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NL-05-1050

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

#### Edwin I. Hatch Nuclear Plant Vogtle Electric Generating Plant 10 CFR 50.46 ECCS Evaluation Model Annual Reports for 2004

Ladies and Gentlemen:

Pursuant to the reporting requirements of 10 CFR 50.46 (a)(3)(ii), Southern Nuclear Operating Company (SNC) is submitting the emergency core cooling system (ECCS) evaluation model annual reports for Hatch Nuclear Plant Units 1 and 2, and Vogtle Electric Generating Plant Units 1 and 2.

These annual reports summarize the nature of and estimated effect of any changes or errors in the ECCS models for the period from January 1, 2004 through December 31, 2004.

This letter contains no NRC commitments. If you have any questions, please advise.

Sincerely,

H. L. Sumner, Jr.

HLS/CLT/daj

Enclosures:

- 1. Edwin I. Hatch Nuclear Plant 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004
- 2. Vogtle Electric Generating Plant 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004

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 cc: Southern Nuclear Operating Company Mr. J. T. Gasser, Executive Vice President Mr. H. L. Sumner, Jr., Vice President – Plant Hatch Mr. D. E. Grissette, Vice President – Plant Vogtle Mr. G. R. Frederick, General Manager – Plant Hatch Mr. T. E. Tynan, General Manager – Plant Vogtle RType: CHA02.004; CVC7000

U.S. Nuclear Regulatory Commission

Dr. W. D. Travers, Regional Administrator

Mr. C. Gratton, NRR Project Manager – Hatch

Mr. C. Gratton, NRR Project Manager – Vogtle

Mr. D. S. Simpkins, Senior Resident Inspector - Hatch

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Mr. G. J. McCoy, Senior Resident Inspector – Vogtle

Enclosure 1

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Edwin I. Hatch Nuclear Plant 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004

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### Enclosure 1 Edwin I. Hatch Nuclear Plant 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004

#### BACKGROUND

In accordance with 10 CFR 50.46(a)(3)(ii), this annual report summarizes the nature of and estimated effect of any changes or errors in the emergency core cooling system (ECCS) model for the period from January 1, 2004 through December 31, 2004 for Hatch Nuclear Plant Units 1 and 2.

#### DISCUSSION

Updated limiting licensing basis peak clad temperatures (PCTs) applicable to Hatch are provided in the following table.

In 2004 Hatch Units 1 and 2 operated with both GE13 and GE14 fuel in their cores. Therefore, the updated licensing basis PCTs are provided for both GE13 and GE14 fuel. The following table begins by listing the baseline ECCS-LOCA evaluations for GE13 fuel (Reference 1) and GE14 fuel (Reference 2).

The next section of the table lists the applicable changes or errors and their estimated effect on PCT that have previously been reported to the NRC (References 3, 4, 5, and 6).

The final section of the table lists those applicable changes or errors and their estimated effect on PCT which SNC has been notified of by GE during the period from January 1, 2004 through December 31, 2004. There have been no SNC changes to the ECCS model to report. Additional information on the one applicable change or error identified during 2004 follows.

### Impact of Postulated Hydrogen-Oxygen Recombination on the PCT

In GE 10 CFR 50.46 Notification Letter 2003-05 (Reference 7), GE reported that a new heat source during the LOCA event has been postulated involving the recombination of hydrogen and oxygen within the fuel bundle during the core heatup. For jet pump plants, the increase in heat of reaction was calculated from the combination of oxygen released from evaporation of the ECCS liquid and hydrogen released from metal water reaction. This reaction is always oxygen limited because there is not sufficient oxygen to react with all the available hydrogen. For jet pump plants with inerted containments, the change in PCT was found to be insignificant. GE estimated the effect on PCT for Hatch to be 0 °F for GE13 and 0 °F for GE14.

### CONCLUSION

As documented in the following table, the updated Hatch limiting licensing basis PCTs for GE13 and GE14 remain in compliance with 10 CFR 50.46(b)(1), specifically requiring that the limiting licensing basis PCT shall not exceed 2200 °F. As such, there is no need for reanalysis or taking any other actions in accordance with 10 CFR 50.46(a)(3)(ii) because compliance with 10 CFR 50.46(b)(1) has been maintained.

