) by amending the following sections for Units 1, 2, and 3:

- TS 3.1.6 "Shutdown Control Element Assembly (CEA) Insertion Limits LCO," currently reads as,

  LCO 3.1.6 *All shutdown CEAs shall be withdrawn to ≥144.75 inches.*

  Revised wording will be,

  LCO 3.1.6 *All shutdown CEAs shall be withdrawn to ≥147.75 inches.*

- Surveillance Requirement (SR) 3.1.6.1 currently reads as,

  SR 3.1.6.1 *Verify each shutdown CEA is withdrawn ≥144.75 inches.*

  Revised wording will be,

  SR 3.1.6.1 *Verify each shutdown CEA is withdrawn to ≥147.75 inches.*

Additionally, two editorial changes will be made to LCO 3.1.6. The "(s)" will be deleted from the word "CEA(s)" Required Action A.1. This allows the Required Action statement to be consistent with its associated Condition statement for a single shutdown CEA not within its limits. The other change will add the letter "s" to the "2 hour" limit currently listed for the Completion Time of LCO 3.1.6, Condition A.

3.0 BACKGROUND

During plant operations a set of control rods (shutdown control element assemblies) are positioned above the reactor core with sufficient material in them (boron) to stop the nuclear reaction when the rods are inserted into the core. The safety analysis assumes these rods have enough worth (a measure of the effectiveness of the rods to reduce the nuclear reaction) above the active fuel region of the core to mitigate the event before the accident begins. Palo Verde engineering personnel have determined that the current Shutdown Control Element Assembly (SDCEA) insertion limit (LCO 3.1.6) value of ≥ 144.75 inches withdrawn does not provide enough rod worth above the fuel region. Analysis has determined that a SDCEA insertion limit of ≥ 147.75 inches withdrawn will provide sufficient rod worth above the fuel region. This limit has been administratively implemented at Palo Verde and this LAR is consistent with the administrative controls that were implemented.

The current SDCEA insertion limit of ≥ 144.75 inches withdrawn is non-conservative because positioning the SDCEAs below 147.75 inches withdrawn would result in the SDCEAs exceeding the amount of insertion assumed in the safety analysis contained in the bias and uncertainty in the rod worth. This is true for all fuel assembly designs used by Palo Verde beginning with Cycle 1. Even though insertion was allowed to 144.75 inches withdrawn by the LCO, the control rod maximum insertion was administratively controlled at 147.75 inches withdrawn in compliance with the Guide Tube Wear Program (GTWP). PVNGS has participated in a GTWP since Cycle 1. The GTWP is designed to prevent localized flow induced wear between control element assemblies (CEAs) and their guide tubes. The GTWP requires CEAs to be repositioned several times during a core operating cycle. The GTWP allowed the CEAs to be inserted up to 2.25 inches (147.75 inches withdraw) below the CEA fully withdrawn position. This insertion did not exceed the insertion assumed in the safety analysis contained in the bias and uncertainty in the rod worth for the original fuel design.

Starting with Unit 1 Cycle 5, new fuel assemblies incorporated a new Guardian grid design. The purpose of the Guardian grid design was to trap debris flowing up the assembly before it reached the fuel pins. To accommodate the Guardian grid design modification, the fuel region was raised 1.59 inches. The combination of the GTWP and the addition of Guardian grids to the fuel assemblies caused the amount of insertion to slightly exceed the amount of insertion assumed in the safety analysis contained in the bias and uncertainty in the rod worth. An evaluation of the effect this change had on the safety analyses in previous core cycles was performed. The result was that there was no effect on the safety analyses.

PVNGS evaluated the new configuration in the GTWP justification analysis and determined that plant operation with the SDCEAs withdrawn at least 147.75 inches assures there is enough rod worth above the fuel region. The new limit ensures PVNGS will operate within its safety analysis.

In the interim, to ensure the SDCEAs are adequately maintained at a position supported by the safety analyses, more restrictive administrative limits were put in place at the time that this discrepancy was discovered. The more restrictive acceptance criterion (SDCEA position limitation of ≥147.75 inches) has been added to shiftly operating logs and surveillance testing procedures for each shutdown CEA. In addition, a new Technical Requirements Manual (TRM) specification has been added to ensure this more restrictive limit is maintained until TS LCO 3.1.6 is changed. Finally, the GTWP program has been re-evaluated and a new two step program has been approved. The new program provides margin between the maximum insertion value and the proposed change in this LAR to TS LCO 3.1.6 (≥147.75 inches withdrawn).

