



A subsidiary of Pinnacle West Capital Corporation

10 CFR 50.90

Palo Verde Nuclear  
Generating Station

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102-05889-DCM/DFS  
August 29, 2008

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

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2, and 3  
Docket Nos. STN 50-528, 50-529, and 50-530  
Request for Amendment to Technical Specification 5.6.5b, Core  
Operating Limits Report (COLR)**

Pursuant to 10 CFR 50.90, Arizona Public Service Company (APS) hereby requests 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 amendment is an administrative change that would modify Technical Specification (TS) 5.6.5, Core Operating Limits Report (COLR), by updating TS 5.6.5b to reflect the current analytical methods used to determine the core operating limits in PVNGS Units 1, 2, and 3. All of these methods have been previously reviewed and approved by the NRC.

Approval of the proposed amendment is requested by August 28, 2009. Once approved, the amendment shall be implemented within 90 days.

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

No commitments are being made to the NRC by this letter. If there are any questions or if additional information is needed, please contact Russell A. Stroud at (623) 393-5111.

A member of the **STARS** (Strategic Teaming and Resource Sharing) Alliance

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A001  
NRR

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

Executed on 8/29/08  
(Date)

Sincerely,



DCM/TNW/DFS/

Enclosure: Evaluation of the Proposed Amendment to TS 5.6.5.

cc:	E. E. Collins Jr.	NRC Region IV Regional Administrator
	M. T. Markley	NRC NRR Project Manager
	R. I. Treadway	NRC Senior Resident Inspector for PVNGS
	A. V. Godwin	Arizona Radiation Regulatory Agency (ARRA)
	T. Morales	Arizona Radiation Regulatory Agency (ARRA)

## **ENCLOSURE**

### **Evaluation of the Proposed Amendment to TS 5.6.5**

Subject: Request for Amendment to Technical Specification 5.6.5, Core Operating Limits Report

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#### **ATTACHMENTS:**

1. Technical Specification Page Markups
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## **1. SUMMARY DESCRIPTION**

This evaluation supports a request 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 administrative change would revise the Operating Licenses to modify Technical Specification (TS) 5.6.5, Core Operating Limits Report (COLR), by updating TS 5.6.5b to reflect the current analytical methods used to determine the core operating limits in PVNGS Units 1, 2, and 3. This change is being proposed to ensure that the current licensing basis methodologies are reflected accurately in the PVNGS Technical Specifications for Units 1, 2, and 3. This is an administrative change because all of the methodologies have previously been approved by the NRC and this change simply updates the TS list to reflect these previously approved methodologies.

## **2. DETAILED DESCRIPTION**

The proposed license amendment would revise Technical Specification Section 5.6.5b by adding the following methodologies:

- a. CENPD-188-A, "HERMITE, A Multi-Dimensional Space-Time Kinetics Code for PWR Transients." [Methodology for Specifications 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
- b. CENPD-206-P-A, "TORC Code, Verification and Simplified Modeling Methods." [Methodology for Specifications 3.1.1, Shutdown Margin – Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
- c. CEN-191-P, "CETOP-D Code Structures and Modeling Methods for Calvert Cliffs 1 and 2." NRC approval in "Safety Evaluation related to Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation, (September 29, 2003)." [Methodology for Specifications 3.1.1, Shutdown Margin – Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
- d. "Safety Evaluation related to Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation, (September 29, 2003)." [Methodology for Specifications 3.1.1, Shutdown Margin – Reactor Trip Breakers Open; 3.1.2,

