Palo Verde
Nuclear Generating Station
5871 S. Wintersburg Road
Tonopah, AZ 85354

102-07474-TNW/MDD
April 6, 2017

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 50-528/529/530
Emergency Core Cooling System (ECCS) Performance Evaluation Models, 10 CFR 50.46(a)(3)(ii) Annual Report for Calendar Year 2016

Pursuant to 10 CFR 50.46(a)(3)(ii), Arizona Public Service Company (APS) is providing a summary of the cumulative effects on calculated peak cladding temperature (PCT) for PVNGS due to changes or errors in ECCS performance evaluation models.

There were no changes or errors that affected PCT in either the large break loss of coolant accident (LOCA) or the small break LOCA calculations for PVNGS Units 1, 2 and 3 for calendar year 2016. Additionally, because PCT is not calculated as part of the post LOCA long-term cooling (LTC) analysis, there are no changes or errors in the LTC models that affect PCT.

The enclosures provide a more detailed discussion of the absolute PCT effects in the Westinghouse (formerly Combustion Engineering) models for pressurized water reactors ECCS performance analyses in calendar year 2016 for PVNGS.

No commitments are being made to the NRC by this letter. Should you need further information regarding this submittal, please contact Michael D. DiLorenzo, Licensing Section Leader, at (623) 393-3495.

Sincerely,

Weber, Thomas N(Z00499)

Digitally signed by Weber, Thomas N(Z00499)
DN: cn=Weber, Thomas N(Z00499)
Reason: I am approving this document
Date: 2017.04.06 15:52:09 -07'00'

Thomas N. Weber
Department Leader, Regulatory Affairs

TNW/MDD/CJS

Enclosure 1: Summary of Cumulative Effects on Calculated Peak Clad Temperature (PCT) for PVNGS Due to Changes/Errors in Emergency Core Cooling System (ECCS) Performance Evaluation Models

Enclosure 2: Westinghouse Electric Company Letter, *Palo Verde Nuclear Generating Station Units 1, 2, and 3, 10 CFR 50.46 Annual Notification and Reporting for 2016,* letter number LTR-SATH-17-005, dated March 21, 2017

cc:

K. M. Kennedy	NRC Region IV Regional Administrator
S. P. Lingam	NRC NRR Project Manager for PVNGS
M. M. Watford	NRC NRR Project Manager
C. A. Peabody	NRC Senior Resident Inspector for PVNGS

Enclosure 1

Summary of Cumulative Effects on Calculated Peak Clad Temperature (PCT) for PVNGS Due to Changes/Errors in Emergency Core Cooling System (ECCS) Performance Evaluation Models

Enclosure 1
Summary of Cumulative Effects on Calculated PCT for PVNGS Due to Changes/Errors in ECCS Performance Evaluation Models

Table 1: Large Break LOCA Margin Summary Sheet for 2016

Plant Name: Palo Verde Nuclear Generating Station Units 1, 2, and 3

Utility Name: Arizona Public Service Company (APS)

Evaluation Model: Westinghouse (formerly Combustion Engineering) 1999 EM

Peak Clad Temperature: 2106 °F (analysis of record reported in PVNGS UFSAR Section 6.3.3)

			Net PCT Effect	Absolute PCT Effect
A.	Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported [a]	ΔPCT =	0 °F	0 °F
B.	10 CFR 50.46 Changes and Error Corrections - New for CY 2016			
	1. None Identified for Units 1, 2 and 3	ΔPCT =	+ 0 °F	+ 0 °F
C.	Absolute Sum of Cumulative 10 CFR 50.46 Changes and Error Corrections	ΔPCT =		+ 0 °F
D.	Licensing Basis PCT (Reported in UFSAR) + Cumulative PCT Assessments (Changes and Error Corrections)			2106 °F

Note: [a] PVNGS reanalyzed the Large Break LOCA event with an NRC approved Evaluation Model in 2009, as reported in Letter No. 102-06113, *30-Day Report Pursuant to 10 CFR 50.46(a)(3)(ii) and Submittal of Large Break Loss of Coolant Accident Reanalysis Results,* dated December 22, 2009 (NRC ADAMS Accession No. ML100040066). The reanalysis incorporated and corrected previously identified changes and errors, resetting the cumulative changes and error corrections that had previously been reported through the end of CY 2008 (NRC ADAMS Accession No. ML091810703).

The sum of the PCT from the most recent analysis of record (AOR) using an acceptable evaluation model, and the estimated cumulative effects of PCT impacts for changes and error corrections made since that AOR, remains less than 2200 °F.

