Georgia Power Company
333 Piedmont Avenue
Atlanta, Georgia 30308
Telephone 404 526-3195

Mailing Address
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Telephone 205 868-5086

J. D. Woodard
Senior Vice President

the southern electric system

June 28, 1996

LCV-0681-C

Docket Nos.: 50-424
50-425

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

Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
GENERIC LETTER 95-07
PRESSURE LOCKING AND THERMAL BINDING
REQUEST FOR ADDITIONAL INFORMATION

The U. S. Nuclear Regulatory Commission (NRC) issued Generic Letter 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves" on August 17, 1995. The letter requested that licensees identify any safety-related power-operated gate valves which may be susceptible to either pressure locking or thermal binding and that licensees perform additional analyses and take appropriate actions, as required, to ensure that susceptible valves are capable of performing their design-basis function. Georgia Power Company completed the engineering evaluations requested in the generic letter for the Vogtle Electric Generating Plant (VEGP) and the results of those evaluations were transmitted to the NRC in letter LCV-0681-B dated February 8, 1996.

In conjunction with the NRC's review of the above referenced submittal, a request for additional information was received on May 30, 1996. The enclosure to this letter provides GPC's response to each of the questions contained in the request for additional information. In addition, during our review relative to Question 2, GPC determined that a re-evaluation of the PORV block valve design functions should be performed. The results of this evaluation will be forwarded to the NRC by July 26, 1996.

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Georgia Power

Should you require any additional information regarding this response, please contact my office.

Sincerely,

J. D. Woodard
Senior Vice President

JDW/HET/het

Enclosure

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

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

Enclosure

Response to Request for Additional Information

Question 1

Regarding valves 1/2HV-8801A/B, Boron Injection Tank Discharge Isolation Valves, your submittal states that, in the event of a loss of offsite power, the centrifugal charging pumps (CCP) will come up to speed in approximately three seconds and release any pressure trapped in the bonnet. In addition, your submittal states that the motors for valves 1/2HV-8801A/B are capable of surviving a locked rotor condition for three seconds without incurring damage. Please provide assurance that, although the CCPs can come up to speed in three seconds, the line pressure immediately upstream of valves 1/2HV-8801A/B will not take significantly longer than three seconds to build up. Also, provide assurance that the motors for valves 1/2HV-8801A/B are capable of surviving locked rotor condition for three seconds without incurring damage.

Response

When the CCPs trip in conjunction with a loss of coolant accident (LOCA) and a loss of off site power (LOSP), the pressure in the discharge piping will decay. Assuming the RCS remains pressurized while the CCPs are tripped, the check valve upstream of the regenerative heat exchanger will close, thereby isolating the normal charging line. This will essentially bottle-up the CCP discharge piping, preventing any significant loss of water from this piping system and allowing the system to remain essentially water solid until the CCPs are restarted.

In the case of a LOSP, the diesels will respond and provide power to the 1E busses in less than 12 seconds. The CCPs and the 1/2HV-8801A/B valves are sequenced to operate at 0.5 seconds after the restoration of 1E power. Conservatively assuming that the CCPs are restarted 15 seconds following a LOCA with a LOSP, Figure 15.6.5-12 in the FSAR indicates that core pressure will be in excess of 400 psia. Therefore, it can be concluded that the normal charging line will not allow the CCP discharge piping to begin to drain while the CCPs are tripped, and that the discharge piping will remain essentially water solid.

The CCPs are tested in accordance with Procedures 14808-1&2, "Centrifugal Charging Pump and Check Valve IST and Response Time Test". In performing this test, the CCP which is being tested is aligned to the RCP seal water heat exchanger, and the time required to develop a differential pressure of 2364 psid across the pump is measured. Table 1-1 outlines the results of the most recent response time test for each pump.

Table 1-1
CCP Response Time Test Results

CCP	Test Date	Response Time
Unit 1-A Train	8/25/94	1.124 sec.
Unit 1-B Train	2/28/96	1.152 sec.
Unit 2-A Train	2/9/95	1.176 sec.
Unit 2-B Train	7/20/93	1.132 sec.