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- Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.1.5, CEA Alignment; 3.1.7, Regulating CEA Insertion Limits; 3.1.8, Part Length or Part Strength CEA Insertion Limits; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; 3.2.5, Axial Shape Index; 3.3.12; Boron Dilution Alarm System (BDAS); and 3.9.1, Boron Concentration (Mode 6).]
- e. CEN-310-P-A, "CPC Methodology Changes for the CPC Improvement Program." [Methodology for Specifications 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
  - f. CENPD-183-A, "Loss of Flow, C-E Methods for Loss of Flow Analysis." [Methodology for Specifications 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
  - g. CENPD-382-P-A, "Methodology for Core Designs Containing Erbium Burnable Absorbers." [Methodology for Specifications 3.1.1, Shutdown Margin – Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; and 3.1.4, Moderator Temperature Coefficient.]
  - h. CEN-386-P-A, "Verification of the Acceptability of a 1-Pin Burnup Limit of 60 MWD/kgU for Combustion Engineering 16 x 16 PWR Fuel." [Methodology for Specifications 3.1.1, Shutdown Margin – Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; and 3.1.4, Moderator Temperature Coefficient.]

This change updates the list of methodologies used to determine core operating limits at PVNGS. The change clarifies the list of methodologies to include those currently being used for PVNGS Units 1, 2, and 3. All of these additional methodologies have been approved by the NRC as described in Section 3 below. In this update APS has followed the existing format in TS 5.6.5b by not referring to supplements, revision numbers and dates of issuance as approved for PVNGS in TS Amendment No. 140, dated March 12, 2002. (Agencywide Document Access and Management System [ADAMS] Accession No. ML020700710)

### **3. TECHNICAL EVALUATION**

A review of industry operating experience and the promulgation of the revised 10 CFR 50.59 rule and Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Evaluations," has identified a need to make an administrative change to update the list of approved methodologies in TS 5.6.5b. In the past the TS 5.6.5b list was considered a high level summary list and not all inclusive. As a result, for the methodologies being added to the TS 5.6.5b list by this request, although they were approved by the NRC and controlled as a part of the PVNGS licensing basis, APS did not update the TS 5.6.5b list.

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Methodologies a through d, g, and h listed below were previously reviewed and approved by the NRC in PVNGS license amendments. Methodologies e and f were generically approved by the NRC and are long standing methods (March 1986 and July 1975) used at PVNGS. Methodology e was incorporated as a part of the implementation of the NRC approved Core Protection Calculator (CPC) improvement program at PVNGS prior to operational cycle 2. Methodology f was included in the NSSS Vendor's license basis, the Combustion Engineering Standard Safety Analysis Report (CESSAR), which was incorporated by reference in the original issue of the PVNGS FSAR.

Core operating limits and parameters are established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and are documented in the COLR. Limits are established for Shutdown Margin - Reactor Trip Breakers Open; Shutdown Margin - Reactor Trip Breakers Closed; Moderator Temperature Coefficient beginning-of-life (BOL) and end-of-life (EOL) Limits; Boron Dilution Alarm System limits; control element assemblies (CEA) Alignment Limits; Regulating CEA Insertion Limits; Part Length or Part Strength CEA Insertion Limits; Linear Heat Rate; Azimuthal Power Tilt -  $T_q$ ; departure from nuclear boiling ratio (DNBR); Axial Shape Index; and Boron Concentration limits for Mode 6.

To establish these limits and parameters the methodologies contained in TS 5.6.5b are used. The methodologies being added to the TS 5.6.5b list are in addition to those currently included in the TS. Each of these methodologies has been approved for use by the NRC for the PVNGS units. Reference sections of the PVNGS UFSAR have also been provided where applicable in support of these methodologies. Although earlier citations can be identified approving several of the methods identified below, for convenience, the Unit 2 issuance of the license amendment on replacement of steam generators and uprated power operation is referenced as these methodologies were also approved as a part of that amendment. (See Proposed TS 5.6.5b, item 17) The methodologies that reference approval for Unit 2 above, were later also approved for Units 1 and 3 in license amendment number 157 for both units, dated November 16, 2005. (ADAMS Accession No. ML053130275)

- a. CENPD-188-A, "HERMITE, A Multi-Dimensional Space-Time Kinetics Code for PWR Transients," July 1976.