Enclosure 1
Summary of Cumulative Effects on Calculated PCT for PVNGS Due to Changes/Errors in ECCS Performance Evaluation Models

Table 2: Small Break LOCA Margin Summary Sheet for 2016

Plant Name: Palo Verde Nuclear Generating Station Units 1, 2, and 3

Utility Name: Arizona Public Service Company (APS)

Evaluation Model: Westinghouse (formerly Combustion Engineering) S2M

Peak Clad Temperature: 1618°F (analysis of record reported in PVNGS UFSAR Section 6.3.3)

			Net PCT Effect	Absolute PCT Effect
A.	Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	ΔPCT =	+ 0 °F	+ 0 °F
B.	10 CFR 50.46 Changes and Error Corrections - New for CY 2016			
	1. None Identified	ΔPCT =	+ 0 °F	+ 0 °F
C.	Absolute Sum of Cumulative 10 CFR 50.46 Changes and Error Corrections	ΔPCT =		+ 0 °F
D.	Licensing Basis PCT (Reported in UFSAR) + Cumulative PCT Assessments (Changes and Error Corrections)			1618 °F

The sum of the PCT from the most recent AOR using an acceptable evaluation model, and the estimated cumulative effects of PCT impacts for changes and error corrections made since that AOR, remains less than 2200 °F.

Enclosure 2

Westinghouse Electric Company Letter, *Palo Verde Nuclear Generating Station Units 1, 2, and 3, 10 CFR 50.46 Annual Notification and Reporting for 2016,* letter number LTR-SATH-17-005, dated March 21, 2017

Westinghouse Electric Company
20 International Drive
Windsor, Connecticut 06095
USA

Direct tel: (860) 731-6426
e-mail: atkinsdw@westinghouse.com

Our ref: LTR-SATH-17-005, Rev.0

March 21, 2017

Palo Verde Nuclear Generating Station Units 1, 2, and 3
10 CFR 50.46 Annual Notification and Reporting for 2016

Dear Sir or Madam:

This letter provides 10 CFR 50.46 reporting information pertaining to the Westinghouse Electric Company emergency core cooling system (ECCS) performance evaluation models (EMs) and their application to your plants for calendar year 2016.

There were no 2016 changes, error corrections, or enhancements to the 1999 EM, which is the EM used in your plants' large break loss of coolant accident (LBLOCA) ECCS performance analysis. Additionally, there were no 2016 changes, error corrections, or enhancements to the Supplement 2 evaluation model (S2M), which is the EM used in your plants' small break loss of coolant accident (SBLOCA) ECCS performance analysis.

The peak cladding temperature (PCT) rackup sheets, along with your plants' specific evaluation text, are enclosed in the attachment. The rackup sheets identify the PCTs of the ECCS performance analyses of record (AOR) for your plants and the PCT assessments associated with the AOR through the end of calendar year 2016. There are no PCT changes on the Units 1, 2 and 3 LBLOCA AOR and Units 1, 2 and 3 SBLOCA AORs for 2016.

There was a cumulative sum of the absolute magnitudes of PCT changes of 4 °F for the Unit 3 Cycle 18 LBLOCA AOR operation for 2015 due to inclusion of NGF LUAs. Cycle 19 also operated during 2015 and 2016 without the inclusion of NGF LUAs and therefore does not have the cumulative sum of the absolute magnitudes of PCT changes of 4 °F. Therefore, the LBLOCA cumulative sum for all three units is 0 °F and the SBLOCA cumulative sum for all three units is 0 °F.

This letter is provided for your use in making a determination relative to the reporting requirements of 10 CFR 50.46. The information provided in this letter was prepared in accordance with Westinghouse's Quality Management System.

Electronically approved records are authenticated in the electronic document management system.

Author: *(Electronically Approved)**
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John Ghergurovich
Manager, SATH

RACKUP SharePoint Check:

EMs applicable to Palo Verde Nuclear Generating Station Units 1, 2, and 3:
Appendix K Small Break – S2M
Appendix K Large Break – 1999 EM

2016 Issues

Transmittal Letter	Issue Description
None	N/A

Attachment: LBLOCA and SBLOCA Rackup Sheets

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Large Break

Plant Name: Palo Verde Nuclear Generating Station Unit 1
Utility Name: Arizona Public Service
Revision Date: 3/2/2017

Analysis Information

EM:	1999 EM	**Analysis Date:**	8/31/2009	**Limiting Break Size:**	0.6 DEG/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR	13.1		

Notes: 1. Plant Configuration: Rated Core Power = 3990 MWt, Replacement Steam Generators.

