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Palo Verde
Nuclear Generating Station
5801 S. Wintersburg Road
Tonopah, AZ 85354

102-06690-TNW/RKR
April 17, 2013

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 2012

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 clad temperature (PCT) for PVNGS due to changes or errors in ECCS performance evaluation models. There were no new errors or changes for calendar year (CY) 2012 that affected the PVNGS large break loss of coolant accident (LOCA) peak clad temperature (PCT) or the small break LOCA PCT calculations. 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 LOCA analysis in the Westinghouse (formerly Combustion Engineering) models for Pressurized Water Reactors (PWRs) ECCS performance analysis in calendar year 2012.

No commitments are being made to the NRC by this letter. Should you need further information regarding this submittal, please contact Mr. Robert K. Roehler, Licensing Section Leader, at (623) 393-5241.

Sincerely,

Thomas N. Weber

Thomas N. Weber
Department Leader, Regulatory Affairs

TNW/RKR/hsc

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NRR

Enclosures:

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

2. Westinghouse Electric Company Letter, *Palo Verde Nuclear Generating Station Units 1, 2, and 3 10 CFR 50.46 Annual Notification and Reporting for 2012*, letter number LTR-LAM-13-21, dated March 22, 2013

cc:

A. T. Howell III	NRC Region IV Regional Administrator
J. K. Rankin	NRC NRR Project Manager for PVNGS
M. A. Brown	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 ECCS Performance Evaluation Models

Table 1: Large Break LOCA Margin Summary Sheet for 2012

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

Utility Name: Arizona Public Service Company

Evaluation Model: Westinghouse (formerly Combustion Engineering) 1999 EM

Peak Clad Temperature: 2106°F (Analysis-of-Record reported in PVNGS UFSAR Section 6.3)

			Net PCT Effect	Absolute PCT Effect
A.	Cumulative 10 CFR 50.46 Changes and Error Corrections – Previously Reported[a]	ΔPCT =	+ 4°F (Units 1 and 3 Only)	+ 4°F (Units 1 and 3 Only)
B.	10 CFR 50.46 Changes and Error Corrections – New for CY 2012			
	1. None Identified	ΔPCT =	+ 0°F	+ 0°F
C.	Absolute Sum of Cumulative 10 CFR 50.46 Changes and Error Corrections	ΔPCT =		+ 4°F (Unit 1) + 0°F (Unit 2) + 4°F (Unit 3)
D.	Licensing Basis PCT (Reported in UFSAR) + Cumulative PCT Assessments (Changes and Error Corrections)			2110°F (Unit 1) 2106°F (Unit 2) 2110°F (Unit 3)

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.

Table 2: Small Break LOCA Margin Summary Sheet for 2012

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

Utility Name: Arizona Public Service Company

Evaluation Model: Westinghouse (formerly Combustion Engineering) S2M

Peak Clad Temperature: 1618°F (Analysis-of-Record reported in PVNGS UFSAR Section 6.3)

			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 2012			
	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 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 2

Westinghouse Electric Company Letter,
Palo Verde Nuclear Generating Station Units 1, 2, and 3
***10 CFR 50.46 Annual Notification and Reporting for 2012*, letter number LTR-LAM-13-21, dated March 22, 2013**

Westinghouse Electric Company
Nuclear Services
20 International Drive
Windsor, Connecticut 06095
USA

Direct tel: (860) 731-6734
Direct fax: (860) 731-1196
e-mail: maguiraj@westinghouse.com

Our ref: LTR-LAM-13-21, Rev. 0
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March 22, 2013

Palo Verde Nuclear Generating Station Units 1, 2 and 3
10 CFR 50.46 Annual Notification and Reporting for 2012

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 2012.

There were no changes, error corrections or enhancements to the 1999 Evaluation Model (EM), which is the EM used in your plants' Large Break Loss-of-Coolant Accident (LBLOCA) ECCS performance analysis in calendar year 2012. In addition, there were no 2012 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, which were obtained from the Westinghouse 10 CFR 50.46 Rackup database, identify the PCTs of the ECCS performance Analyses of Record (AORs) for your plants and the PCT assessments associated with the AORs through the end of calendar year 2012.

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 (QMS).

