Westinghouse

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U.S. Nuclear Regulatory Commission
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Your ref: Docket Number 52-006
Our ref: DCP/NRC2074

February 15, 2008

Subject: 10 CFR 50.46 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 of the emergency core cooling system (ECCS) evaluation model changes and errors for the AP1000 Standard Plant Design.

This is the initial 10 CFR 50.46 report for the AP1000 Standard Plant Design (Docket 52-006). The limiting Transient 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)(1) acceptance criterion of 2200°F. The summary of the updated PCT margin allocations and their bases are provided in Enclosure 1.

Enclosure 2 provides a proposed reanalysis and schedule as required by 10 CFR 50.46 (a)(3)(iii) for the Best Estimate Large Break Loss-of-Coolant Accident. The revised analysis will incorporate the cumulative effects of DCD Revision 16 design changes and provides the basis of the sensitivity for the response to the RAI on Technical Report 29 related to the addition of a flow skirt and neutron pads.

Pursuant to 10 CFR 50.30(b), the information in Enclosures 1 and 2 are submitted under the attached Oath of Affirmation.

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 the changes and 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.

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NRO

If you have any questions, please contact either John DeBlasio at (412) 374-5741, or the undersigned.

Very truly yours,

W. E. Cummins
Vice President
Regulatory Affairs and Standardization

/Attachment

1. "Oath of Affirmation," dated February 15, 2008

/Enclosures

1. 10 CFR 50.46 Report
2. "Proposed Reanalysis and Schedule for BELOCA"

cc:	D. Jaffe	-	U.S. NRC	2E	1A
	E. McKenna	-	U.S. NRC	2E	1A
	P. Ray	-	TVA	2E	1A
	P. Hastings	-	Duke Power	2E	1A
	R. Kitchen	-	Progress Energy	2E	1A
	A. Monroe	-	SCANA	2E	1A
	J. Wilkinson	-	Florida Power & Light	2E	1A
	C. Pierce	-	Southern Company	2E	1A
	E. Schmiech	-	Westinghouse	2E	1A
	G. Zinke	-	NuStart/Entergy	2E	1A
	R. Grumbir	-	NuStart	2E	1A

ATTACHMENT 1

"Oath of Affirmation"

ATTACHMENT 1

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:	)
AP1000 Design Certification Amendment	)
Docket Number 52-006	)

APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

W. E. Cummins, being duly sworn, states that he is Vice President, Regulatory Affairs and Standardization, for Westinghouse Electric Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission this document; that all statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.

W. E. Cummins
Vice President
Regulatory Affairs and Standardization

Subscribed and sworn to
before me this 15th day
of February 2008.

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Debra McCarthy, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Aug. 31, 2009
Member, Pennsylvania Association of Notaries

Debra McCarthy
Notary Public

ENCLOSURE 1

"10 CFR 50.46 Report"

WESTINGHOUSE LOCA PEAK CLAD TEMPERATURE SUMMARY FOR BEST ESTIMATE LARGE BREAK

	Clad Temp (°F)		Ref	Notes
	Blowdown	Reflood		
LICENSING BASIS				
Analysis-Of-Record PCT	1944	2124	1,2	
PCT ASSESSMENTS (Delta PCT)				
A. PRIOR ECCS MODEL ASSESSMENTS				
1. None	0	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS				
1. None	0	0		
C. ECCS MODEL ASSESSMENTS				
1 HOTSPOT Fuel Relocation Error	0	70	3	1
D. OTHER				
1. Re-evaluation for Plant Design Changes and Pressurizer Surge Line Resistance Correction	-44	-36	4	
LICENSING BASIS PCT + PCT ASSESSMENTS				
PCT =	1900	2158		

References:

1. APP-GW-GL-700, Tier 2, Chapter 15, "Design Certification Document: Accident Analysis."
2. CN-LIS-02-69, "AP1000 Best Estimate Large Break Loss of Coolant Accident Analysis MONTECF Calculations of 95th Percentile PCT," September 2002.
3. LTR-LIS-08-39, "10 CFR 50.46 Report for AP1000 Best Estimate Large Break LOCA," January 2008.
4. CN-LIS-04-113, "AP1000 MONTECF Calculations of 95th Percentile PCT for IR03-251-M002 Reanalysis," June 2004.