The piping configuration associated with delivering water to the RCS through the 1/2HV-8801A/B valves is substantially different than the piping configuration utilized to perform the response time testing. However, the results of the response time testing support the fact that the CCPs are capable of developing substantial discharge pressure rapidly upon receipt of a start signal. In addition, since the discharge piping will remain essentially water solid while the CCPs are tripped, the time required to repressurize this piping would be comparable to that measured in the response time testing.

With respect to the ability of the valve operator motor to withstand a locked rotor condition, the Limitorque performance curves indicate that the motor would experience a 90° C temperature rise in 10 seconds based on an ambient temperature of 40° C. The 40° C ambient temperature is conservative for this valve location, therefore, it can be concluded that the motor would be capable of surviving a locked rotor condition for at least 10 seconds without incurring degradation to the insulation system.

Question 2

Regarding valves 1/2HV-8000A/B, Pressurizer PORV Block Valves, your submittal states that if these valves are not closed to isolate an excessively leaking or stuck open PORV, the emergency operating procedure directs the operator to open at least one PORV block valve. Please clarify this wording.

In addition, your submittal discusses various design and operational configurations, to preclude thermal binding of these valves. Please provide any analysis and/or diagnostic test data completed to support the assertion that the valves' unwedging thrust does not exceed the actuator thrust capability under potential thermal binding conditions.

Finally, in the event of a steam generator tube rupture, the reactor coolant system may slightly depressurize, leading to a pressure locked condition for these valves. Please address this scenario.

Response

In the event of a Steam Generator Tube Rupture (SGTR) the PORV's may be required to open to assist in the depressurization of the Reactor Coolant System (RCS). In the event that a PORV block valve(s) was closed, the valve would have to be opened in order to utilize the PORV for this purpose. If a PORV block valve is closed prior to the initiation of the event, it will most likely be due to seat leakage of the associated PORV, as this is the only scenario which allows extended unit operation with a PORV block valve(s) closed. In addition, the PORV block valves will close automatically if RCS pressure decreases to less than 2185 psig, which may occur in conjunction with a SGTR.

Step 5 of the Emergency Operating Procedure covering a SGTR requires the operator to verify the position of the PORV block valves. If at least one PORV block valve is not open the Response Not Obtained column states:

> IF NOT shut to isolate an excessively leaking or open PRZR PORV, AND WHEN PRZR pressure is greater than 2185 psig, THEN open at least one PRZR PORV block valve.

If the PORV block valve(s) is opened at this point following a SGTR negligible cooling will have occurred, therefore, thermal binding will not be a concern. If the PORV block valve(s) was closed to isolate an "excessively" leaking PORV, the operator will make an assessment to determine if the block valve(s) should be opened at this time. However, if the SGTR was of sufficient magnitude to lower the pressurizer pressure to less than 2185 psig, then the PORV block valves would not be re-opened at this point.

The normal method of depressurizing in conjunction with a SGTR event is to utilize the normal pressurizer spray. However, in the event that RCPs 1 or 4 are not operating, as would be the case in the event of a Loss of Off Site Power (LOSP), the PORVs would be an alternate means of depressurizing. If a PORV is not available then the alternate pressurizer spray, which is supplied by the CCPs, would be utilized to depressurize.

VEGP has not attempted to perform any analytical evaluations to quantify the additional valve loads which would occur as a result of thermal binding. There is not a formally validated and approved methodology available to support an analysis of this type. In addition, in-situ testing has not been performed on valves which have been exposed to conditions which are postulated to cause thermal binding. However, static test data for these valves, as outlined in Table 1, provides an indication of the unwedging margins available based on the current valve setup.

Table 1
PORV Block Valve Unwedging Margins

Valve Tag No.	Final Thrust Closing	Unwedging Thrust	Unwedging Accuracy	Opening Capability	Unwedging Margin
1HV-8000A	16,641 lb	2,836 lb	+/- 10%	13,067 lb	361%
1HV-8000B	17,345 lb	1,734 lb	+/- 35%	13,901 lb	702%
2HV-8000A	16,864 lb	5,660 lb	+/- 11.6%	13,531 lb	139%
2HV-8000B	17,718 lb	3,554 lb	+/- 10%	13,994 lb	292%

As can be seen, the valves have at least 139% unwedging margin, based on each valves current setup. These margins are adequate to overcome the minimal pressure locking and/or thermal binding loads which these valves may encounter in conjunction with performing their safety function.