2. Fuel Design: 16x16 System 80 with ZIRLO™ cladding, value-added pellets, and erbia burnable absorbers.

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**2106**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2016 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 2106		

* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

References:

1. CVER-09-62, "Analyis of Record for Large Break LOCA ECCS Performance Analysis Including Replacement Steam Generators and Simplified Head Implementation for PVNGS Units 1, 2, and 3," August 2009.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

Plant Name: Palo Verde Nuclear Generating Station Unit 1
Utility Name: Arizona Public Service
Revision Date: 3/2/2017

Analysis Information

EM:	S2M	**Analysis Date:**	3/22/2002	**Limiting Break Size:**	0.05 sq ft/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR	13.5		

Notes: 1. Plant Configuration: Rated Core Power = 3990 MWt, Replacement Steam Generators.

2. Fuel Design: 16x16 System 80 with ZIRLO™ cladding, value-added pellets, and erbia burnable absorbers.

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**1618**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2016 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1618		

* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

References:

1. A-PV-FE-0149, Rev. 001, "Palo Verde Units 1, 2 and 3 S2M Bounding SBLOCA ECCS Performance Analysis," March 2002.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Large Break

Plant Name: Palo Verde Nuclear Generating Station Unit 2
Utility Name: Arizona Public Service
Revision Date: 3/2/2017

Analysis Information

EM:	1999 EM	**Analysis Date:**	8/31/2009	**Limiting Break Size:**	0.6 DEG/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR	13.1		

Notes: 1. Plant Configuration: Rated Core Power = 3990 MWt, Replacement Steam Generators.

2. Fuel Design: 16x16 System 80 with ZIRLO™ cladding, value-added pellets, and erbia burnable absorbers.

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**2106**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2016 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 2106		

* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

References:

1. CVER-09-62, "Analysis of Record for Large Break LOCA ECCS Performance Analysis Including Replacement Steam Generators and Simplified Head Implementation for PVNGS Units 1, 2, and 3," August 2009.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

Plant Name: Palo Verde Nuclear Generating Station Unit 2
Utility Name: Arizona Public Service
Revision Date: 3/2/2017

Analysis Information

EM:	S2M	**Analysis Date:**	3/22/2002	**Limiting Break Size:**	0.05 sq ft/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR	13.5		

Notes: 1. Plant Configuration: Rated Core Power = 3990 MWt, Replacement Steam Generators.

2. Fuel Design: 16x16 System 80 with ZIRLO™ cladding, value-added pellets, and erbia burnable absorbers.

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**1618**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2016 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1618		

* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

References:

1. A-PV-FE-0149, Rev. 001, "Palo Verde Units 1, 2 and 3 S2M Bounding SBLOCA ECCS Performance Analysis," March 2002.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Large Break

Plant Name: Palo Verde Nuclear Generating Station Unit 3
Utility Name: Arizona Public Service
Revision Date: 3/2/2017

Analysis Information

EM:	1999 EM	**Analysis Date:**	8/31/2009	**Limiting Break Size:**	0.6 DEG/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR	13.1		

Notes: 1. Plant Configuration: Rated Core Power = 3990 MWt, Replacement Steam Generators.

2. Fuel Design: 16x16 System 80 with ZIRLO™ cladding, value-added pellets, and erbia burnable absorbers.

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**2106**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2016 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 2106		

* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

References:

1. CVER-09-62, "Analysis of Record for Large Break LOCA ECCS Performance Analysis Including Replacement Steam Generators and Simplified Head Implementation for PVNGS Units 1, 2, and 3," August 2009.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

Plant Name: Palo Verde Nuclear Generating Station Unit 3
Utility Name: Arizona Public Service
Revision Date: 3/2/2017

Analysis Information

EM:	S2M	**Analysis Date:**	3/22/2002	**Limiting Break Size:**	0.05 sq ft/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR	13.5		

Notes: 1. Plant Configuration: Rated Core Power = 3990 MWt, Replacement Steam Generators.

2. Fuel Design: 16x16 System 80 with ZIRLO™ cladding, value-added pellets, and erbia burnable absorbers.

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**1618**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2016 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1618		

* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

References:

1. A-PV-FE-0149, Rev. 001, "Palo Verde Units 1, 2, and 3 S2M Bounding SBLOCA ECCS Performance Analysis," March 2002.

Notes:

None