This methodology was approved in the safety evaluation (SE) contained in NRC letter dated September 29, 2003, "Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Uprated Power Operation." (ADAMS Accession No. ML032720538) (UFSAR 4.3, 4.4, 15.1, 15.3, Appendix 15D, Appendix 15E, and Table 1.6-3)

This methodology is used in the determination of shutdown margin with reactor trip breakers closed, moderator temperature coefficient, linear heat rate, azimuthal power tilt, DNBR, and axial shape index.

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- b. CENPD-206-P-A, "TORC Code, Verification and Simplified Modeling Methods," June 1981.

This methodology was approved in the SE contained in NRC letter dated September 29, 2003, "Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation." (ADAMS Accession No. ML032720538) (UFSAR 4.4, 15.0, 15.1, Appendix 15E and Table 1.6-3)

This methodology is used in the determination of shutdown margin with reactor trip breakers open, shutdown margin with reactor trip breakers closed, moderator temperature coefficient, linear heat rate, azimuthal power tilt, DNBR, and axial shape index.

- c. CEN-191-P, "CETOP-D Code Structures and Modeling Methods for Calvert Cliffs 1 and 2," December 1981.

This methodology was approved in the SE contained in NRC letter dated September 29, 2003, "Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation." (ADAMS Accession No. ML032720538) (UFSAR 15.0, 15.1, 15.4, and Appendix 15E)

This methodology is used in the determination of shutdown margin with reactor trip breakers open, shutdown margin with reactor trip breakers closed, moderator temperature coefficient, linear heat rate, azimuthal power tilt, DNBR, and axial shape index.

- d. "Safety Evaluation related to Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation," (September 29, 2003).

Various methodologies were provided in the PVNGS Unit 2 license amendment request on the replacement of steam generators and up-rated power operations submitted on December 21, 2001, and as supplemented by letters to the NRC dated March 13, August 27, August 29, September 4, September 6, October 11, November 21, December 10, December 23, 2002, and March 11, June 10, July 25, and August 22, 2003. These various methodologies were approved with the issuance of that license amendment identified above.

These methodologies are used in the determination of shutdown margin with reactor trip breakers open, shutdown margin with reactor trip breakers closed, moderator temperature coefficient, CEA alignment, regulating CEA insertion limits, part length or part strength CEA insertion limits, linear heat rate, azimuthal power tilt, DNBR, axial shape index, boron dilution alarm setpoints, and boron concentration limits in Mode 6. (ADAMS Accession No. ML032720538)

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- e. CEN-310-P-A, "CPC Methodology Changes for the CPC Improvement Program," April 1986.

Approved in "Acceptance for Referencing of Licensing Topical Report CEN-308-P and CEN 310-P," Letter from H. Berkow (NRC) to A.E. Scherer (CE), March 1986 (ADAMS Accession No. 8603180431). Implemented in all three units as a part of the CPC improvement program prior to operation cycle 2. (UFSAR 7.2 and 15.1)

This methodology is used in the determination of linear heat rate, azimuthal power tilt, DNBR, and axial shape index.

- f. CENPD-183-A, "Loss of Flow, C-E Methods for Loss of Flow Analysis," July 1975.

Approved in "Acceptance for Referencing of Licensed Topical Report CENPD-183," Letter from Harold Bernard (NRC) to A.E. Scherer (CE), May 12, 1982 (ADAMS Accession No. 8409240167). This was contained in the Combustion Engineering Standard Safety Analysis Report (CESSAR) which is part of the license basis for PVNGS. (UFSAR 15.1, 15.4, Appendix 15D, and Appendix 15E)

This methodology is used in the determination of linear heat rate, azimuthal power tilt, DNBR, and axial shape index.

- g. CENPD-382-P-A, "Methodology for Core Designs Containing Erbium Burnable Absorbers," August 1993.