On December 16, 2011, the Nuclear Regulatory Commission issued a request for information to Westinghouse regarding the evaluation of fuel thermal conductivity degradation (TCD) using Westinghouse codes and methods. Westinghouse provided a discussion of TCD impact on Large and Small Break LOCA for CE NSSS designs in Reference 1. It was concluded that conservatisms in the FATES models, and the application methodology of the FATES code, compensate for the effects of TCD. The conclusions presented in Reference 1 continue to apply.

Reference:

1. Letter from J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Westinghouse Response to December 16, 2011 NRC Letter Regarding Nuclear Fuel Thermal Conductivity Degradation (TAC No. ME5186) (Proprietary)," LTR-NRC-12-18, February 17, 2012.

Author: (Electronically Approved)*
A. J. Maguire
LOCA Analysis & Methods

Verifier: (Electronically Approved)*
D. W. Atkins
LOCA Analysis & Methods

Approved: (Electronically Approved)*
P. R. Kottas for J. Ghergurovich
Manager, LOCA Analysis & Methods

Attachment

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

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: 2/28/2013

Analysis Information

EM:	1999 EM	**Analysis Date:**	8/31/2009	**Limiting Break Size:**	0.6 DEG/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR (kW/ft):	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 . Evaluation for the Insertion of 8 AREVA LTAs into Palo Verde	4	2	
C. 2012 ECCS MODEL ASSESSMENTS			
1 . None	0		
D. OTHER*			
1 . None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 2110		

* 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.

2 . LTR-OA-08-106, "10 CFR 50.46 Report for PVNGS Units 1, 2, and 3 for an Evaluation for the Insertion of 8 AREVA LTAs and the Correction of an Error in the Steam Generator Economizer Input," December 2008.

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: 2/28/2013

Analysis Information

EM:	S2M	**Analysis Date:**	3/22/2002	**Limiting Break Size:**	0.05 sq ft/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR (kW/ft):	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 . Evaluation for the Insertion of 8 AREVA LTAs Into Palo Verde	0	2	
2 . Evaluation of the Simplified Head Assembly	0	3	
C. 2012 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.

2 . LTR-OA-08-106, "10 CFR 50.46 Report for PVNGS Units 1, 2, and 3 for an Evaluation for the Insertion of 8 AREVA LTAs and the Correction of an Error in the Steam Generator Economizer Input," December 2008.

3 . CVER-09-25, "Interim Evaluation of the Effects of SHA Implementation on PVNGS Units 1, 2, and 3 ECCS Performance," April 2009.

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: 2/28/2013

Analysis Information

EM:	1999 EM	**Analysis Date:**	8/31/2009	**Limiting Break Size:**	0.6 DEG/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR (kW/ft):	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. 2012 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: 2/28/2013

Analysis Information

EM:	S2M	**Analysis Date:**	3/22/2002	**Limiting Break Size:**	0.05 sq ft/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR (kW/ft):	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 . Evaluation of the Simplified Head Assembly	0	2	
C. 2012 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.

2 . CVER-09-25, "Interim Evaluation of the Effects of SHA Implementation on PVNGS Units 1, 2, and 3 ECCS Performance," April 2009.

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: 2/28/2013

Analysis Information

EM:	1999 EM	**Analysis Date:**	8/31/2009	**Limiting Break Size:**	0.6 DEG/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR (kW/ft):	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 . Evaluation for the insertion of up to 8 NGF LUAs	4	2	
C. 2012 ECCS MODEL ASSESSMENTS			
1 . None	0		
D. OTHER*			
1 . None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 2110		

* 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.

2 . WCAP-17188-P, Rev. 2, "Palo Verde NGF LUA Engineering Report," March 2011.

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: 2/28/2013

Analysis Information

EM:	S2M	**Analysis Date:**	3/22/2002	**Limiting Break Size:**	0.05 sq ft/PD
Fuel:	16x16 System 80	**SGTP (%):**	10		
		PLHGR (kW/ft):	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 . Evaluation of the Simplified Head Assembly	0	2	
2 . Evaluation for the insertion of up to 8 NGF LUAs	0	3	
C. 2012 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.

2 . CVER-09-25, "Interim Evaluation of the Effects of SHA Implementation on PVNGS Units 1, 2, and 3 ECCS Performance," April 2009.

3 . WCAP-17188-P, Rev. 2, "Palo Verde NGF LUA Engineering Report," March 2011.

Notes:

None

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

2012 Issues

Transmittal Letter	Issue Description
None	