4.0 TECHNICAL ANALYSIS

Safety Analyses:

The Palo Verde core design group uses an automated checklist when designing new cores. The checklist compares the new parameters resulting from the new core design to limiting parameters used in the safety analyses. To assess the effect control rod position would have on the parameters with the rods positioned at the new limit, several events and specific parameters were analyzed. The events were chosen because of their sensitivity to rod position. Specific parameters were analyzed to determine if, with the rods positioned at the new limit, the power distribution in the core was still within the assumptions made in the safety analyses.

The first accident analyzed was the steam line break accident simulated to occur at the end of the core cycle. The mitigation of this event is most problematic at this time in core cycle (end of core cycle). Normally, the shutdown CEAs would be placed in a position above the new limit at the end of the core cycle (SDCEAs fully withdrawn) in compliance with the Guide Tube Wear Program (GTWP). The event was simulated at the new insertion limit of 147.75 inches withdrawn. This is conservative because the rods have less worth when they are partially inserted into the core. The result was a reduction in rod worth of approximately 1%. The checklist has three limiting parameters for rod worth. Each of the three parameters applies to a different power level and cycle length. When the reduction was applied to the calculated values for the analyzed cycle, the resulting values were still significantly above the limiting values of rod worth in the checklist.

The other accident analyzed was the control rod ejection event. Several cases are simulated every cycle. The case having the smallest difference between the calculated value and the limiting value was selected. The event was simulated at the new insertion limit. The results of the simulation found a reduction in the margin to be less than one half of 1%. Since neither accident resulted in a significant change in the previous calculated value and the limiting parameter in the checklist was not exceeded, the consequences of these accidents remain unchanged. Since these accidents

challenge the limits more so than other accidents, it is concluded that the consequences of other accidents also remain unchanged.

Two parameters, axial peak and saddle index, were examined to determine the effect the new shutdown CEA insertion limit would have on the power distribution of the reactor core. Axial peak is the axial location where power is the highest in the core. Saddle index compares the relationship between peak powers in the top, middle, and bottom of the core and validates the axial power distribution. These two parameters are calculated and assessed using the automated checklist every fuel cycle. To assess the effect the new shutdown CEA insertion limit would have on these parameters, the unit and cycle that had the new design fuel assemblies and that had the highest values of these parameters was selected for the assessment. Since axial peak is highest at the beginning of the core cycle, the shutdown CEAs were inserted at the new limit and the condition was simulated. The results found only a slight increase in the axial peak and still within the limiting parameter checklist value. The saddle index increases over cycle life and is greatest at the end of cycle life. The control rods were again inserted to the new limit and the condition was simulated. The results found little change in the saddle index and well within the limiting value in the checklist; thus, verifying an acceptable axial power distribution. Therefore, the new insertion limit produces axial shapes within the limiting parameters of the checklist which means the consequences of accidents analyzed in our licensing documents remain unchanged.

Safety analyses assume that there is enough rod worth above the fuel region before the start of any accident to mitigate the event. All SDCEAs positioned at ≥147.75 inches withdrawn assures that there is adequate rod worth and pre-accident power distributions are within established limits.

CEA Position Indicators:

There are two independent CEA position indication systems that provide CEA position information to the operator. The systems are the pulse counting CEA position indication system and the reed switch CEA position indication system. CEA position displays are located on the main control boards.

As detailed in PVNGS Updated Final Safety Analysis Report (UFSAR) section 7.5.1.1.4, "Control Element Assembly Position Indication," the reed switch CEA position indication system utilizes a series of magnetically actuated reed switches (reed switch position transmitters) to provide signals representing CEA position. Two independent reed switch position transmitters (RSPT) are provided for each CEA. The RSPT provides an analog position indication signal and three physically separate discrete reed switch position signals. The analog position indication system utilizes a series of magnetically actuated reed switches spaced at 1.5-inch intervals along the RSPT assembly and arranged with precision resistors in a voltage divider network. This indicating system is very reliable but is not as accurate as the Pulse Counting Position Indication System.

