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Georgia Power
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Docket Nos. 50-424
50-425

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

Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
REQUEST TO REVISE TECHNICAL SPECIFICATIONS
OVERTEMPERATURE DELTA-T AND OVERPOWER DELTA-T
REACTOR TRIP FUNCTIONS

In accordance with the provisions of 10 CFR 50.90 and 10 CFR 50.59, Georgia Power Company (GPC) hereby proposes to amend the Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications, Appendix A to Operating Licenses NPF-68 and NPF-81.

The proposed change will revise the time constant (τ_3) used in the lag compensator for delta temperature in the overtemperature delta temperature (OTDT) and the overpower delta temperature (OPDT) reactor trip function equations from 0 seconds to 2 seconds. The K_4 term in the OPDT setpoint equation will also be revised from 1.08 to 1.095.

These revisions will provide additional operating margin to the reactor trip and turbine runback setpoints to account for the potential effects of the recently identified flow phenomenon in the reactor vessel upper plenum. This phenomenon results in a sudden rise in temperature in one of the hot legs with a concurrent decrease in temperature in the adjacent hot leg. This condition occurs randomly, lasts for a short period of time, and then the temperatures return to their previous values. The temperature rise has been sufficient in some cases to cause a turbine runback signal from instrumentation on the affected hot leg. This signal is considered to be spurious since it is not caused by an actual overpower or overtemperature condition. This condition was observed during the startup of VEGP Unit 1 following its last refueling outage. As a result, GPC increased the operating margin

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by reducing the difference between the turbine runback and reactor trip setpoints and increasing the difference between the reference temeprature for OPDT and OTDT and the average temperature used for the control system. The Technical Specification changes proposed by this letter will provide additional margin between the trip setpoints and the normal operating conditions.

Since GPC anticipates operation at an uprated power level for the next fuel cycle, it is prudent to provide additional operating margin to account for the potential effects of spurious signals as a result of the upper head flow phenomenon. Therefore, GPC requests that these changes to the Technical Specifications be approved by March 1, 1993, which will allow implementation in conjunction with initial operation at the uprated power level.

Although these changes are not required for safe operation at the proposed uprated power level, the nature of the anomaly and the use of operating margin in raising the operating power level to the proposed power level suggests that additional operating margin will be needed.

Enclosure 1 describes the proposed changes and the reasons for the requested changes. Enclosure 2 provides an evaluation of the proposed changes in accordance with 10 CFR 50.92 showing that the changes do not result in any significant hazards considerations. Enclosure 3 provides instructions for incorporation of the changes into the Technical Specifications and a markup of the affected pages.

In accordance with 10 CFR 50.91, the designated state official will be sent a copy of this letter and all enclosures.

Mr. C. K. McCoy states that he is a vice president of Georgia Power Company and is authorized to execute this oath on behalf of Georgia Power Company and that, to the best of his knowledge and belief, the facts set forth in this letter and enclosures are true.

GEORGIA POWER COMPANY

By: C K McCoy
C. K. McCoy

Sworn to and subscribed before me this 17TH day of SEPTEMBER 1992.

Mary A. Bentley
Notary Public

MY COMMISSION EXPIRES MAY 9, 1993

CKM/HWM/gmb

Enclosures:
1. Basis for Proposed Change
2. 10 CFR 50.92 Evaluation
3. Instructions for Incorporation and Revised Pages

c(w): 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

State of Georgia
Mr. J. D. Tanner, Commissioner, Depart. of Natural Resources

ENCLOSURE 1

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BASIS FOR PROPOSED CHANGE

Proposed Change

The proposed change will revise the time constant utilized in the lag compensator for delta temperature in the overtemperature delta temperature (OTDT) and overpower delta temperature (OPDT) reactor trip function setpoint equations in table 2.2-1 from 0 seconds to 2.0 seconds and will change the K_4 term of the OPDT equation from 1.08 to 1.095.

Background

During the startup of Vogtle Electric Generating Plant (VEGP) Unit 1 following the last refueling outage, spurious turbine runback signals were experienced. The signals were attributed to an upper head flow phenomenon that has been observed at several Westinghouse four-loop plants with a design similar to VEGP. The flow phenomenon results in a temperature rise in a hot leg with a concurrent temperature decrease in the adjacent hot leg. The problem was resolved by raising the turbine runback setpoint and operating with an average temperature slightly less than the OPDT and OTDT protection reference temperatures. The magnitude of the effect of the upper head flow phenomenon as previously observed at current power levels suggests that additional margin between the setpoints and the operating conditions at uprated power levels could be needed in order to avoid spurious signals. In order to achieve this, Westinghouse has evaluated operating with an increase in the K_4 term of the OPDT setpoint equation and a nonzero delta T lag constant (τ_3) in the OPDT and OTDT setpoint equations. These changes will provide additional reduction of the effect of the upper head flow phenomenon on the OPDT and OTDT instrumentation. The evaluations used the same models and acceptance criteria as were previously used in the safety analyses.

