September 19, 1991

Docket Nos. 50-424
and 50-425

Distribution
See next page

Mr. W. G. Hairston, III
Senior Vice President -
Nuclear Operations
Georgia Power Company
P. O. Box 1295
Birmingham, Alabama 35201

Dear Mr. Hairston:

SUBJECT: ISSUANCE OF AMENDMENT NOS. 45 AND 46 TO FACILITY OPERATING LICENSE NPF-68 AND AMENDMENT NO. 25 TO FACILITY OPERATING LICENSE NPF-81 - VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2 (TACS 80082 AND 80083)

The Nuclear Regulatory Commission has issued the enclosed Amendment Nos. 45 and 46 to Facility Operating License No. NPF-68 and Amendment No. 25 to Facility Operating License No. NPF-81 for the Vogtle Electric Generating Plant, Units 1 and 2. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated November 29, 1990, as supplemented January 29 and March 6, 1991, and as revised March 29, 1991, as supplemented August 8, 1991. The changes to the TSs accommodate removal of the Resistance Temperature Detector (RTD) bypass system.

Consistent with your request to implement TS changes in conjunction with the initial loading of VANTAGE-5 fuel, Amendment No. 45 is effective beginning with Vogtle Unit 1 Cycle 4, and Amendment Nos. 46 and 25 are effective beginning with Vogtle Unit 2 Cycle 3.

A copy of the related Safety Evaluation is also enclosed. Notice of issuance of the amendments will be included in the Commission's biweekly Federal Register notice.

Sincerely,

ORIGINAL SIGNED BY: K. KJABBOUR

Darl S. Hood, Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment Nos. 45 and 46 to NPF-68
2. Amendment No. 25 to NPF-81
3. Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

September 19, 1991

Docket No. 50-424
and 50-425

Mr. W. G. Hairston, III
Senior Vice President -
Nuclear Operations
Georgia Power Company
P. O. Box 1295
Birmingham, Alabama 35201

Dear Mr. Hairston:

SUBJECT: ISSUANCE OF AMENDMENT NOS. 45 AND 46 TO FACILITY OPERATING LICENSE NPF-68 AND AMENDMENT NO. 25 TO FACILITY OPERATING LICENSE NPF-81 - VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2 (TACS 80082 AND 80083)

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Consistent with your request to implement TS changes in conjunction with the initial loading of VANTAGE-5 fuel, Amendment No. 45 is effective beginning with Vogtle Unit 1 Cycle 4, and Amendment Nos. 46 and 25 are effective beginning with Vogtle Unit 2 Cycle 3.

A copy of the related Safety Evaluation is also enclosed. Notice of issuance of the amendments will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Kahe N. Jabbour for
Darl S. Hood, Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment Nos. 45 and 46 to NPF-68
2. Amendment No. 25 to NPF-81
3. Safety Evaluation

cc w/enclosures:
See next page

DATED: SEPTEMBER 19, 1991

AMENDMENT NOS. 45 AND 46 TO FACILITY OPERATING LICENSE NPF-68 - Vogtle, Unit 1
AMENDMENT NO. 25 TO FACILITY OPERATING LICENSE NPF-81 - Vogtle, Unit 2

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Mr. W. G. Hairston, III
Georgia Power Company

Vogtle Electric Generating Plant

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

GEORGIA POWER COMPANY

OGLETHORPE POWER CORPORATION

MUNICIPAL ELECTRIC AUTHORITY OF GEORGIA

CITY OF DALTON, GEORGIA

DOCKET NO. 50-424

VOGTLE ELECTRIC GENERATING PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 45
License No. NPF-68

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Vogtle Electric Generating Plant, Unit 1 (the facility) Facility Operating License No. NPF-68 filed by the Georgia Power Company, acting for itself, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and City of Dalton, Georgia (the licensees) dated November 29, 1990, as supplemented January 29 and March 6, 1991, and as revised March 29, 1991, as supplemented August 8, 1991, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. NPF-68 is hereby amended to read as follows:

   Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 45, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. GPC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective beginning with Vogtle Unit 1 Cycle 4 startup.

FOR THE NUCLEAR REGULATORY COMMISSION

Kahtan N. Jabbour for

David B. Matthews, Director
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: September 19, 1991

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

GEORGIA POWER COMPANY

OGLETHORPE POWER CORPORATION

MUNICIPAL ELECTRIC AUTHORITY OF GEORGIA

CITY OF DALTON, GEORGIA

DOCKET NO. 50-424

VOGTLE ELECTRIC GENERATING PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 46
License No. NPF-68

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Vogtle Electric Generating Plant, Unit 1 (the facility) Facility Operating License No. NPF-68 filed by the Georgia Power Company, acting for itself, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and City of Dalton, Georgia (the licensees) dated November 29, 1990, as supplemented January 29 and March 6, 1991, and as revised March 29, 1991, as supplemented August 8, 1991, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. NPF-68 is hereby amended to read as follows:

   Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 46, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. GPC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective beginning with Vogtle Unit 2 Cycle 3 startup.