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Report Period	Description of Change or Error in ECCS Evaluation	Estimated PCT Change ( °F)				Updated PCT	
		GE13 Fuel		GE14 Fuel		GE13	GE14
		PCT Change	Absolute Value	PCT Change	Absolute Value	Fuel	Fuel
Baseline Evaluations	SAFER/ GESTR-LOCA Analysis dated March, 1997 (Ref. 1)	N/A	N/A	N/A	N/A	1688	N/A
	SAFER/ GESTR-LOCA Analysis dated March, 2002 (Ref. 2)	N/A	N/A	N/A	N/A	N/A	1820
	Hatch 50.46 Annual Report for 2000 (Ref. 3)	10	20	N/A	N/A	1698	N/A
Previously Reported Changes or	Hatch 50.46 30 Day Report dated 5/21/01 (Ref. 4)	100	100	N/A	N/A	1798	N/A
Errors	Hatch 50.46 Annual Report for 2002 (Ref. 5)	15	15	0	0	1813	1820
	Hatch 50.46 Annual Report for 2003 (Ref. 6)	10	10	-5	5	1823	1815
2004 Changes or Errors	GE 50.46 Notification Letter 2003-05 dated 5/13/04 (Ref. 7)	0	0	0	0	1823	1815

#### REFERENCES

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- 1. NEDC-32720P, "Hatch Units 1 and 2 SAFER/GESTR Loss-of-Coolant Accident Analysis," dated March 1997.
- 2. GE-NE-0000-0000-9200-02P, "Hatch Units 1 and 2 ECCS-LOCA Evaluation for GE14," dated March 2002.
- 3. SNC Letter HL-6028, H. L. Sumner, Jr. to NRC, "Reporting of Changes and Errors in ECCS Evaluation Models," dated January 31, 2001.
- 4. SNC Letter HL-6090, H. L. Sumner, Jr. to NRC, "Reporting of Changes and Errors in ECCS Evaluation Models," dated May 21, 2001.
- 5. SNC Letter NL-03-0999, J. B. Beasley, Jr. to NRC, "10 CFR 50.46 ECCS Evaluation Model Annual Reports for 2002," dated June 2, 2003.
- 6. SNC Letter NL-04-1042, L. M. Stinson to NRC, "10 CFR 50.46 ECCS Evaluation Model Annual Reports for 2003," dated June 29, 2004.
- 7. E-mail from Margaret E. Harding (GNF) to Ken S. Folk (SNC), "10 CFR 50.46 Notification 2003-05 Southern Co.," dated May 14, 2004.

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Enclosure 2

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Vogtle Electric Generating Plant 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004

# Enclosure 2 Vogtle Electric Generating Plant 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004

### BACKGROUND

In accordance with 10 CFR 50.46(a)(3)(ii), this annual report summarizes the nature of and estimated effect of any changes or errors in the emergency core cooling system (ECCS) model for the period from January 1, 2004 through December 31, 2004 for Vogtle Electric Generating Plant Units 1 and 2.

#### DISCUSSION

The following presents a summary of the effects of errors and changes to the Westinghouse ECCS Evaluation Models on the Vogtle Electric Generating Plant (VEGP) Units 1 and 2 loss of coolant accident (LOCA) analyses since the Annual Report submitted on June 29, 2004 (Reference 10). This report has been prepared in accordance with the methodology presented in WCAP-13451 (Reference 1) and additional guidance provided by Westinghouse (Reference 2). The LBLOCA and SBLOCA analyses, Evaluation Model assessments, and planned plant change evaluation results reported herein will be included in a future VEGP Final Safety Analysis Report (FSAR) update.

#### Large-Break LOCA

#### LBLOCA ECCS MODEL ANALYSIS-OF-RECORD

In the Annual Report submitted on June 29, 2004 (Reference 10), SNC reported a LBLOCA PCT of 2040.5 °F for both Unit 1 and Unit 2. This value is based on fuel designs containing 128 Integral Fuel Burnable Absorber (IFBA) rods.