It is expected that the margin between the operating conditions and the OPDT and OTDT setpoints will decrease slightly at the uprated power level proposed by GPC letter ELV-03375 dated February 28, 1992. Therefore, GPC is requesting that this Technical Specification change be approved on a schedule that will allow its implementation at the same time as the implementation of operation at the uprated power level.

ENCLOSURE 2

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10 CFR 50.92 EVALUATION

Pursuant to 10 CFR 50.92, each application for amendment to an operating license must be reviewed to determine if the proposed change involves a significant hazards consideration. The proposed Technical Specification amendment, for the overtemperature delta-T (OTDT) and overpower delta-T (OPDT) reactor trip functions at an uprated reactor power of 3565 MWt, has been reviewed and deemed not to involve significant hazards considerations. The basis of this determination is presented below.

Background

Westinghouse has identified a potential operational issue related to a phenomenon discovered in the reactor vessel upper plenum, which is characterized by temperature increases in one hot leg. The loop remains at the higher temperature for several seconds, then returns to the original temperature. Simultaneously, the adjacent hot leg temperature decreases by about the same amount for the same time period. Predictions based on characterization of this temperature fluctuation to date indicate that sufficient operating margin may not exist to permit plant operation at full uprated power without the possibility of actuating OTDT and OPDT trip and turbine runback alarms in a single channel. In order to provide additional operating margin, it is necessary to modify certain parameters in the OTDT and OPDT reactor trip setpoint equations in Technical Specification table 2.2-1, which will result in the margin to support operation at uprated power. To generate the requisite margin for OTDT, it is proposed to modify the τ_3 term used in the OTDT and OPDT equation. τ_3 defines the time constant utilized in the lag compensator for measured delta-T. The OTDT reactor trip function provides core protection to prevent hot leg boiling and departure from nucleate boiling (DNB) for combinations of pressurizer pressure, reactor power, reactor coolant system (RCS) temperature, and axial power distribution. The setpoint automatically varies in accordance with the equation in NOTE 1 of Technical Specification table 2.2-1 based on changes in RCS temperature, pressurizer pressure, and axial power distribution.

To generate the requisite margin for OPDT, the same τ_3 time constant is proposed to be changed as in the OTDT equation. In addition, an increase in the value of K_4 is proposed, which defines a maximum power excursion limit. The OPDT reactor trip provides assurance of fuel integrity under possible overpower conditions, limits the required range for the OTDT trip, and provides a backup to the high neutron flux trips. The OPDT also provides protection to mitigate the consequences of various sizes of steam line breaks. The setpoint automatically varies with coolant temperature and the rate of change of temperature, which compensates for piping delays from the core to the loop temperature detectors.

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Changes to these parameters, as discussed in detail below, will provide additional margin between operating conditions and reactor trip setpoints to support plant operation at uprated power.

Analysis

In order to support operation at uprated power with the upper plenum flow phenomenon, the K_4 term in the OPDT equation will be increased from 1.08 to 1.095 to provide additional operating margin. In addition, a τ_3 value of 2 seconds will be implemented in the OPDT and OTDT equations. Increasing this delta-T time constant from 0 seconds to 2 seconds will dampen the response of the alarm electronics to any temperature spikes of short duration. In order to address the impact of changes to the OPDT and OTDT reactor trip functions discussed above, it was necessary to assess the effect of the changed OTDT and OPDT setpoints on the accidents that rely on those trips for protection. The following VEGP Final Safety Analysis Report (FSAR) events take credit for a trip on the OTDT setpoint:

- Uncontrolled rod cluster control assembly (RCCA) bank withdrawal at power (FSAR section 15.4.2)
- Inadvertent opening of a pressurizer safety or relief valve (FSAR section 15.6.1)
- Chemical and volume control system (CVCS) malfunction that results in a decrease in the boron concentration in the reactor coolant (FSAR section 15.4.6)
- Steam generator tube rupture (FSAR section 15.6.3)

The following VEGP analyses take credit for a trip on the OPDT setpoint:

- Steamline break coincident with control rod withdrawal (FSAR section 15.4.9)
- Steamline break superheat analysis (WCAP-11285)

The affects on the above accidents due to the proposed changes are addressed below.

Uncontrolled RCCA Bank Withdrawal at Power

This transient relies upon the OTDT and high neutron flux for protection to ensure that the minimum departure from nucleate boiling ratio (DNBR) remains above the limit value. A spectrum of reactivity insertion rates is considered from several initial power levels to demonstrate that these two trips provide adequate

protection. These analyses are performed assuming both minimum and maximum reactivity feedback. The cases that trip on high neutron flux will be unaffected by the increase in the measured delta-T filter from 0 to 2 seconds, whereas those cases that trip on the OTDT function are only slightly affected.