Furthur evaluations are currently in progress to ensure that all of the credible safety functions associated with the PORV block valves have been identified and evaluated with respect to susceptibility to pressure locking and/or thermal binding. The results of these evaluations will be forwarded to the NRC by July 26, 1996.

Question 3

Through review of operational experience feedback, the staff is aware of instances where licensees have completed design or procedural modifications to preclude pressure locking or thermal binding which may have had an adverse impact on plant safety due to incomplete or incorrect evaluation of the potential effects of these modifications. Please describe evaluations and training for plant personnel that have been conducted for each design or procedural modification completed to address potential pressure locking or thermal binding concerns.

Response

A total of 10 valves on each unit have been or will be modified to preclude susceptibility to pressure locking and/or thermal binding. The Unit 1 modifications, with the exception of the RHR miniflow valves, were completed during the spring 1996 outage. The Unit 1 miniflow modifications will be implemented during the fall 1997 outage. All of the remaining Unit 2 modifications will be implemented during the fall 1996 outage. The valves are being modified in accordance with the normal design change process and all of the associated controls including a 10 CFR 50.59 safety evaluation.

A total of eight valves on each unit are being modified by drilling a vent hole in one side of the valve disk to preclude susceptibility to pressure locking. Items evaluated in conjunction with these modifications include the effect on the structural integrity of the disk, the effect on the valves seismic operability qualifications and any potential reduction in the valves ability to provide positive shutoff in both directions.

Valves 1/2HV-8716A/B are the RHR to RCS hot leg isolation valves and are normally open. The valves are closed when aligning the RHR system for normal decay heat removal and for cold leg recirculation during a LOCA. Since the valves are normally open and are not required to perform a containment isolation function, the orientation of the vent hole is not critical. These valves have been modified by drilling a vent hole in the upstream (RHR pump) side of the valve disk.

Valves 1/2HV-8802A/B are the safety injection (SI) Pump to RCS hot-leg isolation valves and are normally closed. These valves are containment isolation valves and they are being modified by drilling a vent hole in the downstream (RCS) side of the valve disk to ensure the integrity of the containment isolation function. In normal operation, the upstream side of these valves is not exposed to pressure except in conjunction with the quarterly performance of inservice testing of the SI pumps. The discharge pressure capability of the SI pumps is substantially less than normal RCS pressure, therefore, leakage would not be a problem in conjunction with inservice testing.

Valves 1/2HV-8811A/B are the RHR pump containment sump suction isolation valves and are normally closed. These valves are containment isolation valves and they are being modified by drilling a vent hole in the upstream (containment sump) side of the valve disk to ensure the integrity of the containment isolation function. The downstream side of this valve is isolated from the RHR system by a check valve which is exposed to the reactor water storage tank (RWST) elevation head. In the unlikely event that the downstream side of the valve disk was unseated, water may leak into the containment sumps. The containment sump levels are alarmed and the Operations personnel would respond in accordance with the appropriate annunciator response procedure.

Valves 1/2HV-9002A/B are the containment spray pump containment sump suction isolation valves and are normally closed. These valves are containment isolation valves and they are being modified by drilling a vent hole in the upstream (containment sump) side of the valve disk to ensure the integrity of the containment isolation function. The downstream side of this valve is isolated from the containment spray system by a normally closed gate valve which is exposed to the RWST elevation head. In the unlikely event that the downstream side of the valve disk was unseated, water may leak into the containment sumps. The containment sump levels are alarmed and the Operations personnel would respond in accordance with the appropriate annunciator response procedure.

In addition, the control scheme on the RHR miniflow valves is also being revised. These valves will be controlled in the closing direction by the limit switch, with the limit switch set to prevent hard wedging. The Design Change Packages for these modifications and the associated safety evaluations have not been completed. However, the relevant issues associated with the revised control scheme will be evaluated, including any changes relative to the valves ability to provide positive shutoff.

There were no Operations procedures changed specifically to address pressure locking or thermal binding. However, to ensure that the valve disks which have been drilled to provide a vent path are maintained in the proper configuration, maintenance procedure 26610-C has been revised to identify the correct disk orientation.

The normal design change process includes reviews to identify training requirements relative to the implementation of plant modifications. These training requirements are routinely integrated into the licensed operator training program.