The LBLOCA analysis was performed with the 1981 Version of the Westinghouse ECCS Evaluation Model using BASH (Reference 3) including changes in the methodology for execution of the model described in References 4 and 5, and the latest acceptable LOCBART model. The limiting size break analysis assumes the following information important to the LBLOCA analyses:

- o 17x17 VANTAGE+ Fuel Assembly
- o Core Power = 1.02 \* 3565 MWt
- o Vessel Average Temperature =  $570.7 \,^{\circ}$ F
- o Steam Generator Plugging Level = 10%
- o  $F_0 = 2.50$
- o  $F\Delta H = 1.65$

Enclosure 2 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004

For VEGP Units 1 and 2, the limiting size break continues to be the double-ended guillotine rupture of the cold leg piping with a discharge coefficient of  $C_D = 0.6$ . The LBLOCA LOCBART analysis-of-record calculated PCT value is 2040.5 °F for both Unit 1 and Unit 2.

# PRIOR LBLOCA ECCS MODEL ASSESSMENTS

There are no LBLOCA prior assessments.

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Current LBLOCA ECCS Model Assessments

There are no LBLOCA current assessments.

# CURRENT PLANNED PLANT CHANGE EVALUATIONS

There are no current planned plant changes that affect PCT for Unit 1 and Unit 2.

### TOTAL RESULTANT LBLOCA PCT

For Unit 1, the absolute sum of the LBLOCA PCT assessments is 0 °F.

For Unit 2, the absolute sum of the LBLOCA PCT assessments is 0 °F.

# UNIT 1 LICENSING BASIS LBLOCA PCT

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Based on the above discussions concerning the VEGP-specific application of the Westinghouse BASH large-break ECCS Evaluation Model, the licensing basis LBLOCA PCT is as follows:

# A. LBLOCA ECCS MODEL ANALYSIS-OF-RECORD

	LOCBART Analysis Result (128 IFBA)	2040.5 °F
B.	PRIOR LBLOCA ECCS MODEL ASSESSMENTS	
	Combined assessments previously reported as significant	+0 °F
	Combined planned plant change evaluations	+0 °F
C.	CURRENT LBLOCA ECCS MODEL ASSESSMENTS	
	None	+0 °F
D.	<b>CURRENT PLANNED PLANT CHANGE EVALUATIONS</b>	
	None	+0 °F
E.	TOTAL RESULTANT LBLOCA PCT	
	Total	<u>2040.5 °F</u>

# UNIT 2 LICENSING BASIS LBLOCA PCT

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Based on the above discussions concerning the VEGP-specific application of the Westinghouse BASH large-break ECCS Evaluation Model, the licensing basis LBLOCA PCT is as follows:

# A. LBLOCA ECCS MODEL ANALYSIS-OF-RECORD

	LOCBART Analysis Result (128 IFBA)	2040.5 °F
B.	PRIOR LBLOCA ECCS MODEL ASSESSMENTS	
	Combined assessments previously reported as significant	+0 °F
	Combined planned plant change evaluations	+0 °F
C.	CURRENT LBLOCA ECCS MODEL ASSESSMENTS	
	None	+0 °F
D.	CURRENT PLANNED PLANT CHANGE EVALUATIONS	
	None	+0 °F
E.	TOTAL RESULTANT LBLOCA PCT	
	Total	<u>2040.5 °F</u>

Enclosure 2 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004

## Small-Break LOCA

### SBLOCA ECCS MODEL ANALYSIS-OF-RECORD

In the Annual Report submitted on June 29, 2004 (Reference 10), SNC reported a SBLOCA PCT of 1138.0 °F for both Unit 1 and Unit 2.

The SBLOCA analysis was performed with the Westinghouse ECCS Evaluation Model using NOTRUMP (References 6 and 7), including changes to the methodology described in References 8 and 9, and the latest acceptable SBLOCTA model. The limiting size break analysis assumes the following information important to the SBLOCA analyses:

- o 17x17 VANTAGE+ Fuel Assembly
- o Core Power = 1.02 \* 3565 MWt
- o Vessel Average Temperature = 570.7 °F
- o Steam Generator Plugging Level = 10%
- o  $F_0 = 2.58$
- o  $F\Delta H = 1.70$

For VEGP Units 1 and 2, the limiting size small-break continues to be a three-inch equivalent diameter break in the cold leg. The SBLOCA SBLOCTA analysis-of-record calculated PCT value is 1138.0 °F for both Unit 1 and Unit 2.

#### PRIOR SBLOCA ECCS MODEL ASSESSMENTS

There are no SBLOCA prior assessments.

#### CURRENT SBLOCA ECCS MODELASSESSMENTS

There are no SBLOCA current assessments.