FOR THE NUCLEAR REGULATORY COMMISSION

Kahtan N. Jabbour for

David B. Matthews, Director
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: September 19, 1991

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

GEORGIA POWER COMPANY

OGLETHORPE POWER CORPORATION

MUNICIPAL ELECTRIC AUTHORITY OF GEORGIA

CITY OF DALTON, GEORGIA

DOCKET NO. 50-425

VOGTLE ELECTRIC GENERATING PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 25
License No. NPF-81

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Vogtle Electric Generating Plant, Unit 2 (the facility) Facility Operating License No. NPF-81 filed by the Georgia Power Company, acting for itself, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and City of Dalton, Georgia (the licensees) dated November 29, 1990, as supplemented January 29 and March 6, 1991, and as revised March 29, 1991, as supplemented August 8, 1991, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. NPF-81 is hereby amended to read as follows:

   Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 25, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. GPC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective beginning with Vogtle Unit 2 Cycle 3 startup.

FOR THE NUCLEAR REGULATORY COMMISSION

Kahe N. Jabbour for

David B. Matthews, Director
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: September 19, 1991

ATTACHMENT TO LICENSE AMENDMENT NOS. 45 AND 46

FACILITY OPERATING LICENSE NO. NPF-68

AND LICENSE AMENDMENT NO. 25

FACILITY OPERATING LICENSE NO. NPF-81

DOCKET NOS. 50-424 AND 50-425

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change.

Phase 1 is effective beginning with Unit 1 Cycle 4 reload, and Phase 2 is effective beginning with Unit 2 Cycle 3 reload.

	Remove Pages	Insert Pages
Phase 1	2-8	2-8
	2-10	2-10
	3/4 3-14	3/4 3-14
Phase 2	2-8	2-8
	2-10	2-10
	3/4 3-9	3/4 3-9
	3/4 3-14	3/4 3-14

PHASE 1

THIS PAGE APPLICABLE TO UNIT 1 ONLY

TABLE 2.2-1 (Continued)

TABLE NOTATIONS - UNIT 1

NOTE 1: OVERTEMPERATURE ΔT

$$\Delta T \frac{(1 + \tau_1 S)}{(1 + \tau_2 S)} \left(\frac{1}{1 + \tau_3 S}\right) \leq \Delta T_0 \left\{K_1 - K_2 \frac{(1 + \tau_4 S)}{(1 + \tau_5 S)} \left[T \left(\frac{1}{1 + \tau_6 S}\right) - T'\right] + K_3(P - P') - f_1(\Delta I)\right\}$$

Where:

ΔT	=	Measured ΔT
$\frac{1 + \tau_1 S}{1 + \tau_2 S}$	=	Lead-lag compensator on measured ΔT;
τ_1, τ_2	=	Time constants utilized in lead-lag compensator for ΔT, $\tau_1 \geq 8$ s, $\tau_2 \leq 3$ s;
$\frac{1}{1 + \tau_3 S}$	=	Lag compensator on measured ΔT;
τ_3	=	Time constants utilized in the lag compensator for ΔT, $\tau_3 = 0$ s;
ΔT_0	=	Indicated ΔT at RATED THERMAL POWER;
K_1	$\leq$	1.12 (UNIT 1);
K_2	=	0.0224/°F (UNIT 1);
$\frac{1 + \tau_4 S}{1 + \tau_5 S}$	=	The function generated by the lead-lag compensator for T_{avg} dynamic compensation;
τ_4, τ_5	=	Time constants utilized in the lead-lag compensator for T_{avg}, $\tau_4 \geq 28$ s, $\tau_5 \leq 4$ s;
T	=	Average temperature, °F;
$\frac{1}{1 + \tau_6 S}$	=	Lag compensator on measured T_{avg};
τ_6	=	Time constant utilized in the measured T_{avg} lag compensator, $\tau_6 = 0$ s;

THIS PAGE APPLICABLE TO UNIT 1 ONLY

TABLE 2.2-1 (Continued)

TABLE NOTATIONS (Continued) - UNIT 1

NOTE 3: OVERPOWER ΔT

$$\Delta T \frac{(1 + \tau_1 S)}{(1 + \tau_2 S)} \left(\frac{1}{(1 + \tau_3 S)}\right) \leq \Delta T_0 \left\{K_4 - K_5 \frac{(\tau_7 S)}{(1 + \tau_7 S)} \left(\frac{1}{(1 + \tau_6 S)}\right) T - K_6 \left[T \left(\frac{1}{(1 + \tau_6 S)}\right) - T''\right] - f_2(\Delta I)\right\}$$

Where:

ΔT	=	Measured ΔT
$\frac{1 + \tau_1 S}{1 + \tau_2 S}$	=	Lead-lag compensator on measured ΔT;
τ_1, τ_2	=	Time constants utilized in lead-lag compensator for ΔT, $\tau_1 \geq 8$ S, $\tau_2 \leq 3$ s;
$\frac{1}{1 + \tau_3 S}$	=	Lag compensator on measured ΔT;
τ_3	=	Time constants utilized in the lag compensator for ΔT, τ_3=0s;
ΔT_0	=	Indicated ΔT at RATED THERMAL POWER;
K_4	$\leq$	1.08 (UNIT 1),
K_5	$\geq$	0.02/°F for increasing average temperature and $\geq$ 0 for decreasing average temperature,
$\frac{\tau_7 S}{1 + \tau_7 S}$	=	The function generated by the rate-lag compensator for T_{avg} dynamic compensation,
τ_7	=	Time constants utilized in the rate-lag compensator for T_{avg}, $\tau_7 \geq 10$ s,
$\frac{1}{1 + \tau_6 S}$	=	Lag compensator on measured T_{avg};

TABLE 4.3-1 (Continued)

TABLE NOTATIONS (Continued)

(10) Setpoint verification is not applicable.

(11) The TRIP ACTUATING DEVICE OPERATIONAL TEST shall include independent verification of the OPERABILITY of the Undervoltage and Shunt trip of the Reactor Trip Breaker.

(12) For Unit 2, the CHANNEL CALIBRATION shall include the RTD bypass loops flow rate.

(13) Not used.

(14) The TRIP ACTUATING DEVICE OPERATIONAL TEST shall independently verify the OPERABILITY of the undervoltage and shunt trip circuits for the Manual Reactor Trip Function. The test shall also verify the OPERABILITY of the Bypass Breaker trip circuit(s).

(15) Local manual shunt trip prior to placing breaker in service.

(16) Automatic undervoltage trip.

(17) Each channel shall be tested at least every 92 days on a STAGGERED TEST BASIS.

(18) The surveillance frequency and/or MODES specified for these channels in Table 4.3-2 are more restrictive and, therefore, applicable.

PHASE 2

TABLE 2.2-1 (Continued)

TABLE NOTATIONS

NOTE 1: OVERTEMPERATURE ΔT

$$\Delta T \frac{(1 + \tau_1 S)}{(1 + \tau_2 S)} \left(\frac{1}{1 + \tau_3 S}\right) \leq \Delta T_o \left\{K_1 - K_2 \frac{(1 + \tau_4 S)}{(1 + \tau_5 S)} \left[T \left(\frac{1}{1 + \tau_6 S}\right) - T'\right] + K_3(P - P') - f_1(\Delta I)\right\}$$

Where:

ΔT	=	Measured ΔT
$\frac{1 + \tau_1 S}{1 + \tau_2 S}$	=	Lead-lag compensator on measured ΔT;
τ_1, τ_2	=	Time constants utilized in lead-lag compensator for ΔT, $\tau_1 \geq 8$ s, $\tau_2 \leq 3$ s;
$\frac{1}{1 + \tau_3 S}$	=	Lag compensator on measured ΔT;
τ_3	=	Time constants utilized in the lag compensator for ΔT, $\tau_3 = 0$ s;
ΔT_o	=	Indicated ΔT at RATED THERMAL POWER;
K_1	$\leq$	1.12
K_2	=	0.0224/°F
$\frac{1 + \tau_4 S}{1 + \tau_5 S}$	=	The function generated by the lead-lag compensator for T_{avg} dynamic compensation;
τ_4, τ_5	=	Time constants utilized in the lead-lag compensator for T_{avg}, $\tau_4 \geq 28$ s, $\tau_5 \leq 4$ s;
T	=	Average temperature, °F;
$\frac{1}{1 + \tau_6 S}$	=	Lag compensator on measured T_{avg};
τ_6	=	Time constant utilized in the measured T_{avg} lag compensator, $\tau_6 = 0$ s;

TABLE 2.2-1 (Continued)

TABLE NOTATIONS (Continued)

NOTE 3: OVERPOWER ΔT

$$\Delta T \frac{(1 + \tau_1 S)}{(1 + \tau_2 S)} \left(\frac{1}{(1 + \tau_3 S)}\right) \leq \Delta T_o \{K_4 - K_5 \left(\frac{\tau_7 S}{(1 + \tau_7 S)}\right) \left(\frac{1}{(1 + \tau_6 S)}\right) T - K_6 [T \left(\frac{1}{(1 + \tau_6 S)}\right) - T''] - f_2(\Delta I)\}$$

Where:

ΔT	=	Measured ΔT
$\frac{1 + \tau_1 S}{1 + \tau_2 S}$	=	Lead-lag compensator on measured ΔT;
τ_1, τ_2	=	Time constants utilized in lead-lag compensator for ΔT, $\tau_1 \geq 8$ S, $\tau_2 \leq 3$ s;
$\frac{1}{1 + \tau_3 S}$	=	Lag compensator on measured ΔT;
τ_3	=	Time constants utilized in the lag compensator for ΔT, τ_3=0s;
ΔT_o	=	Indicated ΔT at RATED THERMAL POWER;
K_4	$\leq$	1.08
K_5	$\geq$	0.02/°F for increasing average temperature and $\geq$ 0 for decreasing average temperature,
$\frac{\tau_7 S}{1 + \tau_7 S}$	=	The function generated by the rate-lag compensator for T_{avg} dynamic compensation,
τ_7	=	Time constants utilized in the rate-lag compensator for T_{avg}, $\tau_7 \geq 10$ s,
$\frac{1}{1 + \tau_6 S}$	=	Lag compensator on measured T_{avg};

