Georgia Power Company
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Telephone 205 877-7122

C. K. McCoy
Vice President, Nuclear
Vogtle Project

March 17, 1995

Georgia Power
the southern electric system

LCV-0579

Docket Nos. 50-424
50-425

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

Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
10 CFR 50.46 ECCS EVALUATION MODELS 1994 ANNUAL REPORT

Attached is Georgia Power Company's 10 CFR 50.46 Emergency Core Cooling System (ECCS) Evaluation Models 1994 Annual Report in accordance with WCAP-13451 and in compliance with the reporting requirements of 10 CFR 50.46(a)(3)(ii). It is based on information provided by Westinghouse of changes to the Vogtle Electric Generating Plant (VEGP) ECCS Evaluation Models since the last report (LCV-0327-B dated December 8, 1994), which was a significant change report.

The attached annual report summarizes the effects of changes and errors in the ECCS Evaluation Models on peak clad temperature (PCT). The results presented for the large-break loss of coolant accident (LBLOCA) are based on an ECCS LOCBART reanalysis which incorporated the latest acceptable LOCBART model and the implementation of the 1.5X integral fuel burnable absorber fuel rod design. The overall effect of the reanalysis is a reduction in PCT of about 69°F. Also, the report provides a summary of the plant changes performed under the provisions of 10 CFR 50.59 that also affect PCT. The report results will be incorporated into the next Final Safety Analysis Report (FSAR) update.

The attached report still reflects a cumulative assessment greater than 50°F PCT for the small-break LOCA as reported in LCV-0327-B. Once the NRC has completed its review of the NOTRUMP addendum to WCAP-10054-P-A, Georgia Power will incorporate the new model at the next licensing action requiring reanalysis of the SBLOCA and for which the NOTRUMP code would be used within the Evaluation Model.

Based on the attached 1994 Annual Report, it has been determined that compliance with the requirements of 10 CFR 50.46 continues to be maintained when the effects of plant design changes are combined with the effects of the ECCS Evaluation Models assessments applicable to VEGP Units 1 and 2.

A001
1/1

If you have any questions regarding this report, please contact this office.

Sincerely,

C. K. McCoy

CKM/BCA/HWM:gps

Attachment

cc: Georgia Power Company
Mr. W. B. Shipman
Mr. M. Sheibani
NORMS

U. S. Nuclear Regulatory Commission
Mr. S. D. Ebneter, Regional Administrator
Mr. D. S. Hood, Licensing Project Manager, NRR
Mr. B. R. Bonser, Senior Resident Inspector, Vogtle

ATTACHMENT

10 CFR 50.46 ECCS EVALUATION MODELS 1994 ANNUAL REPORT

BACKGROUND

Provisions in 10 CFR 50.46 require applicants and holders of operating licenses or construction permits to notify the Nuclear Regulatory Commission (NRC) of errors and changes in the Emergency Core Cooling System (ECCS) Evaluation Models on an annual basis when the errors and changes are not significant, and within 30 days of discovery when the errors and changes are significant. A significant error or change, as defined by 10 CFR 50.46, is one which results in a calculated fuel peak cladding temperature (PCT) different by more than 50°F from the temperature calculated for the limiting transient using the last acceptable model, or a cumulation of changes and errors such that the sum of the absolute magnitudes of the respective temperature changes is greater than 50°F.

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. The current LOCA analyses results were reported in the 1993 Annual Report (Reference 1), as supplemented by a December 8, 1994, Significant Change Report (Reference 2) based on the format presented in WCAP-13451 (Reference 3). The updated LOCA results included herein are based on a reanalysis by Westinghouse of the VEGP large-break LOCA (LBLOCA) ECCS LOCBART analysis incorporating the 1.5X integral fuel burnable absorber (IFBA) fuel rod design. The latest acceptable LOCBART model was used in the VEGP LBLOCA reanalysis. The large-break LOCA and SBLOCA analyses, Evaluation Model assessments, and safety evaluation results reported herein will be included in a future VEGP Final Safety Analysis Report (FSAR) update.