As discussed in UFSAR section 7.7.1.3.2.3, "Pulse Counting Position Indication System," the pulse counting indication system infers each CEA position by maintaining a record of the "raise" and "lower" control pulses sent to each Control Element Drive Mechanism (CEDM). The pulse counting CEA position signal associated with each CEA is reset to zero whenever the rod drop contact (located within the reed switch position transmitter housing) is closed. This action permits the pulse counting system to automatically reset the position to zero, whenever a reactor trip occurs or whenever a CEA is fully dropped into the core. This system is incorporated in the Plant Monitoring System (PMS) which feeds control board digital displays. One digital display provides CEA group information. A second digital display provides individual CEA position information. The position of each CEA is periodically printed out for a permanent record. A printout is available, on operator demand, of selected CEA positions. The pulse counting CEA position indication system provides position information to CEA related alarm programs and the Core Operating Limit Supervisory System (COLSS) contained in the PMS. Power Dependent Insertion Limits (PDILs) are operating limits on allowable insertion of full length CEAs as a function of reactor power and are used to maintain operation consistent with shutdown margin (when the reactor is critical) and ejected CEA worth (when the reactor is critical) constraints. During CEA withdrawal (i.e., reactor startup and surveillance testing), outward motion is stopped by the upper group stop at 145.5 inches withdrawn. Each individual CEA is then withdrawn to 150 inches where outward motion is stopped by the Primary Upper Electrical Limit (UEL) switch. The UEL is a separate reed switch indicator, positioned at the '150 inch' withdrawn location in the core, from that of the RSPTs. At this time, each CEA's pulse counting indicator is set at 150 inches withdrawn. Throughout an operating cycle, this process is repeated as necessary during a quarterly surveillance test and can be likened to a calibration of the pulse counting indication system since the Primary Upper Electrical Limit switch is at a known location that does not change. This Pulse Counting position indicating system is very accurate but not as reliable as the RSPT system.

To ensure SDCEAs are positioned to support assumptions in the safety analysis, each SDCEA must be withdrawn to ≥147.75 inches withdrawn as indicated by the pulse counter. A lower limit is allowed for the RSPT indication due to its instrument inaccuracies (current values are +3.1/-2.1 inches). Slipping of an individual CEA will be detected by the deviation between its pulse counter indication and its RSPT indication, as well as the deviation between other CEAs within its group.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

This license amendment request (LAR) is to amend Operating Licenses NPF-41, NPF-51, and NPF-74 for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3, respectively. This LAR would revise Technical Specification (TS) Limiting Condition for Operation (LCO) 3.1.6 "Shutdown Control Element

Assembly (CEA) Insertion Limits." The revision to this LCO places a more restrictive limit to the "fully withdrawn" definition for the shutdown CEAs. This license amendment will revise the limit to ensure the CEAs are placed in a position that satisfies assumptions made in the PVNGS safety analyses. This new restrictive limit requires the shutdown CEAs to be withdrawn to ≥147.75 inches, instead of the current limit of ≥144.75 inches.

During plant operations a set of control rods (shutdown CEAs) are positioned such that there is sufficient material in them (boron) to stop the nuclear reaction when the rods are inserted into the core. The safety analysis assumes there is enough rod worth above the fuel region before the start of any accident to mitigate the event. The Shutdown Control Element Assembly (SDCEA) insertion limit specified in TS LCO 3.1.6 of ≥144.75 inches withdrawn does not assure this and, therefore, is non-conservative with respect to the safety analysis.

This Technical Specification change is needed to incorporate the new, more restrictive shutdown CEA position limitation of ≥147.75 inches withdrawn which is being implemented to ensure PVNGS continues to operate within its design bases.

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

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

   Response: No.

Safety analyses require that the shutdown CEAs insert into the core at least 90% within 4 seconds of the safety signal initiating the shutdown sequence with the assumption that the shutdown CEAs starting position are at 150 inches withdrawn. This assumption will not be altered with the new proposed withdrawal limit.

The positioning of control rods (shutdown CEAs) to a new limit of ≥147.75 inches withdrawn is not a precursor to any accident analyzed at Palo Verde nor do these conditions affect any accident precursor; thus, initial control rod position does not change the probability of an accident previously evaluated.

To assess the effect control rod position would have on the safety analyses with the rods positioned at the new limit, several events and specific parameters were analyzed. The events were chosen because of their sensitivity to rod position.

The specific parameters were analyzed to determine if, with the rods positioned at the new limit, the power distribution in the core was still within the assumptions made in the safety analyses.

Since, none of the related safety analyses resulted in a significant change in the previously calculated values and the limiting parameters associated for those analyses were not exceeded, the consequences of these accidents remain unchanged. Therefore, the new insertion limit for the shutdown CEAs will not increase the consequences of any accident analyzed in our licensing bases documents.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   Response: No.