#### CURRENT PLANNED PLANT CHANGE EVALUATIONS

There are no current planned plant changes that affect PCT for Unit 1 and Unit 2.

### TOTAL RESULTANT SBLOCA PCT

For Unit 1, the absolute sum of the SBLOCA PCT assessments is 0 °F.

For Unit 2, the absolute sum of the SBLOCA PCT assessments is 0 °F.

# UNIT 1 LICENSING BASIS SBLOCA PCT

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Based on the above discussions concerning the VEGP-specific application of the Westinghouse NOTRUMP small-break ECCS Evaluation Model, the licensing basis SBLOCA PCT is as follows:

# A. SBLOCA ECCS MODEL ANALYSIS-OF-RECORD

	SBLOCTA Analysis Result	1138.0 °F
B.	PRIOR SBLOCA ECCS MODEL ASSESSMENTS	
	Combined assessments previously reported as significant	+ 0 °F
	Combined planned plant change evaluations	+ 0 °F
c.	CURRENT SBLOCA ECCS MODEL ASSESSMENTS	
	None	+ 0 °F
D.	<b>CURRENT PLANNED PLANT CHANGE EVALUATIONS</b>	
	None	+ 0 °F
E.	TOTAL RESULTANT SBLOCA PCT	
	Total	<u>1138.0 °F</u>

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# UNIT 2 LICENSING BASIS SBLOCA PCT

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Based on the above discussions concerning the VEGP-specific application of the Westinghouse NOTRUMP small-break ECCS Evaluation Model, the licensing basis SBLOCA PCT is as follows:

# A. SBLOCA ECCS MODEL ANALYSIS-OF-RECORD SBLOCTA Analysis Result 1138.0 °F B. PRIOR SBLOCA ECCS MODEL ASSESSMENTS Combined assessments previously reported as significant + 0 °F Combined plant change evaluations + 0 °F C. CURRENT SBLOCA ECCS MODEL ASSESSMENTS None + 0 °F D. CURRENT PLANNED PLANT CHANGE EVALUATIONS None + 0 °F E. TOTAL RESULTANT SBLOCA PCT Total <u>1138.0 °F</u>

# Enclosure 2 10 CFR 50.46 ECCS Evaluation Model Annual Report for 2004

# CONCLUSION

As documented in the preceding tables, the updated VEGP large-break and small-break LOCA analyses PCTs remain in compliance with 10 CFR 50.46(b)(1), specifically requiring that the PCT shall not exceed 2200 °F. As such, there is no need for reanalysis or taking any other actions in accordance with 10 CFR 50.46(a)(3)(ii) because compliance with 10 CFR 50.46(b)(1) has been maintained.

# REFERENCES

- 1. WCAP-13451, "Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting," October 1992.
- 2. Westinghouse letter GP-17337, "Southern Nuclear Operating Company, Inc., Vogtle Electric Generating Plant Units 1 and 2, 10 CFR 50.46 Annual Notification Reporting for 2001," March 1, 2002.
- 3. "The 1981 Version of the Westinghouse ECCS Evaluation Model Using the BASH Code," WCAP-10266-P-A, Revision 2 (Proprietary) and WCAP-11524-A, Revision 2 (Non-Proprietary), March 1987.
- 4. Westinghouse letter NTD-NRC-94-4143 from N. J. Liparulo to W. T. Russell (USNRC), "Change in Methodology for Execution of BASH Evaluation Model," May 23, 1994.
- 5. Westinghouse letter NTD-NRC-95-4540 from N. J. Liparulo to W. T. Russell (USNRC), "Change in Methodology for Execution of BASH Evaluation Model," August 29, 1995.
- 6. "NOTRUMP: A Nodal Transient Small Break and General Network Code," WCAP-10079-P-A (Proprietary) and WCAP-10080-A (Non-Proprietary), August 1985.
- 7. "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A, August 1985.
- "Addendum to the Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code: Safety Injection into the Broken Loop and COSI Condensation Model," WCAP-10054-P-A, Addendum 2, Revision 1, July 1997.
- 9. "Model Changes to the Westinghouse Appendix K Small Break LOCA NOTRUMP Evaluation Model: 1988 – 1997," WCAP-15085, July 1998.
- 10. NL-04-1042, "10 CFR 50.46 ECCS Evaluation Model Annual Reports for 2003," (multidocket) letter from L. M. Stinson (SNC) to USNRC, June 29, 2004.