Progress Energy

Serial: NPD-NRC-2010-024
March 22, 2010

10 CFR 50.46

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

SHEARON HARRIS NUCLEAR POWER PLANT, UNITS 2 AND 3
DOCKET NOS. 52-022 AND 52-023
LEVY NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 52-029 AND 52-030
10 CFR 50.46 ANNUAL REPORT FOR THE AP1000 STANDARD PLANT DESIGN

Reference: 1) Letter from Robert Sisk, Westinghouse Electric Company (WEC), to the Nuclear Regulatory Commission (NRC), 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design, dated March 18, 2010

Ladies and Gentlemen:

The purpose of this letter is to provide a required report in accordance with 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors."

In the referenced letter, WEC submitted a report to the NRC stating no change in the calculated peak cladding temperature and the Annual Report as required by 10 CFR 50.46. A design certification holder is required to report to the NRC in accordance with 10 CFR 50.46(a)(3). This same regulation requires a similar report from any combined license (COL) applicant if the applicant is also affected by the change. The Progress Energy Carolinas application for Shearon Harris Nuclear Power Plant, Units 2 and 3, and the Progress Energy Florida Levy Nuclear Plant, Units 1 and 2, incorporate by reference the AP1000 design certification document (DCD) and thus, also utilize the peak cladding temperature calculations performed by WEC. As such, the WEC report is also applicable to the Harris and Levy AP1000 COL applications.

Attachment 1 of the Referenced Annual Report Letter contains the WEC analysis summary as required by 10 CFR 50.46. The WEC analysis is also applicable to the Harris and Levy applications.

If you have any further questions, or need additional information, please contact me at (919) 546-6992.

Sincerely,

Robert Kitchen
Manager-Nuclear Plant Licensing
Nuclear Plant Development

cc : U.S. NRC Region II, Regional Administrator
U.S. NRC Resident Inspector SHNPP Unit 1
Mr. Brian Anderson, U.S. NRC Project Manager
Mr. Brian Hughes, U.S. NRC Project Manager

Progress Energy Carolinas, Inc.
P.O. Box 1551
Raleigh, NC 27602

D063
D084
D094
NRO

Westinghouse Electric Company
Nuclear Power Plants
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355
USA

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, D.C. 20555

Direct tel: 412-374-6206
Direct fax: 724-940-8505
e-mail: sisklrb@westinghouse.com

Your ref: Docket No. 52-006
Our ref: DCP_NRC_002824

March 18, 2010

Subject: 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design

Pursuant to 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water reactors," Westinghouse Electric Company is submitting this report to document any emergency core cooling system (ECCS) evaluation model changes or errors that affect the temperature calculation for the AP1000 Standard Plant Design. There are no additional model changes or errors that affect the temperature calculation to the items reported in the last 10 CFR 50.46 report documented in letter DCP/NRC2373, dated February 13, 2009.

The limiting Transient for the AP1000 Certified Design as documented in the AP1000 DCD (Revision 15, dated December 8, 2005) is the Best Estimate Large Break Loss-of-Coolant Accident (BELOCA). The peak cladding temperature (PCT) is 2158°F for the BELOCA and does not exceed the 10 CFR 50.46 (b)(l) acceptance criterion of 2200°F. The summary of the updated PCT margin allocations and their bases are provided in Attachment 1. Westinghouse submitted the initial 10 CFR 50.46 report for the AP1000 Standard Plant Design in letter DCP/NRC2074, dated February 15, 2008. The limiting peak clad temperature of 2158°F for the BELOCA has not changed since the issuance of DCP/NRC2074.

In DCP/NRC2074 Westinghouse provided a schedule as required by 10 CFR 50.46 (a)(3)(iii) for the reanalysis of Best Estimate LOCA using the Automated Statistical Treatment of Uncertainty Method (ASTRUM) methodology. In accordance with the reanalysis schedule Westinghouse submitted the reanalysis of Best Estimate LOCA using the ASTRUM methodology to the NRC in letter DCP/NRC2182, dated June 30, 2008. Westinghouse included the reanalysis in Revision 17 of the DCD which was submitted to the NRC in letter DCP/NRC2266 dated September 22, 2008. As a result of Requests for Additional Information received from the NRC in November, 2008, Westinghouse revised the report documenting the reanalysis for Best Estimate LOCA using the ASTRUM methodology and resubmitted the report to the NRC in letter DCP/NRC2368, dated February 3, 2009. Attachment 1 also contains updated PCT margin allocations and their bases for the reanalysis of Best Estimate LOCA using ASTRUM.