TABLE 4.3-1

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
1. Manual Reactor Trip	N.A.	N.A.	N.A.	R(14)	N.A.	1, 2, 3[a], 4[a], 5[a]
2. Power Range, Neutron Flux (NI-0041B&C, NI-0042B&C, NI-0043B&C, NI-0044B&C)						
a. High Setpoint	S	D(2, 4), M(3, 4), Q(4, 6), R(4, 5)	Q(17)	N.A.	N.A.	1, 2
b. Low Setpoint	S	R(4)	S/U(1)	N.A.	N.A.	1[d], 2
3. Power Range, Neutron Flux, High Positive Rate (NI-0041B&C, NI-0042B&C, NI-0043B&C, NI-0044B&C)	N.A.	R(4)	Q(17)	N.A.	N.A.	1, 2
4. Power Range, Neutron Flux, High Negative Rate (NI-0041B&C, NI-0042B&C, NI-0043B&C, NI-0044B&C)	N.A.	R(4)	Q(17)	N.A.	N.A.	1, 2
5. Intermediate Range, Neutron Flux (NI-0035B,D&E, NI-0036B,D&G)	S	R(4, 5)	S/U(1)	N.A.	N.A.	1[d], 2
6. Source Range, Neutron Flux (NI-0031B,D&E, NI-0032B,D&G)	S	R(4, 5)	S/U(1),Q(9,17)	N.A.	N.A.	2[c], 3, 4, 5
7. Overtemperature ΔT (TDI-0411C, TDI-0421C, TDI-0431C, TDI-0441C)	S	R	Q(17)	N.A.	N.A.	1, 2

TABLE 4.3-1 (Continued)

TABLE NOTATIONS (Continued)

(10) Setpoint verification is not applicable.

(11) The TRIP ACTUATING DEVICE OPERATIONAL TEST shall include independent verification of the OPERABILITY of the Undervoltage and Shunt trip of the Reactor Trip Breaker.

(12) Not used.

(13) Not used.

(14) The TRIP ACTUATING DEVICE OPERATIONAL TEST shall independently verify the OPERABILITY of the undervoltage and shunt trip circuits for the Manual Reactor Trip Function. The test shall also verify the OPERABILITY of the Bypass Breaker trip circuit(s).

(15) Local manual shunt trip prior to placing breaker in service.

(16) Automatic undervoltage trip.

(17) Each channel shall be tested at least every 92 days on a STAGGERED TEST BASIS.

(18) The surveillance frequency and/or MODES specified for these channels in Table 4.3-2 are more restrictive and, therefore, applicable.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 45 AND 46 TO FACILITY OPERATING LICENSE NPF-68

AND AMENDMENT NO. 25 TO FACILITY OPERATING LICENSE NPF-81

GEORGIA POWER COMPANY, ET AL.

VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 50-424 AND 50-425

1.0 INTRODUCTION

By letters dated November 29, 1990, as supplemented January 29 and March 6, 1991, and as revised March 29, 1991, as supplemented July 16, August 5, August 8, and August 19, 1991, Georgia Power Company, et al. (GPC or the licensee), submitted a request for changes to the Technical Specifications (TSs) for the Vogtle Electric Generating Plant, Units 1 and 2. Additional information was provided, as requested, in the July 16, 1991 letter, and letter dated August 19, 1991, the licensee provided clarifying information. By letter dated August 5, 1991, the licensee forwarded errata sheets to correct a typographical error in the WCAP-12788 Rev. 1 (Proprietary)/WCAP-12789 Rev. 1 (Non-Proprietary), "RTD Bypass Elimination Licensing Report for Vogtle Generating Plant." These letters did not change the initial proposed no significant hazards consideration determination.

The requested changes would revise the TSs to accommodate the removal of the Resistance Temperature Detector (RTD) bypass system and installation of narrow range, fast response RTDs which would be located directly in the hot and cold leg piping. In addition to, and concurrent with the RTD bypass system elimination, signal processing would be upgraded by additions to the process control (Westinghouse Model 7300) racks using 7300 technology.

Other changes in the licensee's submittals are outside the scope of this Safety Evaluation.

This design modification is desired by the licensee because of problems with the existing RTD bypass system due to leakage from valve packing or mechanical joints. These problems reduce system reliability and result in high radiation doses during the performance of maintenance around the RTD bypass system. The licensee indicated that the detailed engineering and installation of this system would be done by the Westinghouse Electric Company (W) and would be scheduled in conjunction with their initial loading of VANTAGE-5 fuel, which would be Cycle 4 for Unit 1 and Cycle 3 for Unit 2.