Notes:

1. 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.

ENCLOSURE 2

"Proposed Reanalysis and Schedule for BELOCA"

Westinghouse applies the WCOBRA/TRAC computer code to perform best-estimate large-break LOCA analyses for the AP1000 Standard Plant Design. WCOBRA/TRAC is a thermal-hydraulic computer code that calculates realistic fluid conditions in a PWR during the blowdown and reflood of a postulated large-break LOCA. The current methodology employed for the AP1000 Standard Plant Design analysis is documented in WCAP-12945-P-A and WCAP-14171, Revision 2.

The best-estimate large-break LOCA analyses assessment is based on correction of the HOTSPOT Fuel Relocation Error, which has resulted in an absolute PCT penalty of 70°F. The assessed penalty of 70°F per the requirements of 10CFR50.46 necessitates a plan for reanalysis or a justification as to why analysis is not required.

Westinghouse plans to perform a reanalysis of the Best Estimate Large Break LOCA (BELOCA) for the AP1000 to increase the current margin available to the regulatory limit of 2200°F. This revised analysis will utilize the approved Westinghouse WCOBRA/TRAC with the ASTRUM uncertainty approach as documented in WCAP -16009-P-A, entitled "Realistic Large Break LOCA Evaluation Methodology Using Automated Statistical Treatment of Uncertainty Method (ASTRUM)" dated January, 2005.

The use of the approved ASTRUM approach for the Best Estimate LOCA (BELOCA) reanalysis is a different approach than the current analysis in revision 15 of the DCD. The current statistical uncertainty methodology uses a simplified application of the uncertainty methodology described in WCAP-12945-P-A, Code Qualification Document for Best Estimate LOCA Analysis. The simplification is that the initial conditions and power distribution uncertainty components are treated in a bounded manner. Only the model uncertainty components are treated statistically.

The model uncertainty component addresses uncertainties in the code models that affect the overall system transient ("global" models), as well as those which affect the hot rod only ("local" models).

The approved ASTRUM methodology differs from the previously approved AP1000 methodology primarily in the statistical technique used to make a probabilistic statement with regard to the conformance of the system under analysis to the regulatory requirements of 10 CFR 50.46. The AP1000 methodology requires the construction of a response surface, that in effect replaces the WCOBRA/TRAC code. The response surface allows a Monte Carlo computation to estimate the appropriate percentile of the variables (e.g. peak cladding temperature, maximum local oxidation, and core-wide oxidation) of the peak cladding temperature at the 95th percentile. A WCOBRA/TRAC run which bounds the 95th percentile peak cladding temperature is then used to conservatively calculate maximum local oxidation and core-wide oxidation.

The ASTRUM methodology, on the other hand, applies a non-parametric statistical technique directly to a random sample of outputs (e.g. peak cladding temperature, maximum local oxidation, and core-wide oxidation) from the WCOBRA/TRAC calculations. These sample outputs are computed by applying Monte Carlo sampling to the inputs of WCOBRA/TRAC calculations. This approach allows the formulation of a simple singular statement of uncertainty in the form of a tolerance interval for the numerical acceptance criteria of 10 CFR 50.46. Based on the computed tolerance interval, a decision can be made with regard to the conformance of the performance of the systems under analysis to the regulatory requirements of 10 CFR 50.46. A unique characteristic of the non-parametric statistical approach is that once a desired tolerance level is defined, the number of Monte Carlo code runs required to construct the tolerance interval that meets the desired level of safety can be easily computed. The ASTRUM methodology has chosen a 95/95 tolerance level to demonstrate conformance to 10 CFR 50.46; this tolerance level requires 124 runs.

Scope and Schedule

Westinghouse is performing a reanalysis of the AP1000 BELOCA which will incorporate changes that resulted in previous penalties and the use of ASTRUM. The schedule for submittal to the NRC with the analytical results and associated DCD revisions is June 2008.