The information included in this letter is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and Design Certification Amendment Application. By copy of this letter, COL Applicants are hereby notified of any changes or errors in the AP1000 Standard Design PCT as required by 10 CFR 50.46(a)(3)(iii).

Questions or requests for additional information related to content and preparation of this information should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of letter.

Very truly yours,

D. A. Lindgren /FOR

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Attachment

1. 10 CFR 50.46 Report

cc:	D. Jaffe	-	U.S. NRC	1E
	E. McKenna	-	U.S. NRC	1E
	S. K. Mitra	-	U.S. NRC	1E
	T. Spink	-	TVA	1E
	P. Hastings	-	Duke Power	1E
	R. Kitchen	-	Progress Energy	1E
	A. Monroe	-	SCANA	1E
	P. Jacobs	-	Florida Power & Light	1E
	C. Pierce	-	Southern Company	1E
	E. Schmiech	-	Westinghouse	1E
	G. Zinke	-	NuStart/Entergy	1E
	R. Grumbir	-	NuStart	1E
	D. Behnke	-	Westinghouse	1E
	J. Monahan	-	Westinghouse	1E

ATTACHMENT 1

10 CFR 50.46 Report

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: AP1000
Utility Name: Westinghouse Nuclear Power Plants

Revision Date: 1/27/10

Composite

Analysis Information

EM:	CQD-AP (1998)	**Analysis Date:**	9/13/02	**Limiting Break Size:**	Guillotine
FQ:	2.6	**FdH:**	1.65		
Fuel:	RFA	**SGTP (%):**	0		
Notes:	Bounds 10% SGTP				

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**2124**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1 . HOTSPOT Fuel Relocation Error	70		(a)
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1 . None	0		
C. 2009 ECCS MODEL ASSESSMENTS			
1 . None	0		
D. OTHER			
1 . Re-evaluation for Plant Design Changes and Pressurizer Surge Line Resistance Correction	-36		(b)
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 2158		

References:

1 . AP1000 Certified Design as documented in the AP1000 DCD (Revision 15, dated December 8, 2005)

Notes:

(a) In the axial node where burst is predicted to occur, a fuel relocation model in HOTSPOT is used to account for the likelihood that additional fuel pellet fragments above that elevation may settle into the burst region. It was discovered that the effect of fuel relocation on local linear heat rate was being calculated, but then cancelled out later in the coding.

(b) In the AP1000 WCOBRA/TRAC model used in the analysis of record, there was an error in the pressurizer surge-line resistance. Due to an analyst input error, the resistance at the surge-line/pressurizer interface was inadvertently set too high. After the error was discovered, the large-break LOCA WCOBRA/TRAC model was updated to correct the erroneous resistance and to incorporate plant-design changes since the calculations were performed for the analysis of record. The resistance correction and plant-design changes were evaluated together and individual PCT impacts were not assessed. With the updated model, the reference transient was determined, the global model matrix of runs was performed, and the MONTECF uncertainty calculations were completed. The net effects of the input updates were a 36°F PCT benefit in reflood, and a 44°F PCT benefit in blowdown assessed against the analysis of record.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: AP1000
Utility Name: Westinghouse Nuclear Power Plants

Revision Date: 1/27/10

Reflood 1

Analysis Information

EM:	CQD-AP (1998)	**Analysis Date:**	9/13/02	**Limiting Break Size:**	Guillotine
FQ:	2.6	**FdH:**	1.65		
Fuel:	RFA	**SGTP (%):**	0		
Notes:	Bounds 10% SGTP				

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**2124**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1 . HOTSPOT Fuel Relocation Error	70		(a)
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1 . None	0		
C. 2009 ECCS MODEL ASSESSMENTS			
1 . None	0		
D. OTHER			
1 . Re-evaluation for Plant Design Changes and Pressurizer Surge Line Resistance Correction	-36		(b)
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 2158		

References:

1 . AP1000 Certified Design as documented in the AP1000 DCD (Revision 15, dated December 8, 2005)

Notes:

(a) In the axial node where burst is predicted to occur, a fuel relocation model in HOTSPOT is used to account for the likelihood that additional fuel pellet fragments above that elevation may settle into the burst region. It was discovered that the effect of fuel relocation on local linear heat rate was being calculated, but then cancelled out later in the coding.