PVNGS licensing bases documents describe the design function of the control rods as components that include a positive means (gravity) for inserting the control rods and are capable of reliably controlling the nuclear reactor to assure that under conditions of normal operation, including anticipated accidents, fuel design limits are not exceeded. The proposed amendment, new control rod (shutdown CEA) insertion limit, does not create the possibility of a new or different kind of accident from any accident previously evaluated nor does it affect the control rods ability to perform its design function.

Control rods placed at the new insertion limit will not cause fuel design limits to be exceeded during normal operations or accidents. Placing the control rods at the new insertion limit in no way impedes their insertion due to gravity. These CEAs are tested to ensure that they will insert greater than 90% into the core in less than 4 seconds from a completely withdrawn position (150 inches) and this requirement will continue to be met.

Establishing a new insertion limit for the control rods does not modify any of the existing components or systems used to position the control rods. The new insertion limit will also satisfy the assumptions made in the safety analyses.

In conclusion, the new insertion limit stills allows the control rods to fulfill their design function and does not create a new or different accident than is already described in the licensing bases documents. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

Response: No.

The proposed amendment, new shutdown CEA insertion limit, does not involve a reduction in the margin of safety. The new shutdown CEA insertion limit does not affect any of the limits used to determine the acceptability of newly designed cores. The safety analyses in the licensing bases documents remain acceptable when this new (more restrictive) shutdown CEA insertion limit is applied. Additionally, the design basis of the control rods is unaffected by the new insertion limit. The design function of the control rods is to provide a positive means (gravity) for inserting the control rods and is capable of reliably controlling the nuclear reactor to assure that under conditions of normal operation, including anticipated accidents, fuel design limits are not exceeded. Since the bounding safety analyses limits used remain the same and the control rod design basis is unaffected, the fuel design limits associated with the clad material; which houses the fuel; and the design limits of the coolant system; which houses the fuel assemblies; remain unchanged. Therefore, the margin of safety is not reduced.

In conclusion, since the bounding limits used for safety analyses are unaffected by the new shutdown CEA insertion limit, the safety limits associated with the fuel and the coolant system remain unchanged. The design basis on the control rods is to ensure the fuel safety limits are not exceeded and since they remain unchanged the design basis is still achieved. Therefore, there is no reduction in the margin of safety.

Therefore, APS has concluded that the proposed license amendment request does not involve a significant reduction in a margin of safety.

Based on the above, Arizona Public Service Company (APS) concludes that the proposed amendment 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.

5.2 Applicable Regulatory Requirements/Criteria

10 CFR 50, Appendix A, General Design Criteria (GDC) 10 states:

Criterion 10 – Reactor design. The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

Additionally, 10 CFR 50, Appendix A, GDC 26 states:

Criterion 26--Reactivity control system redundancy and capability. Two independent reactivity control systems of different design principles shall be provided. One of the systems shall use control rods, preferably including a positive means for inserting the rods, and shall be capable of reliably controlling reactivity changes to assure that under conditions of normal operation, including anticipated operational occurrences, and with appropriate margin for malfunctions such as stuck rods, specified acceptable fuel design limits are not exceeded. The second reactivity control system shall be capable of reliably controlling the rate of reactivity changes resulting from planned, normal power changes (including xenon burnout) to assure acceptable fuel design limits are not exceeded. One of the systems shall be capable of holding the reactor core subcritical under cold conditions.

This proposed change will further ensure that both of the criteria above are maintained.

6.0 ENVIRONMENTAL CONSIDERATION

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environment impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Enclosure 3

Marked-up Technical Specification Pages for LCO 3.1.6 – Shutdown Control Element Assembly (CEA) Insertion Limits

Pages:

3.1.6-1
3.1.6-2

3.1 REACTIVITY CONTROL SYSTEMS

3.1.6 Shutdown Control Element Assembly (CEA) Insertion Limits

LCO 3.1.6 All shutdown CEAs shall be withdrawn to ≥ ~~144.75~~ 147.75 inches.

Replace

APPLICABILITY: MODE 1,
MODE 2 with any regulating CEA not fully inserted.

----------NOTE----------
This LCO is not applicable while performing SR 3.1.5.3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One shutdown CEA not within limit.	A.1 Restore shutdown CEA~~(s)~~ to within limit.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours

Add

Delete

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.6.1	Verify each shutdown CEA is withdrawn ≥ ~~144.75~~ 147.75 inches.	12 hours

Replace

Enclosure 4

Retyped Technical Specification Pages for LCO 3.1.6 – Shutdown Control Element Assembly (CEA) Insertion Limits

Pages:

3.1.6-1
3.1.6-2

3.1 REACTIVITY CONTROL SYSTEMS

3.1.6 Shutdown Control Element Assembly (CEA) Insertion Limits

LCO 3.1.6 All shutdown CEAs shall be withdrawn to ≥ 147.75 inches.