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P PDR

2.0 EVALUATION

2.1 Current System

The present reactor coolant temperature measurement system uses coolant scoops in the primary coolant to divert a portion of the reactor coolant into bypass manifold loops. The RTDs for T-hot and T-cold temperature measurement are located within the bypass manifolds and are inserted directly into the reactor coolant bypass flow without thermowells. Separate bypass loops are provided for each reactor coolant loop to develop individual T-hot and T-cold loop temperature signals for use in the reactor protection and control systems.

Bypass piping from the hot leg side of each steam generator to the crossover leg is used for the T-hot RTDs. Additional bypass piping from the cold leg side of the reactor coolant pump to the crossover leg is used for the T-cold RTD. Both T-hot and T-cold manifolds empty through a common header to the crossover leg between the steam generator and reactor coolant pump. Flow for each T-hot bypass loop is provided by three scoops located at 120 degree intervals around the hot leg piping. Because of the mixing effects of the reactor coolant pump only one scoop connection is required for bypass flow to the T-cold bypass manifold. Each scoop has five orifices which sample the hot leg flow along the leading edge of the scoop.

The bypass manifold system was developed to resolve concerns with temperature streaming (temperature gradients) within the hot leg primary coolant. The temperature streaming experienced in the hot leg piping is a result of incomplete mixing of the coolant leaving various regions of the reactor core at different temperatures. The bypass manifold system compensates for the temperature streaming by mixing the primary coolant within the bypass manifold. The bypass manifold system also limits high velocity coolant flow to the RTDs and allows RTD replacement without the need to drain the reactor coolant system.

The output from the bypass loop RTDs provides the signals necessary to calculate the arithmetic average loop temperature (T-average) and the loop differential temperature (Delta-T). The T-average and Delta-T signals are then input to the reactor protection system. The T-average and Delta-T signals for the plant control system are derived from the same set of protection system RTDs and T-average and Delta-T calculations. The T-average and Delta-T values are provided to the plant control system through isolation devices.

As referenced by the licensee, the bypass manifold system created its own set of operational problems. Examples referenced by the licensee included plant shutdowns due to primary leakage through valves or flanges, and the interruption of bypass flow due to valve stem failure. Additionally, the licensee stated that the bypass piping contributes to increased man-rem exposure when maintenance must be performed in bypass manifold system areas.

2.1.2 Proposed System

The proposed system for hot leg temperature measurement for each loop would use three fast response, narrow range, dual element RTDs mounted in thermowells. The hot leg RTDs would be mounted in thermowells within the existing bypass manifold scoop penetrations. Each bypass scoop would be modified such that reactor coolant would flow in through the existing holes of the bypass scoop past the RTD/thermowell assembly and out through a new hole machined in the bypass scoop. This modified RTD arrangement would perform the same sampling/ temperature averaging function as the original bypass manifold system.

The cold leg temperature measurements would be obtained by one fast response, narrow range, dual element RTD located at the discharge of the reactor coolant pump. This RTD would be mounted in a thermowell within the existing cold leg bypass manifold penetration. Because of the mixing action of the reactor coolant pump, temperature gradients in the cold leg are minimized and only one RTD is necessary for cold leg temperature measurement. As in the hot leg, the bypass manifold penetration would be modified to accept the RTD thermowell. Additionally, the bypass manifold return line would be capped at the nozzle on the crossover leg.

The licensee would replace the bypass manifold direct immersion RTDs with Weed Instrument Company Inc. dual element RTDs mounted in thermowells. One of each of the RTD dual elements would be placed in service while the other would be installed as a spare. The spare element of each RTD would be terminated at the 7300 rack input terminals in the control room. This arrangement would allow on-line accessibility to the RTD spare elements in the event of an RTD element failure.

Each hot leg temperature input for protection system functions would be developed by electronically averaging the signals from the three new fast response, narrow range RTDs. This averaged input would replace the single input from the currently installed hot let RTD. Each cold leg input for protection system functions would be provided by the new fast response, narrow range RTD which replaces the currently installed cold leg RTD. In the event of a hot leg RTD failure, the electronics would allow a bias developed from historical data for the failed RTD to be manually added via a potentiometer to the remaining two RTD signals in order to obtain an average value comparable to the three-RTD average prior to failure of one RTD. If a cold leg RTD fails, the spare cold leg RTD can be used instead. The failure of an RTD would be detected by the T-average or Delta-T deviation alarm.

Inputs for the control system functions would be provided, through isolators, from the average loop temperatures and loop differential temperatures calculated by the protection system. This aspect of the design has not been changed; only the use of three hot leg RTDs instead of one per loop to provide an average hot leg temperature is different.

2.2 Analysis

The licensee presented information regarding the response time of the new RTD measurement system and also the accuracy of the new method for measuring the hot leg temperature by scoop mixing as designed by Westinghouse. The RTD response time and accuracy affect the accident analyses.

2.2.1 RTD Response Time

As shown in the tabulation below, the response time for overtemperature Delta-T for the proposed system has some gains and losses compared to the existing RTD bypass system, but the total response time of the proposed system remains the same as for the existing system (6.0 sec).