To address the increase in the measured delta-T filter time constant, analyses were performed using the same methods as were used for the existing FSAR analyses. All the cases that are currently performed for the FSAR were examined. In all cases, the minimum DNBR remained above the safety analysis DNBR limit, demonstrating that the conclusions presented in the FSAR remain valid.

CVCS Malfunction (Boron Dilution)

An increase in the measured delta-T filter time constant potentially affects the full power with manual rod control boron dilution event presented in the VEGP FSAR. In this case, the operator action time is determined from the time of reactor trip. The change in the time of trip would be minimal (<3 seconds). A change of this magnitude is insignificant relative to the total time available for operator action following the trip before a loss of shutdown margin. The 15-minute operator action time criterion would continue to be met. Therefore, the conclusions presented in the FSAR remain valid.

Steam Generator Tube Rupture (SGTR)

An increase in the measured delta-T filter time constant has no effect on the SGTR response since a 0-second delay is conservatively assumed between reaching the OTDT setpoint and reactor trip. For the SGTR event, a delay in the trip signal decreases the amount of steam released through the atmospheric relief valves.

Accidental RCS Depressurization

The RCS depressurization event is analyzed to demonstrate that the minimum DNBR does not go below the safety analysis limit value. An analysis of the event was performed using the same methods as were used for the existing FSAR analysis to determine the effects of the increased measured delta-T time constant. The analysis showed that the safety analysis DNBR limit continues to be met. Therefore, the conclusions presented in the FSAR remain valid.

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Steamline Break (SLB) with Coincident Rod Withdrawal at Power (RWAP)

The SLB with coincident RWAP (SLB/RWAP) event is analyzed to demonstrate that the minimum DNBR does not go below the safety analysis limit value. An analysis of the SLB/RWAP event was performed to determine the effect of the increased OPDT K4 gain and the increased measured delta-T filter time constant. The analysis showed that the safety analysis DNBR limit continues to be met. Therefore, the conclusions presented in the FSAR remain valid.

Superheat Analysis

The VEGP steamline break superheat analysis has four cases which trip on the OPDT reactor trip function. These cases trip early in the transient (before 30 seconds) compared to the total length of the transient (1800 seconds). Based on analyses performed for the SLB/RWAP, reactor trip would not be delayed by more than a few seconds in the SLB superheat analysis. A delay of this magnitude would not result in any significant change in the overall profile of the mass and energy releases or superheat conditions due to the extended length of the transient. Therefore, the SLB superheat analysis remains valid.

Results

Based on the information presented above, the following conclusions can be reached with respect to 10 CFR 50.92 for the changes to the OTDT and OPDT reactor trip functions.

1. The revised reactor trip functions do not involve a significant increase in the probability or consequences of an accident previously evaluated. Operation with these revised values will not cause any design or analysis acceptance criteria to be exceeded. The structural and functional integrity of any plant system is unaffected. The OTDT and OPDT reactor trip functions are part of the accident mitigation response and are not themselves initiators for any transient. Therefore, the probability of occurrence is not affected.

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The changes to the reactor trip functions do not affect the integrity of the fission product barriers utilized for mitigation of radiological dose consequences as a result of an accident. Both the margin to DNB and fuel temperature limits remain protected with the revised OTDT and OPDT setpoints, respectively. In addition, the offsite mass releases used as input to the dose calculations are unchanged from those previously assumed. Therefore, the offsite dose predictions remain within the acceptance criteria for each of the transients affected. Since it has been determined that the transient results are unaffected by these parameter modifications, it is concluded that the consequences of an accident previously evaluated are not increased.

2. The revised reactor trip functions do not create the possibility of a new or different kind of accident from any accident previously evaluated. The setpoint adjustments do not affect the assumed accident initiation sequences. No new operating configuration is being imposed by the setpoint adjustments that would create a new failure scenario. In addition, no new failure modes are being created for any plant equipment. Therefore, the types of accidents defined in the FSAR continue to represent the credible spectrum of events to be analyzed which determine safe plant operation.

3. The margin of safety associated with the OTDT and OPDT reactor trip functions is evident by the results of the accident analyses. Analyses and evaluations have been performed to determine the effect on plant response to affected transients due to the new reactor trip setpoints. This effort has confirmed that the accident analysis criteria are met, and the required margin of safety regulated for each affected safety analysis is maintained. The acceptance criteria for the analyzed event are unchanged. Thereby, the adequacy of the revised Technical Specification values to maintain safe plant operation is also confirmed, and the changes to the OTDT and OPDT reactor trip setpoints do not involve a significant reduction in a margin of safety.

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Conclusion

Based upon the preceding analysis, it has been determined that the proposed change to the Technical Specifications to modify the OTDT and OPDT reactor trip setpoints does not involve a significant increase in the probability or consequences of an accident previously evaluated, create the possibility of a new or different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed changes meet the requirements of 10 CFR 50.92(c) and do not involve a significant hazards consideration.