APPLICABILITY: MODE 1,
MODE 2 with any regulating CEA not fully inserted.

----------NOTE----------
This LCO is not applicable while performing SR 3.1.5.3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One shutdown CEA not within limit.	A.1 Restore shutdown CEA to within limit.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.6.1	Verify each shutdown CEA is withdrawn ≥ 147.75 inches.	12 hours

Enclosure 5

Marked-up Technical Specification Bases Pages for Shutdown Control Element Assembly (CEA) Insertion Limits Change

Pages:

B 3.1.5-7
B 3.1.6-2
B 3.1.6-4
Insert page
B 3.3.3-10
B 3.3.3-14

BASES

ACTIONS

A.1 and A.2 (continued)

In both cases, a 2 hour time period is sufficient to:

a. Identify cause of a misaligned CEA;

b. Take appropriate corrective action to realign the CEAs; and

c. Minimize the effects of xenon redistribution.

The CEA must be returned to OPERABLE status within 2 hours. If a CEA misalignment results in the COLSS programs being declared INOPERABLE, refer to Section 3.2 Power Distribution Limits for applicable actions.

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.

Add the following:

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.

If only one CEA position indicator channel is OPERABLE, 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 ~~(Full Out)~~ when ~~withdrawn to at least 144.75 inches.~~

C.1

Delete

If a Requi[illegible] 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

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

Add Insert "A"

Accident analysis assumes that the shutdown CEAs are fully withdrawn any time the reactor is critical. This ensures that:

a. The minimum SDM is maintained; and

b. The potential effects of a CEA ejection accident are limited to acceptable limits.

~~CEAs are considered fully withdrawn at 144.75 inches, since this position places them outside the active region of the core.~~

On a reactor trip, all CEAs (shutdown CEAs and regulating CEAs), except the most reactive CEA, are assumed to insert into the core. The shutdown and regulating CEAs shall be at or above their insertion limits and available to insert the maximum amount of negative reactivity on a reactor trip signal. The regulating CEAs may be partially inserted in the core as allowed by LCO 3.1.7, "Regulating Control Element Assembly (CEA) Insertion Limits." The shutdown CEA insertion limit is established to ensure that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM (see LCO 3.1.2, "SHUTDOWN MARGIN (SDM) - Reactor Trip Breakers Closed") following a reactor trip from full power. The combination of regulating CEAs and shutdown CEAs (less the most reactive CEA, which is assumed to be fully withdrawn) is sufficient to take the reactor from full power conditions at rated temperature to zero power, and to maintain the required SDM at rated no load temperature (Ref. 3). The shutdown CEA insertion limit also limits the reactivity worth of an ejected shutdown CEA.

The acceptance criteria for addressing shutdown CEA as well as regulating CEA insertion limits and inoperability or misalignment are that:

a. There be no violation of:

1. specified acceptable fuel design limits, or

2. Reactor Coolant System pressure boundary damage integrity; and

(continued)

BASES (continued)

ACTIONS (continued)

A.1 (continued)

Completion Times in LCO 3.1.5, "Control Element Assembly (CEA) Alignment."

B.1

When Required Action A.1 cannot be met or 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.

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

Verification that the shutdown CEAs are within their insertion limits prior to an approach to criticality ensures that when the reactor is critical, or being taken critical, the shutdown CEAs (along with the regulating CEAs) will be available to shut down the reactor, and the required SDM will be maintained following a reactor trip. This SR and Frequency ensure that the shutdown CEAs are withdrawn before the regulating CEAs are withdrawn during a unit startup.

Add Insert B →

Since the shutdown CEAs are positioned manually by the control room operator, verification of shutdown CEA position at a Frequency of 12 hours is adequate to ensure that the shutdown CEAs are within their insertion limits. Also, the Frequency takes into account other information available to the operator in the control room for the purpose of monitoring the status of the shutdown CEAs.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10 and GDC 26.
2. 10 CFR 50.46.
3. UFSAR, Section 15.4.

ADD →

4. Calculation 13-JC-SF-0202

(continued)

Insert A

With the Shutdown CEAs at a fully withdrawn position (as defined in SR 3.1.6.1 Bases section), the requirements of LCO 3.1.6 are met and the assumptions made in the safety analyses are maintained.