RESPONSE TIME PARAMETERS FOR RCS TEMPERATURE MEASUREMENT

	Present RTD Bypass System	Proposed Fast Response Thermowell RTD System
RTD Bypass Piping and Thermal Lag (sec)	2.0	N/A
RTD Response Time (sec)	2.0	4.0
Electronics Delay (sec)	2.0	2.0
Total Response Time (sec)	6.0 sec	6.0 sec

The Technical Specification limit is 6.0 seconds.

NUREG-0809, "Review of Resistance Temperature Detector Time Response Characteristics," points out that RTD response times have been known to degrade and that the Loop Current Step Response (LCSR) methodology is the recommended on-site method for checking RTD response times. The licensee, in its July 16, 1991, letter, has stated that they would perform RTD response time testing using the recommended LCSR method as stated in NUREG/CR-5560, "Aging of Nuclear Plant Resistance Temperature Detectors," for checking the RTD response time. The on-site response time testing of the RTDs would be performed by the licensee once every refueling cycle (18 months). The licensee also indicated that the measured value of the RTD response time would be increased consistent with NUREG/CR-5560 to account for the uncertainty in the LCSR method. Since the NUREG/CR-5560 states that the LCSR method provide results within 10 percent of the actual step response of the RTD, the measured RTD response time should be increased by 10 percent. Permanent records of RTD response time test results would be maintained to identify a drift in measured response time. The licensee indicated that the 2.0 second electronic delay time for processing is conservative and, therefore, provides some margin to the total response time.

Based on the above information, the staff finds that the RTD response time has been addressed in an acceptable manner and these modifications will continue to provide hot and cold temperature information for reactor startup, shutdown, or post accident monitoring.

2.2.2 RTD Uncertainty

The new method of measuring each hot leg temperature with three thermowell RTDs, has been analyzed by the licensee to be at least as effective as the RTDs in the existing bypass system. The dual element Weed RTDs have improved accuracy over the existing RTDs. The total uncertainty including a value for drift in addition to the normal accuracy (includes hysteresis and repeatability) has been appropriately incorporated in the licensee's set point analysis.

Because three RTDs are used to measure each hot leg temperature instead of the existing single measurement, the error associated with the hot leg measurement is reduced to one over the square root of three compared to a single RTD. The three signals, which account for the non-uniform temperature streaming, would be averaged to obtain the loop's T-hot value. The existing overall channel functional checks and calibration accuracy requirements would be maintained. The impact of the rack drift has also been considered in the licensee evaluation. The impact of the additional electronics needed for the two additional hot leg RTDs per loop has been evaluated by the licensee to be minimal.

The net result of the proposed RTD bypass system modification is a slight improvement in the accuracy of the temperature related functions compared to the existing RTDs in the bypass system. The licensee has reviewed the impact of the proposed modifications on the Vogtle setpoint study to verify that the accuracy of the temperature related functions are met.

The licensee has made a commitment to obtain confirmatory information on the mixed mean temperature accuracy. The pre-installation and post-installation calorimetric data on the RTD temperature measurements for the Vogtle plants should be compared and the differences reconciled. The licensee will make the data available to the staff.

2.2.3 RTD Failure Detection

The failure of an RTD would be detected by the deviation alarm. This alarm system compares T-average and Delta-T to a pre-set threshold value.

For the T-average the threshold value is set to ±2°F. The T-aeravge would be obtained for each of the three loops by first calculating the average T-hot of the three dual element RTDs in each of the hot legs. T-average for a given loop would be obtained by adding the T-cold values to the average of the T-hot values and dividing by two. If any of the other Vogtle T-average values differ from the ±2°F range, the deviation alarm goes off and that T-average is considered to be unacceptable. The RTDs in that loop would be examined by a channel check to find the particular RTD, among the three in that hot leg, that has failed.

For the Delta-T deviation, a failed RTD would be detected by the loop Delta-T deviation alarm, currently set at ±3°F. The Delta-T value for each loop would be obtained by subtracting the T-cold value for the cold leg from the average T-hot value for each loop. The Delta-T value from the other three loops would be compared against the Delta-T value and any deviation greater than ±3°F sets off the alarm and would be considered a failure. The particular RTD that has failed, among the three in that hot leg, would be found by a channel check.

With the failure of one of the RTDs, the failed RTD would be disconnected and the hot leg temperature measurement would be obtained by averaging the remaining two RTD measurements and applying a bias correction. If two or more of the three hot leg RTDs or both cold leg RTD elements fail in the same protection channel then that channel would be considered inoperable and would be placed in trip. Any failed RTD's would be replaced at the next outage by connecting the spare one in the dual elements.

For the cold leg, if an active RTD fails, it would be disconnected from the 7300 cabinets and would be replaced by the spare RTD element. In addition to the continual monitoring by the T-average and Delta-T deviation alarm method, channel check would be performed for each RTD every twelve hours which will detect a failed RTD.