LARGE-BREAK LOCA

ECCS Evaluation Model

A reanalysis of the LBLOCA LOCBART portion of the VEGP ECCS Evaluation Model was performed since the last 10 CFR 50.46 submittal (Reference 2). The LBLOCA analysis results are based on the Westinghouse BASH large-break ECCS Evaluation Model (Reference 4), as approved by the NRC for VEGP-specific application (References 5 and 6) and the latest acceptable LOCBART model. The latest acceptable LOCBART model includes a revised burst strain limit model and a correction for the spacer grid heat transfer error. Both changes result in a PCT benefit for Vogtle. The limiting size break analysis continues to assume the following information important to the LBLOCA analyses:

- 17x17 VANTAGE-5 Fuel Assembly
- Core Power = 1.02 * 3565 MWT
- Vessel Average Temperature = 571.9°F
- Steam Generator Plugging Level = 10%
- $F_Q = 2.50$
- $F\Delta H = 1.65$

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 reanalysis calculated PCT result was 1915°F. Thus, the analysis-of-record LOCBART calculated PCT value has been revised from 2025° to 1915°F.

The containment purge, T_{avg} uncertainty, and transition core penalty items continue to be listed separately per the format of WCAP-13451. The items are listed separately because these items are not explicitly modeled. The PCT assessment values on these items remain 10, 11, and 50°F, respectively.

In addition to these assessments, VEGP is adding a 41°F PCT penalty assessment for fuel burnups less than 150 MWD/MTU for core designs using the 1.5X integral fuel burnable absorber (IFBA) fuel rod design. VEGP will begin using the 1.5X IFBA rod in the Vogtle-2 Cycle 5 core design scheduled for startup in March 1995. The 1.5X IFBA rod replaces the current 1.0X IFBA rod for peaking factor and moderator temperature coefficient control. The 1.5X IFBA rod has a reduced fuel rod backfill pressure as compared to the 1.0X IFBA rod. Thus, the 1.5X IFBA rod results in a penalty of 41°F PCT for cycle burnups less than 150 MWD/MTU as calculated by the latest acceptable LOCBART model. At and beyond cycle burnups of 150 MWD/MTU, the 1.5X IFBA internal fuel rod pressure will have increased to a value such that the non-IFBA fuel rods are more limiting in regards to PCT. Since the non-IFBA rod is the more limiting rod for PCT for the majority of the cycle, VEGP continues to show an analysis-of-record LOCBART calculated PCT value based on non-IFBA fuel rods (1915°F), and will apply a 41°F PCT burnup penalty below 150 MWD/MTU when the VEGP cores contain the 1.5X IFBA rod.

Prior BASH Large-Break ECCS Evaluation Model Assessments

The steam generator flow area application, structural metal heat modeling, and LUCIFER error correction assessments continue to be listed separately per the format of WCAP-13451. These items are prior BASH large-break ECCS Evaluation Model assessments. The PCT assessment values on these items are 10, -25, and -6°F, respectively.

New BASH Large-Break ECCS Evaluation Model Assessments

Since the 1993 annual report, no new assessments to the BASH large-break ECCS Evaluation Model that would affect the VEGP LBLOCA PCT analysis have been identified.

LBLOCA ECCS Evaluation Model Assessment Summary

The absolute sum of the PCT assessments remains below 50°F. Therefore, no LBLOCA ECCS reanalysis is required for VEGP Units 1 and 2.

10 CFR 50.59 Evaluation Assessments

As reported in Reference 2, there is only one plant modification pursuant to 10 CFR 50.59 which affects the LBLOCA analysis results. The evaluation concerning the permanent radiation shield on both VEGP Units 1 and 2 remains in effect.