Insert B

Shutdown CEAs are considered fully withdrawn when each shutdown CEA is positioned to meet one of the following conditions:

Condition 1:

- Pulse Counter ≥ 147.75 inches.

  and

- At least one Reed Switch Position Transmitter (RSPT) ≥ 145.25 inches.

OR

Condition 2:

- Upper Electrical Limit (UEL) position.

Condition 1 necessitates that the Pulse Counter and at least one of the two Reed Switch Position Transmitters (RSPTs) be available to verify the position of each shutdown CEA. The Pulse Counter is a very accurate position indication system but is not as reliable (i.e., slip rod) as the other position indicating systems. The RSPTs are very reliable but are not as accurate as the Pulse Counter indicating system. Therefore, requiring these two systems together will account for instrument inaccuracies and reliability issues associated with these position indicators (instrument inaccuracies and the acceptability of these indicator limits are detailed in Reference 4).

Additionally, a CEA at its UEL (Upper Electrical Limit) position alone provides an acceptable indication (accounting for inaccuracies) of CEA position to satisfy the condition for a CEA to be considered fully withdrawn. A CEA at its UEL position will be ≥ 147.75 inches withdrawn.

BASES

ACTIONS (Before CPC Upgrade) (continued)

B.1, B.2, B.3, B.4, B.5 and B.6 (continued)

The Required Actions are as follows:

B.1

Meeting the DNBR margin requirements of LCO 3.2.4, "DNBR" ensures that power level is within a conservative region of operation based on actual core conditions.

Insert the following:

(all CEAs meet the requirements of LCO 3.1.6 and 3.1.7)

B.2

This Action requires that the CEAs are maintained fully withdrawn ~~(≥ 144.75")~~, except as required for specified testing or flux control via group #5. This verification ensures that undesired perturbations in local fuel burnup are prevented. The Upper Electrical Limit (UEL) CEA reed switches provide an acceptable indication of CEA position.

B.3

The "RSPT/CEAC Inoperable" addressable constant in each of the OPERABLE CPCs is set to indicate that both CEACs are inoperable. This provides a conservative penalty factor to ensure that a conservative effective margin is maintained by the CPCs in the computation of DNBR and LPD trips.

B.4

The CEDMCS is placed and maintained in "STANDBY MODE," except during CEA motion permitted by Required Action B.2, to prevent inadvertent motion and possible misalignment of the CEAs.

B.5

A comprehensive set of comparison checks on individual CEAs within groups must be made within 4 hours. Verification that each CEA is within 6.6 inches of other CEAs in its group provides a check that no CEA has deviated from its proper position within the group.

B.6

The Reactor Power Cutback (RPCB) System must be disabled. This ensures that CEA position will not be affected by RPCB operation.

(continued)

BASES

ACTIONS

(After CPC Upgrade) (continued)

- Action B.2.1 through B.2.6 disable the Control Element Drive Mechanism Control System (CEDMCS), while providing increased assurance that CEA deviations are not occurring and informing all OPERABLE CPC channels, via a software flag, that both CEACs are failed. This will ensure that the large penalty factor associated with two CEAC failures will be applied to the CPC calculations. The penalty factor for two failed CEACs is sufficiently large that power must be maintained significantly < 100% RTP if CPC generated reactor trips are to be avoided. The Completion Time of 4 hours is adequate to accomplish these actions while minimizing risks.

The Required Actions are as follows:

B.1

Required Action B.1 provides for immediate declaration of affected CPC channel inoperability, and entry into Required Actions associated with LCO 3.3.1 for the DNBR-Low and LPD-High trip functions. This Required Action treats failure of both CEACs in one or more channels in a manner consistent with other RPS failures in one or more channels. Similarly, this Required Action permits immediate declaration of channel inoperability and entry in the Required Actions of LCO 3.3.1 if the Required Actions and associated Completion Times of Condition A are not met. Required Action B.1 might be the preferred action if only one CPC channel is affected. If the failure affects more than two CPC channels, required Actions B.2.1 through B2.6 would be preferable.

B.2.1

Insert the following:

(all CEAs meet the requirements of LCO 3.1.6 and 3.1.7)

Meeting the DNBR margin requirements of LCO 3.2.4, "DNBR" ensures that power level is within a conservative region of operation based on actual core conditions.

B.2.2

This Action requires that the CEAs are maintained fully withdrawn ~~(≥ 144.75")~~, except as required for specified testing or flux control via group #5. This verification ensures that undesired perturbations in local fuel burnup

continued)