From experience, the licensee has noted that when a RTD fails there is usually a very large change in its measurement value. The deviation alarms have been set at values that are high enough to avoid spurious alarms from the normal fluctuations in signals and low enough to avoid excessively large variations.

2.2.4 Flow Measurement Uncertainty

A flow measurement uncertainty analysis presented in WCAP-12788 Rev. 1 (Proprietary)/WCAP-12789 Rev. 1 (Non-Proprietary), "RTD Bypass Elimination Licensing Report for Vogtle Generating Plant," indicate calculated value of 1.9% (2.0% including a 0.1% feedwater fouling penalty). In a letter dated March 29, 1991, GPC stated that with the removal of the RTD bypass system a more conservative flow measurement uncertainty value of 2.3% (including a 0.1% feedwater fouling penalty) would be used in the Vogtle plant TSs. This flow measurement uncertainty was further increased to 2.7% by the licensee in their August 8, 1991 letter, to account for uncertainty associated with the reading of RCS flow at the main control board flow indicators. Associated with the 2.7% uncertainty, RCS flow of 393,136 gpm was provided by the licensee in their August 19, 1991 letter. The RCS flow and flow measurement uncertainty were evaluated and found acceptable by the NRC staff in their Safety Evaluation of VANTAGE-5 fuel reload dated September 19, 1991.

The licensee, in its July 16, 1991 letter, stated that they would perform a cross-calibration of all RTDs during each refueling cycle by comparing the installed RTD temperatures to each other. The licensee indicated that this would ensure proper applicability of the temperature parameter as presented in the flow measurement uncertainty analysis. To assure that there is no systematic drift of the RTDs in one direction with time, the licensee should use trending of "as found" and "as left" data to detect a drift if it should occur. NUREG/CR-5560 recommends that if problems in drift are found a few RTDs should be removed at each refueling outage, recalibrated, and the results used along with the cross calibration data to determine the "as found" status of the plant RTDs.

2.2.5 Non-LOCA and LOCA Accidents Safety Analyses

By letter dated November 29, 1990, the licensee proposed to amend the Vogtle Units 1 and 2 TSs to allow the use of reload fuel assemblies of the Westinghouse VANTAGE-5 design. The staff review found the transient and accident analyses using the VANTAGE 5 fuel to be acceptable.

The impact of the RTD bypass elimination for the Vogtle plants on FSAR Chapter 15 LOCA and non-LOCA accidents have been evaluated by the licensee. These analyses indicate that the temperature response time and accuracy of the new system uncertainties associated with RCS temperature and flow measurement is not degraded, and therefore, the conclusions in the FSAR remain valid.

Therefore, the plant design changes due to the RTD bypass elimination are acceptable from a LOCA and non-LOCA analyses standpoint without requiring any detailed reanalysis for the effect of the removal of the RTD bypass system.

2.2.6 Instrumentation and Controls

Based on our review, the staff concludes that the modified RTD system is not functionally different from the current system except for the use of three RTDs instead of one in each hot leg.

To support the modifications required to eliminate the RTD bypass manifold system, the licensee proposed changes to the Vogtle Electric Generating Plant TS. The TS revisions are a result of differences in the instrument system uncertainties between the thermowell mounted RTD system and the bypass manifold temperature measurement system as outlined in the licensee's March 29, 1991, and November 29, 1990 letters for RTD bypass manifold removal and VANTAGE-5 fuel TS amendments. The TS revisions for instrument uncertainty values have been approvd by the staff in their safety evaluations associated with the VANTAGE-5 TS amendments. It should be noted that the evaluation assumes that the RTD bypass elimination occurs no earlier than the first reload incorporating VANTAGE-5 fuel.

The TS changes submitted to the staff for VANTAGE-5 fuel included sufficient limits to allow reactor coolant system (RCS) temperatures to be measured by bypass manifold RTDs or thermowell mounted RTDs located directly within the RCS loops. The TS revisions for Overtemperature Delta-T and Overpower Delta-T reactor trip setpoints (Table 2.2-1) are included in the VANTAGE-5 reload TS amendment. The changes include revised Z, S, and allowable values for Overtemperature Delta-T and Overpower Delta-T. Various notes and bases that reference the bypass manifold RTDs are also revised.

The control system T-average and Delta-T signals are derived from the reactor protection system T-average and Delta-T calculations and provided to the plant control system through isolation devices. The isolation devices and control system input methodology for T-average and Delta-T are not revised per this TS amendment and continue to meet the licensee basis as outlined in Chapter 7 of the Vogtle Electric Generating Plant Final Safety Analysis Report.

2.2.7 Mechanical Safety Evaluation

The staff has reviewed the fabrication and inspection methods described in the licensee's letter dated March 29, 1991, for the replacement of the RTD bypass system with the new RTD thermowell system. This change requires modifications to the hot leg scoops, the crossover leg bypass return nozzle, the cold leg

piping and the cold leg bypass manifold connection. The new thermowells, caps, and penetrations would be fabricated in accordance with the ASME Code, Section III. The licensee would perform welding using approved procedures and the welding would be inspected by penetrant testing per the ASME Code, Section XI. In accordance with Article IWA-4000 of Section XI, Hydrostatic test of the new pressure boundary welds will be performed in accordance with Article IWA-400 of Section XI.