Licensing Basis LBLOCA PCT

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.	1994 Annual Report LBLOCA BASH ECCS Model Analysis-of-Record	
	1. LOCBART Reanalysis Result	1915.0°F
	2. Evaluation for Containment Purging	+ 10.0°F
	3. Evaluation for +/- 6°F Uncertainty Band	+ 11.0°F
	4. Evaluation for Transition Cycle Penalty	+ 50.0°F
	5. Burnup Penalty Below 150 MWD/MTU Applied to Core Designs Using the 1.5X IFBA Rod (Unit 2 only)	+ 41.0°F
B.	Prior BASH Large-Break ECCS Model Assessments	
	1. Steam Generator Flow Area Application	+ 10.0°F
	2. Structural Metal Heat Modeling	- 25.0°F
	3. LUCIFER Error Corrections	- 6.0°F
C.	10 CFR 50.59 Evaluations	
	1. Permanent Radiation Shield	+ 1.0°F
D.	1994 BASH Large-Break ECCS Model Assessments	
	None	+ 0.0°F
	Licensing Basis LBLOCA PCT (Unit 1) =	1966.0°F
	(Unit 2) =	2007.0°F

Conclusion

An evaluation of the effect of assessments to the Westinghouse BASH large-break ECCS Evaluation Model was performed on the LBLOCA reanalysis results. When the effects of the BASH ECCS Evaluation Model assessments and safety evaluations were combined with the VEGP LBLOCA reanalysis results, it was determined that VEGP Units 1 and 2 remain in compliance with the requirements of 10 CFR 50.46(b).

SMALL-BREAK LOCA

ECCS Evaluation Model

In the last report (Reference 2), significant errors/changes were assessed against the small-break LOCA (SBLOCA) analysis PCT for VEGP Units 1 and 2 since the 1993 Annual Report (Reference 1). Also, as discussed in the last report (Reference 2), the SBLOCTA portion of the SBLOCA Evaluation Model was reanalyzed using the latest acceptable SBLOCTA model. The SBLOCTA reanalysis included the axial nodalization error fix, rod internal pressure model revisions, hot assembly average rod burst strain, revised fuel rod burst strain limit, and other SBLOCTA error corrections. The SBLOCA reanalysis results were based on the earlier Westinghouse NOTRUMP small-break ECCS Evaluation Model (Reference 7) as approved by the NRC for VEGP-specific application (References 5 and 6) and the latest acceptable SBLOCTA model. The limiting size break analysis continues to assume the following information important to the SBLOCA analyses:

- 17x17 VANTAGE-5 Fuel Assembly
- Core Power = 1.02 * 3565 MWT
- Vessel Average Temperature = 571.9°F
- Steam Generator Plugging Level = 10%
- F_Q = 2.48 at 9.5 ft
- $F\Delta H$ = 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. Thus, the SBLOCA analysis-of-record SBLOCTA calculated PCT was revised from 1834°F to 1770°F, incorporating the SBLOCTA reanalysis results. This revision to the analysis-of-record value allows for the SBLOCTA assessment of 64°F to be deleted from that last reported in Reference 2.

The steam generator lower level tap relocation and T_{avg} uncertainty items continue to be listed separately per the format of WCAP-13451. The items are listed separately because these items are not explicitly modeled. The PCT assessment values on these items are 15 and 4°F, respectively.

Prior NOTRUMP Small-Break ECCS Evaluation Model Assessments

In the last 10 CFR 50.46 report (Reference 2), there are seven model assessments remaining following the SBLOCTA reanalysis. They are: (1) safety injection (SI) flow into the broken RCS loop, (2) improved steam condensation model, (3) drift flux flow regime error, (4) LUCIFER error corrections, (5) burst and blockage/time in life issue, (6) boiling heat transfer correlation error, and (7) steam line isolation logic error.

New NOTRUMP Small-Break ECCS Evaluation Model Assessments

Since the last report, no new assessments have been identified to the NOTRUMP small-break ECCS Evaluation Model that would affect the VEGP SBLOCA PCT reanalysis results.