Approved as PVNGS License Amendment 145, in letter from the NRC to APS, "Palo Verde Nuclear Generating Station, Units 1, 2, and 3 - Issuance of Amendments on Peak Fuel Centerline Temperature Safety Limit," December 2, 2002. (ADAMS Accession No. ML023040463) (UFSAR 4.2, 4.3, and 4.4)

This methodology is used in the determination of shutdown margin with reactor trip breakers open, shutdown margin with reactor trip breakers closed, and moderator temperature coefficient.

- h. CEN-386-P-A, "Verification of the Acceptability of a 1-Pin Burnup Limit of 60 MWD/kgU for Combustion Engineering 16 x 16 PWR Fuel," August 1992.

Approved as PVNGS License Amendment 145, in letter from the NRC to APS, "Palo Verde Nuclear Generating Station, Units 1, 2, and 3 - Issuance of Amendments on Peak Fuel Centerline Temperature Safety Limit," December 2, 2002. (ADAMS Accession No. ML023040463) (UFSAR 4.3, and 15.7)

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This methodology is used in the determination of shutdown margin with reactor trip breakers open, shutdown margin with reactor trip breakers closed, and moderator temperature coefficient.

These additional methodologies along with those already listed in the TS 5.6.5b are used at PVNGS for the development of the COLR limits. This proposed amendment updates the TS 5.6.5b list to provide an accurate and complete list of methodologies used at PVNGS.

#### **4. REGULATORY EVALUATION**

##### **4.1 Applicable Regulatory Requirements/Criteria**

###### 10 CFR 50.36(d)(5) Administrative Controls

This regulation requires that section 5.0 of the TS provide the administrative controls related to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner. TS 5.6.5 provides the requirement for determining and reporting of the core operating limits. Section b of TS 5.6.5 provides the list of analytical methods used to determine the core operating limits. This amendment updates the TS methodology list to include the other NRC reviewed and approved methodologies used at PVNGS to determine the COLR limits.

##### **4.2 Precedent**

The NRC has approved similar updates of the COLR methodologies list for other licensees including Salem Nuclear Generating Station, Unit Nos. 1 and 2 (ADAMS Accession No. ML072210499), Diablo Canyon, Units Nos. 1 and 2 (ADAMS Accession No. ML070350051), and North Anna Power Station, Unit Nos. 1 and 2 (ADAMS Accession No. ML062020005).

##### **4.3 No Significant Hazards Consideration Determination**

The proposed change would revise technical specification (TS) 5.6.5, Core Operating Limits Report (COLR), by updating TS 5.6.5b to reflect the current analytical methods used to determine the core operating limits in Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3. Each of the methods has been previously approved for use at PVNGS.

Arizona Public Service Company (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:

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

Response: No.

The proposed change to the list of methodologies used at PVNGS to determine the various COLR limits is an administrative change which updates the list in the TS to include NRC reviewed and approved COLR methodologies for PVNGS. It does not add or modify any previously used methodologies; it updates the list to include those already approved for use. This change does not make any physical changes to any structure, system or component, and it does not affect any design basis accident evaluation.

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

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 change to the list of methodologies used at PVNGS to determine the various COLR limits is an administrative change which updates the list in the TS to include all of the NRC reviewed and approved COLR methodologies for PVNGS. This change does not create any new failure modes or affect the interaction between any structure, system or component.

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 amendment involve a significant reduction in a margin of safety?

Response: No.

The proposed change to the list of methodologies used at PVNGS to determine the various COLR limits is an administrative change which updates the list in the TS to include all of the NRC reviewed and approved COLR methodologies for PVNGS. This change does not modify any margin of safety.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, APS concludes that the proposed amendment does not involve a 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.