(b) In the AP1000 WCOBRA/TRAC model used in the analysis of record, there was an error in the pressurizer surge-line resistance. Due to an analyst input error, the resistance at the surge-line/pressurizer interface was inadvertently set too high. After the error was discovered, the large-break LOCA WCOBRA/TRAC model was updated to correct the erroneous resistance and to incorporate plant-design changes since the calculations were performed for the analysis of record. The resistance correction and plant-design changes were evaluated together and individual PCT impacts were not assessed. With the updated model, the reference transient was determined, the global model matrix of runs was performed, and the MONTECF uncertainty calculations were completed. The net effects of the input updates were a 36°F PCT benefit in reflood, and a 44°F PCT benefit in blowdown assessed against the analysis of record.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: AP1000
Utility Name: Westinghouse Nuclear Power Plants

Revision Date: 1/27/10

Blowdown

Analysis Information

EM:	CQD-AP (1998)	**Analysis Date:**	9/13/02	**Limiting Break Size:**	Guillotine
FQ:	2.6	**FdH:**	1.65		
Fuel:	RFA	**SGTP (%):**	0		
Notes:	Bounds 10% SGTP				

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1944	1	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1 . HOTSPOT Fuel Relocation Error	0		(a)
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1 . None	0		
C. 2009 ECCS MODEL ASSESSMENTS			
1 . None	0		
D. OTHER			
1 . Re-evaluation for Plant Design Changes and Pressurizer Surge Line Resistance Correction	-44		(b)
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1900		

References:

1 . AP1000 Certified Design as documented in the AP1000 DCD (Revision 15, dated December 8, 2005)

Notes:

(a) In the axial node where burst is predicted to occur, a fuel relocation model in HOTSPOT is used to account for the likelihood that additional fuel pellet fragments above that elevation may settle into the burst region. It was discovered that the effect of fuel relocation on local linear heat rate was being calculated, but then cancelled out later in the coding.

(b) In the AP1000 WCOBRA/TRAC model used in the analysis of record, there was an error in the pressurizer surge-line resistance. Due to an analyst input error, the resistance at the surge-line/pressurizer interface was inadvertently set too high. After the error was discovered, the large-break LOCA WCOBRA/TRAC model was updated to correct the erroneous resistance and to incorporate plant-design changes since the calculations were performed for the analysis of record. The resistance correction and plant-design changes were evaluated together and individual PCT impacts were not assessed. With the updated model, the reference transient was determined, the global model matrix of runs was performed, and the MONTECF uncertainty calculations were completed. The net effects of the input updates were a 36°F PCT benefit in reflood, and a 44°F PCT benefit in blowdown assessed against the analysis of record.

Westinghouse LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break

Future

Plant Name: AP1000
Utility Name: Westinghouse Nuclear Power Plants
Revision Date: 1/27/10

Analysis Information

EM:	ASTRUM (2004)	**Analysis Date:**	5/9/08	**Limiting Break Size:**	Split
FQ:	2.6	**FdH:**	1.75		
Fuel:	RFA	**SGTP (%):**	10		

Notes:

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**1837**	**1**	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1 . None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1 . None	0		
C. 2009 ECCS MODEL ASSESSMENTS			
1 . None	0		
D. OTHER			
1 . None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1837		

References:

1 . APP-GW-GLE-026, Rev. 1 "Application of ASTRUM Methodology for Best-Estimate Large-Break Loss-of-Coolant Accident Analysis for AP1000," January 2009.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

Plant Name: AP1000
Utility Name: Westinghouse Nuclear Power Plants
Revision Date: 1/27/10

Analysis Information

EM:	NOTRUMP	**Analysis Date:**	8/23/02	**Limiting Break Size:**	10 Inch
FQ:	2.6	**FdH:**	1.65		
Fuel:	RFA	**SGTP (%):**	10		

Notes:

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**1370**	**1**	**(a)**
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1 . None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1 . None	0		
C. 2009 ECCS MODEL ASSESSMENTS			
1 . None	0		
D. OTHER			
1 . None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1370		

References:

1 . AP1000 Certified Design as documented in the AP1000 DCD (Revision 15, dated December 8, 2005)

Notes:

(a) This is an adiabatic heat-up calculated PCT.