SBLOCA ECCS Model Assessment Summary

The absolute sum of the seven SBLOCA PCT assessments remains above 50°F for the VEGP NOTRUMP SBLOCA ECCS model as reported in LCV-0327-B (Reference 2). However, the net effect of the assessments is a reduction in the VEGP SBLOCA PCT results.

10 CFR 50.59 Evaluation Assessments

As reported in Reference 2, there is only one plant modification which affects the SBLOCA analysis results. The evaluation concerning the loose part in the VEGP Unit 1 RCS remains in effect.

Licensing Basis SBLOCA PCT

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. 1994 Annual Report SBLOCA NOTRUMP ECCS Model Analysis-of-Record	
1. SBLOCTA Reanalysis Result	1770.0°F
2. Evaluation for Steam Generator Lower Level Tap Relocation	+ 15.0°F
3. Evaluation for +/- 6°F Uncertainty Band	+ 4.0°F
B. Prior NOTRUMP Small-Break ECCS Model Assessments	
1) SI in Broken Loop/Improved Condensation Model (pending NRC approval of addendum to WCAP-10054-P-A), Drift Flux Flow Regime, LUCIFER Error Corrections, Boiling Heat Transfer Correlation Error, and Steam Line Isolation Logic Error	- 17.0°F
2) Burst and Blockage/Time in Life	+ 15.0°F
C. 10 CFR 50.59 Evaluations	
1. Loose Part (VEGP Unit 1)	+ 2.0°F
D. 1994 NOTRUMP Small-Break ECCS Model Assessments	
None	+ 0.0°F
Licensing Basis SBLOCA PCT (Unit 1) =	1789.0°F
(Unit 2) =	1787.0°F

Conclusion

An evaluation of the effect of assessments to the Westinghouse NOTRUMP small-break ECCS Evaluation Model was performed on the SBLOCA analysis results. When the effects of the NOTRUMP ECCS Evaluation Model assessments, addendum to WCAP-10054-P-A under NRC review, and safety evaluations were combined with the VEGP SBLOCA reanalysis results, it was determined that the sum of the absolute magnitude of the prior assessments was greater than 50°F. However, the cumulative effect of the prior assessments is a reduction of 2°F in the SBLOCA PCT results.

As discussed in Reference 2, Georgia Power does not propose to reanalyze the NOTRUMP portion of the SBLOCA analysis at this time. Once the NRC has completed review of the NOTRUMP addendum to WCAP-10054-P-A, Georgia Power will incorporate the new model (which also includes revisions for the drift flux flow regime, LUCIFER error corrections, boiling heat transfer correlation error, and steam line isolation logic error assessments) at the next licensing action requiring reanalysis of the SBLOCA and for which the NOTRUMP code would be used within the Evaluation Model.

REFERENCES

1. LCV-0327, "Vogtle Electric Generating Plant, 10 CFR 50.46 ECCS Evaluation Models 1993 Annual Report," letter from C. K. McCoy (GPC) to USNRC, dated April 4, 1994.

2. LCV-0327-B, "Vogtle Electric Generating Plant, 10 CFR 50.46 ECCS Model Significant Change Report," letter from C. K. McCoy (GPC) to the USNRC, dated December 8, 1994.

3. WCAP-13451, "Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting," dated October 1992.

4. "The 1981 Version of the Westinghouse ECCS Evaluation Model Using the BASH Code," WCAP-11524-A (Non-Proprietary), March 1987.

5. ELV-02166, "Vogtle Electric Generating Plant, Request for Technical Specifications Changes VANTAGE-5 Fuel Design," letter from W. G. Hairston, III, to USNRC, dated November 29, 1990.

6. ELV-03375, "Vogtle Electric Generating Plant, Licensing Change Power Uprating," letter from C. K. McCoy (GPC) to the NRC, dated February 28, 1992.

7. "Westinghouse Small-Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A (Proprietary) and WCAP-10081-A (Non-Proprietary).