#### **4.4 Conclusions**

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. ENVIRONMENTAL CONSIDERATION**

The proposed amendment is confined to changes to recordkeeping, reporting, or administrative procedures or requirements. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(10). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

### **6. REFERENCES**

- 6.1 NRC letter dated March 12, 2002, "Palo Verde Nuclear Generating Station, Units 1, 2, and 3 - Issuance of Amendments Re: Technical Specification 5.6.5b, Core Operating Limits Report (COLR) and Use of ZIRLO Cladding Material." (ADAMS Accession No. ML020700710)
- 6.2 NRC letter dated November 16, 2005, "Palo Verde Nuclear Generating Station, Units 1, 2, And 3 - Issuance Of Amendments Re: Replacement Of Steam Generators And Uprated Power Operations And Associated Administrative Changes." (ADAMS Accession No. ML053130275)
- 6.3 NRC letter dated September 29, 2003, "Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Uprated Power Operation." (ADAMS Accession No. ML032720538)
- 6.4 Letter from H. Berkow (NRC) to A.E. Scherer (CE), dated March 1986, "Acceptance for Referencing of Licensing Topical Report CEN-308-P and CEN 310-P." (ADAMS Accession No. 8603180431)
- 6.5 Letter from Harold Bernard (NRC) to A.E. Scherer (CE), dated May 12, 1982, "Acceptance for Referencing of Licensed Topical Report CENPD-183." (ADAMS Accession No. 8409240167)

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- 6.6 Letter from the NRC to APS, dated December 2, 2002, "Palo Verde Nuclear Generating Station, Units 1, 2, and 3 - Issuance of Amendments on Peak Fuel Centerline Temperature Safety Limit." (ADAMS Accession No. ML023040463)
- 6.7 Letter from R.B. Ennis (NRC) to W. Levis, PSEG Nuclear LLC, dated August 23, 2007, "Salem Nuclear Generating Station, Unit Nos. 1 and 2, Issuance of Amendments Re: Topical Report References in Technical Specification for Core Operating Limits Report." (ADAMS Accession No. ML072210499)
- 6.8 Letter from A. Wang (NRC) to J. S. Keenan, Pacific Gas and Electric Company, dated April 17, 2007, "Diablo Canyon Power Plant, Unit Nos. 1 and 2 - Issuance of Amendments Re: Technical Specification (TS) 3.4.1, 'Reactor Coolant System (RCS) Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits', and TS 5.6.5, 'Core Operating Limits Report (COLR)'." (ADAMS Accession No. ML070350051)
- 6.9 Letter from S. Monarque (NRC) to D. A. Christian, Virginia Electric and Power Company, dated July 18, 2006, "North Anna Power Station, Unit Nos. 1 and 2, Issuance of Amendments on Changes to Analytical Methodology and Core Operating Limits Report." (ADAMS Accession No. ML062020005)

**ENCLOSURE, ATTACHMENT 1**

**Technical Specification  
Page Markups**

**Pages:**

**5.6-5  
5.6-5A  
5.6-5B**

5.6 Reporting Requirements (continued)

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5.6.5 Core Operating Limits Report (COLR) (continued)

7. Letter: O.D. Parr (NRC) to F. M. Stern (CE), dated June 13, 1975 (NRC Staff Review of the Combustion Engineering ECCS Evaluation Model). NRC approval for: 5.6.5.b.6.
8. Letter: K. Kniel (NRC) to A. E. Scherer (CE), dated September 27, 1977 (Evaluation of Topical Reports CENPD-133, Supplement 3-P and CENPD-137, Supplement 1-P). NRC approval for 5.6.5.b.6.
9. "Fuel Rod Maximum Allowable Pressure," CEN-372-P-A, (Methodology for Specification 3.2.1, Linear Heat Rate).
10. Letter: A. C. Thadani (NRC) to A. E. Scherer (CE), dated April 10, 1990, ("Acceptance for Reference CE Topical Report CEN-372-P"). NRC approval for 5.6.5.b.9.
11. "Arizona Public Service Company PWR Reactor Physics Methodology Using CASMO-4/SIMULATE-3," [Methodology for Specifications 3.1.1, Shutdown Margin - Reactor Trip Breakers Open; 3.1.2, Shutdown Margin - Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.1.7, Regulating CEA Insertion Limits and 3.9.1, Boron Concentration (Mode 6)].
12. "Technical Manual for the CENTS Code," CE-NPD 282-P-A, Volumes 1-3, [Methodology for Specifications 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.1.5, CEA Alignment; 3.1.7, Regulating CEA Insertion Limits; 3.1.8, Part Length or Part Strength CEA Insertion Limits and 3.2.3, Azimuthal Power Tilt-  $T_q$ ].
13. CENPD-404-P-A, "Implementation of ZIRLO™ Cladding Material in CE Nuclear Power Fuel Assembly Designs.
14. CENPD-188-A, "HERMITE, A Multi-Dimensional Space-Time Kinetics Code for PWR Transients." [Methodology for Specifications 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
15. CENPD-206-P-A, "TORC Code, Verification and Simplified Modeling Methods." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat

(continued)

5.6 Reporting Requirements (continued)

Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]

16. CEN-191-P, "CETOP-D Code Structures and Modeling Methods for Calvert Cliffs 1 and 2." NRC approval in "Safety Evaluation Report related to Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation, (September 29, 2003)." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
17. "Safety Evaluation Report related to Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation, (September 29, 2003)." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.1.5, CEA Alignment; 3.1.7, Regulating CEA Insertion Limits; 3.1.8, Part Length or Part Strength CEA Insertion Limits; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index; 3.3.12, Boron Dilution Alarm System (BDAS); and 3.9.1, Boron Concentration (Mode 6).]
18. CEN-310-P-A, "CPC Methodology Changes for the CPC Improvement Program." [Methodology for Specifications 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
19. CENPD-183-A, "Loss of Flow, C-E Methods for Loss of Flow Analysis." [Methodology for Specifications 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
20. CENPD-382-P-A, "Methodology for Core Designs Containing Erbium Burnable Absorbers." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; and 3.1.4, Moderator Temperature Coefficient.]
21. CEN-386-P-A, "Verification of the Acceptability of a 1-Pin Burnup Limit of 60 MWD/kgU for Combustion Engineering 16 x 16 PWR Fuel." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; and 3.1.4, Moderator Temperature Coefficient.]

(continued)

5.6 Reporting Requirements (continued)

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- c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.
- d. The COLR, including any mid cycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

**ENCLOSURE, ATTACHMENT 2**

**Retyped Technical Specification Pages**

**Pages:**

**5.6-5**

**5.6-6**

**5.6-7**

**5.6-8**

5.6 Reporting Requirements

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5.6.5 Core Operating Limits Report (COLR) (continued)

7. Letter: O.D. Parr (NRC) to F. M. Stern (CE), dated June 13, 1975 (NRC Staff Review of the Combustion Engineering ECCS Evaluation Model). NRC approval for: 5.6.5.b.6.
8. Letter: K. Kniel (NRC) to A. E. Scherer (CE), dated September 27, 1977 (Evaluation of Topical Reports CENPD-133, Supplement 3-P and CENPD-137, Supplement 1-P). NRC approval for 5.6.5.b.6.
9. "Fuel Rod Maximum Allowable Pressure," CEN-372-P-A, (Methodology for Specification 3.2.1, Linear Heat Rate).
10. Letter: A. C. Thadani (NRC) to A. E. Scherer (CE), dated April 10, 1990, ("Acceptance for Reference CE Topical Report CEN-372-P"). NRC approval for 5.6.5.b.9.
11. "Arizona Public Service Company PWR Reactor Physics Methodology Using CASMO-4/SIMULATE-3," [Methodology for Specifications 3.1.1, Shutdown Margin - Reactor Trip Breakers Open; 3.1.2, Shutdown Margin - Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.1.7, Regulating CEA Insertion Limits and 3.9.1, Boron Concentration (Mode 6)].
12. "Technical Manual for the CENTS Code," CE-NPD 282-P-A, Volumes 1-3, [Methodology for Specifications 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.1.5, CEA Alignment; 3.1.7, Regulating CEA Insertion Limits; 3.1.8, Part Length or Part Strength CEA Insertion Limits and 3.2.3, Azimuthal Power Tilt-  $T_q$ ].
13. CENPD-404-P-A, "Implementation of ZIRLO™ Cladding Material in CE Nuclear Power Fuel Assembly Designs.
14. CENPD-188-A, "HERMITE, A Multi-Dimensional Space-Time Kinetics Code for PWR Transients." [Methodology for Specifications 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
15. CENPD-206-P-A, "TORC Code, Verification and Simplified Modeling Methods." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat

(continued)

5.6 Reporting Requirements

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5.6.5 Core Operating Limits Report (COLR) (continued)

- Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
16. CEN-191-P, "CETOP-D Code Structures and Modeling Methods for Calvert Cliffs 1 and 2." NRC approval in "Safety Evaluation Report related to Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation, (September 29, 2003)." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
  17. "Safety Evaluation related to Palo Verde Nuclear Generating Station, Unit 2 (PVNGS-2) Issuance of Amendment on Replacement of Steam Generators and Up-rated Power Operation, (September 29, 2003)." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; 3.1.4, Moderator Temperature Coefficient; 3.1.5, CEA Alignment; 3.1.7, Regulating CEA Insertion Limits; 3.1.8, Part Length or Part Strength CEA Insertion Limits; 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index; 3.3.12, Boron Dilution Alarm System (BDAS); and 3.9.1, Boron Concentration (Mode 6).]
  18. CEN-310-P-A, "CPC Methodology Changes for the CPC Improvement Program." [Methodology for Specifications 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
  19. CENPD-183-A, "Loss of Flow, C-E Methods for Loss of Flow Analysis." [Methodology for Specifications 3.2.1, Linear Heat Rate; 3.2.3, Azimuthal Power Tilt; 3.2.4, DNBR; and 3.2.5, Axial Shape Index.]
  20. CENPD-382-P-A, "Methodology for Core Designs Containing Erbium Burnable Absorbers." [Methodology for Specifications 3.1.1, Shutdown Margin-Reactor Trip Breakers Open; 3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; and 3.1.4, Moderator Temperature Coefficient.]

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5.6 Reporting Requirements

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5.6.5 Core Operating Limits Report (COLR) (continued)

21. CEN-386-P-A, "Verification of the Acceptability of a 1-Pin Burnup Limit of 60 MWD/kgU for Combustion Engineering 16 x 16 PWR Fuel." [Methodology for Specifications  
3.1.1, Shutdown Margin-Reactor Trip Breakers Open;  
3.1.2, Shutdown Margin-Reactor Trip Breakers Closed; and  
3.1.4, Moderator Temperature Coefficient.]
- c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.
- d. The COLR, including any mid cycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

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## 5.6 Reporting Requirements

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### 5.6.6 PAM Report

When a report is required by Condition B or G of LCO 3.3.10, "Post Accident Monitoring (PAM) Instrumentation," a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.

### 5.6.7 Tendon Surveillance Report

Any abnormal degradation of the containment structure detected during the tests required by the Pre-Stressed Concrete Containment Tendon Surveillance Program shall be reported to the NRC within 30 days. The report shall include a description of the tendon condition, the condition of the concrete (especially at tendon anchorages), the inspection procedures, the tolerances on cracking, and the corrective action taken.

### 5.6.8 Steam Generator Tube Inspection Report

A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.9, Steam Generator (SG) Program. The report shall include:

- a. The scope of inspections performed on each SG.
  - b. Active degradation mechanisms found.
  - c. Nondestructive examination techniques utilized for each degradation mechanism.
  - d. Location, orientation (if linear), and measured sizes (if available) of service induced indications.
  - e. Number of tubes plugged during the inspection outage for each active degradation mechanism.
  - f. Total number and percentage of tubes plugged to date.
  - g. The results of condition monitoring, including the results of tube pulls and in-situ testing.
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