2.2.8 Radiological Safety Evaluation

The RTD bypass system has been a contributor to plant outages as well as occupational radiation exposure associated with maintenance activities. The licensee has noted that based on data recorded at other plants, radiation exposures associated with the RTD bypass manifold are about 80-90 person-rem per outage. These exposures are received by personnel who work on the RTD bypass manifolds as well as those working on other systems such as reactor coolant pumps and steam generators located in the vicinity of the manifolds.

The licensee also noted that radiation exposures incurred by other licensees in removing RTD bypass manifolds have ranged from a low of 74 person-rem to a high of 178 person-rem. The licensee thus noted that significant personnel radiation exposure reductions would be expected to be attained over the life of the Vogtle units, even assuming the highest reported personnel radiation exposures for RTD bypass manifold removal (178 person-rem) are incurred at the Vogtle units.

As noted in the March 29, 1991 letter, GPC will implement necessary training (including the use of mockups), tooling, shielding, and decontamination to reduce exposures to levels which are as low as is reasonably achievable.

The licensee estimated that approximately 1000 ft^3 of solid waste is expected to be generated per plant, of which about 160 ft^3 is piping weighing about 3,000 lbs. GPC indicated that the piping and valves removed will be cut into pieces and shipped in standard B-25 containers. This quantity of solid waste represents less than 5% of the average volume of radioactive waste shipped per PWR in recent years (729 cubic meters per reactor-year).

The staff has reviewed the changes proposed by the licensee and finds that a substantial net reduction in personnel radiation exposures would be expected to be achieved as a result of the proposed modifications. In addition, the staff agrees with the licensee's assertion that significant reductions in personnel exposure will result from these modifications with a minimum cost in terms of generation of waste or exposure during the modifications.

The licensee has evaluated the impact of RTD bypass eliminations on the FSAR Chapter 15 safety analyses and the radiological consequences of analyzed events and concluded that there are no additional radiological consequences associated with the proposed modification since no additional mass releases were predicted and since fuel integrity and mitigating equipment integrity is maintained. The consequences of analyzed transient and accidents have been previously evaluated by the staff in the Vogtle 1, 2 Safety Evaluation Report associated with VANTAGE-5 fuel reload and found acceptable. These analyses are bounding for the proposed modifications.

Based on the above, the NRC staff concludes that the licensee's proposal will result in substantial personnel exposure reductions with no increase in calculated radiological consequences of postulated accidents and transients. Therefore, the changes are acceptable.

3.0 EVALUATION OF TECHNICAL SPECIFICATIONS

As a result of the modifications associated with the removal of the existing bypass manifold and replacement with the new RTDs, changes to the plant's Technical Specifications were proposed by the licensee. The removal of the RTD manifold would be done in two phases. In Phase 1 the proposed changes would initially apply to Unit 1 starting with its Cycle 4, and in Phase 2 the changes would apply to Unit 2 starting with its Cycle 3. The following Technical Specifications in the cognizant area of the Reactor Systems Branch were examined.

Change 1

Table 4.3-1, page 3/4.3-14 - "Reactor Trip System Instrumentation Surveillance Requirements" - Note 12, referring to RTD bypass loop flow, was changed to make it apply to Unit 2 only. This is acceptable as it reflects the removal of the RTD bypass system for Unit 1, whereas the RTD bypass system remains for Unit 2 in Phase 1.

Change 2

Table 4.3-1, pages 3/4 3-9 and 3/4-14 - "Reactor Trip System Instrumentation Surveillance Requirements" - Note 12, referring to RTD bypass loop flow rate, was eliminated. This is acceptable as it reflects the removal of the RTD bypass system for Unit 2 in Phase 2 in addition to its previous removal for Unit 1 in Phase 1.

Change 3

Table 2.2-1, pages 2-8 and 2-10 - "Reactor Trip System Instrumentation Trip Setpoints" - In Phase 1, the definition of Δ T in Note 1 (overtemperature ΔT) and Note 3 (overpower ΔT), would be changed from "measured Δ T by RTD Manifold Instrumentation" to "measured Δ T (Unit 1)."

Change 4

Table 2.2.1, pages 2-8 and 2-10 - "Reactor Trip System Instrumentation Trip Setpoints" - In Phase 2, the reference to Unit 1 in the definition of Δ T in Note 1 (overtemperature Δ T) and Note 3 (overtemperature Δ T), will be deleted. This is acceptable since this is the only change necessary to reflect the RTD bypass system removal for Unit 2 beginning with Phase 2 and the pages are applicable for Units 1 and 2, as approved by the VANTAGE-5 Amendment 24 dated September 19, 1991 for Unit 2.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Georgia State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (56 FR 24101 and 56 FR 41147). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Date: September 19, 1991