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LCV-0780

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 1995 ANNUAL REPORT

Attached is Georgia Power Company's 10 CFR 50.46 Emergency Core Cooling System (ECCS) Evaluation Models 1995 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-0579 dated March 17, 1995).

The attached annual report summarizes the effects of changes and errors in the ECCS Evaluation Models on peak clad temperature (PCT). 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.

Based on the attached 1995 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.

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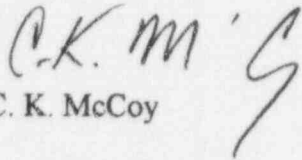
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If you have any questions regarding this report, please contact this office.

Sincerely,


C. K. McCoy

CKM/BCA/HWM/gps

Attachment

cc: Georgia Power Company
Mr. J. B. Beasley, Jr.
Mr. M. Sheibani
NORMS

U. S. Nuclear Regulatory Commission
Mr. S. D. Ebnetter, Regional Administrator
Mr. L. L. Wheeler, Licensing Project Manager, NRR
Mr. C. R. Ogle, Senior Resident Inspector, Vogtle

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VOGTLE ELECTRIC GENERATING PLANT
10 CFR 50.46 ECCS EVALUATION MODELS 1995 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 since the 1994 annual report (Reference 1). This annual report has been prepared in accordance with the methodology presented in WCAP-13451 (Reference 2). 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

The LBLOCA analysis results are based on the Westinghouse BASH large-break ECCS Evaluation Model (Reference 3), as applied to VEGP (References 4 and 5) and the latest acceptable LOCBART model. The limiting size break analysis continues to assume the following information important to the LBLOCA analyses:

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

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 analysis-of-record calculated PCT value remains at 1915°F.

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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.

As reported in Reference 1, VEGP includes 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. Vogtle-1 will begin using the 1.5X IFBA rod in the Vogtle-1 Cycle 7 core design scheduled for startup in March 1996. The 1.5X IFBA rod is currently in the Vogtle-2 Cycle 5 core design and replaces the current 1.0X IFBA rod for peaking factor and moderator temperature coefficient control. All of the 1.5X IFBA rods in Vogtle-2 and 4064 of the IFBA rods in Vogtle-1 contain a reduced backfill pressure as compared to the 1.0X IFBA rod. Thus, the 1.5X IFBA rods with reduced backfill pressure result 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. The 1.5X IFBA rods in Vogtle-1 Cycle 7 without reduced backfill pressure are bounded by the 1.5X IFBA rods with reduced backfill pressure.

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.

1995 BASH Large-Break ECCS Evaluation Model Assessments

Since the 1994 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

There are two plant modifications pursuant to 10 CFR 50.59 which affect the LBLOCA analysis results. Combining the PCT effects from the two evaluations concerning the permanent radiation shield and trisodium phosphate baskets still results in only a 1°F PCT assessment.

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. 1995 Annual Report LBLOCA BASH ECCS Model Analysis-of-Record

1. LOCBART Analysis 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 (Units 1 and 2)	+ 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. 1995 BASH Large-Break ECCS Model Assessment

None	0°F
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D. 10 CFR 50.59 Evaluations

1. Permanent Radiation Shield/TSP baskets	+ 1.0°F
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E. 1994 BASH Large-Break ECCS Model Assessments

None	+ 0.0°F
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Licensing Basis LBLOCA PCT (Unit 1)	=	<u>2007.0°F</u>
(Unit 2)	=	<u>2007.0°F</u>

Conclusion

An evaluation of the effect of assessments to the Westinghouse BASH large-break ECCS Evaluation Model was performed on the LBLOCA analysis results. When the effects of the BASH ECCS Evaluation Model assessments and safety evaluations were combined with the VEGP LBLOCA analysis 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

Since the last annual report (Reference 1), only one new error has been assessed against the small-break LOCA (SBLOCA) analysis PCT for VEGP Units 1 and 2. This error will be addressed in another section. The current SBLOCA analysis results are based on the earlier Westinghouse NOTRUMP small-break ECCS Evaluation Model (Reference 6) as applied to VEGP (References 4 and 5) and the latest acceptable SBLOCA model. The limiting size break analysis continues to assume the following information important to the SBLOCA analyses:

- o 17x17 VANTAGE-5 Fuel Assembly
- o Core Power = 1.02×3565 MWT
- o Vessel Average Temperature = 571.9°F
- o Steam Generator Plugging Level = 10%
- o $F_Q = 2.48$ at 9.5 ft
- 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. Thus, the SBLOCA analysis-of-record SBLOCA calculated PCT value remains at 1770°F.

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

As reported in the last annual report (Reference 1), there were seven prior model assessments that are combined as shown in Table 2. 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.

1995 NOTRUMP Small-Break ECCS Evaluation Model Assessments

Since the last report, only one new assessment has been identified to the NOTRUMP small-break ECCS Evaluation Model that would affect the VEGP SBLOCA PCT analysis results. A typographical error was found in a line of NOTRUMP coding with regard to calculating specific enthalpy. Although the equation in the topical report is correct, the coding

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represented the last term as a partial derivative with respect to the fluid node mixture region total energy instead of the mixture region total mass. This correction is a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451. The generic effect of this error to both Units 1 and 2 is an estimated penalty assessment of +20°F.

SBLOCA ECCS Model Assessment Summary

The absolute sum of the new SBLOCA PCT assessments is less than 50°F for the VEGP NOTRUMP SBLOCA ECCS model since that last reported in LCV-0579 (Reference 1). The net effect of the prior and new assessments to the VEGP SBLOCA PCT results is also less than 50°F.

10 CFR 50.59 Evaluation Assessments

As reported in Reference 1, 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. 1995 Annual Report SBLOCA NOTRUMP ECCS Model Analysis-of-Record

1. SBLOCA Analysis 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

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, Steam Line Isolation Logic Error, and Burst and Blockage/Time in Life as reported to the NRC in Reference 1.	- 2.0°F
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C. 1995 NOTRUMP Small-Break ECCS Model Assessments

1) NOTRUMP Specific Enthalpy Error	+ 20.0°F
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D. 10 CFR 50.59 Evaluations

1. Loose Part (VEGP Unit 1 only) + 2.0°F

E. 1994 NOTRUMP Small-Break ECCS Model Assessments

None + 0.0°F

Licensing Basis SBLOCA PCT (Unit 1) =	<u>1809.0°F</u>
(Unit 2) =	<u>1807.0°F</u>

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 were combined with the 10 CFR 50.59 evaluation and the VEGP SBLOCA analysis results, it was determined that compliance with the requirements of 10 CFR 50.46 would be maintained for both Units 1 and 2.

REFERENCES

1. LCV-0579, "Vogtle Electric Generating Plant, 10 CFR 50.46 ECCS Evaluation Models 1994 Annual Report," letter from C. K. McCoy (GPC) to USNRC, dated March 17, 1995.
2. WCAP-13451, "Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting," dated October 1992.
3. "The 1981 Version of the Westinghouse ECCS Evaluation Model Using the BASH Code," WCAP-10266-P-A, Rev. 2, (Proprietary), March 1987.
4. 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.
5. ELV-03375, "Vogtle Electric Generating Plant, Licensing Change Power Upgrading," letter from C. K. McCoy (GPC) to the NRC, dated February 28, 1992.
6. "Westinghouse Small-Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A (Proprietary) and WCAP-10081-A (Non-Proprietary), August 1985.