Georgia Power Company
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Telephone 205 877-7279

J. T. Beckham, Jr.
Vice President - Nuclear
Hatch Project

Georgia Power
the southern electric system

April 4, 1994

Docket Nos. 50-321
50-366

HL-4550

TAC Nos. M59202, M83192
M59203, M83193

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

Edwin I. Hatch Nuclear Plant
Second Ten Year Inspection Interval
IST Program Safety Evaluation Response

Gentlemen:

By letter dated April 5, 1993, the Nuclear Regulatory Commission (NRC) staff transmitted a Safety Evaluation (SE) for the 18 responses provided in Georgia Power Company's (GPC) letter dated June 5, 1992. The SE contained three items which were granted on an interim basis for a period of one year to allow GPC to investigate alternate testing methods or actions which could be taken to resolve the NRC's concerns. The three items for which interim relief was granted are described below.

(1) Frequency response range for the instruments used for vibration monitoring of the Standby Liquid Control Pumps (Relief Request RR-P-6, SER paragraph 2.2.3, page 8)

(2) Axial vibration monitoring on the Standby Diesel Service Water Pump (Relief Request RR-P-6, SER paragraph 2.2.3, pages 3 and 9)

(3) The variance in flow measurement for the Residual Heat Removal pumps (Relief Request RR-P-7, SER paragraph 2.3.3, page 11)

In response to the items listed above, GPC has taken the appropriate actions to resolve the NRC staff's concerns. Relief Request RR-P-6 has been revised to include additional justification for using the existing vibration monitoring equipment. The NRC questioned the frequency response range of this equipment as it is applicable to the Standby Liquid

A047
1/1

Control Pumps for the detection of bearing oil whirl. A review of the subject pumps in conjunction with conversations with the pump vendor has shown that vibration associated with pump degradation will occur at frequencies which are within the frequency response range of the equipment utilized.

Relief Request RR-P-6 has also been revised to indicate that axial vibration monitoring will be performed on all vertical line shaft pumps which includes the Standby Diesel Service Water Pump. A relief request is necessary as the location of such measurements is different from that required by the O&M Code; however, the measurements will provide data representative of axial vibration of the subject pump.

Relief Request RR-P-7 has been revised to indicate changes implemented for the RHR flow instrument calibration accuracy in order to satisfy Code requirements to the extent practical. Site calibration procedures are being revised to tighten the calibration accuracy and thus meet the Code limits on the total flow measurement variance. The Code would allow a flow measurement variance of approximately 460 GPM and the total loop accuracy of the instruments utilized is being changed to provide a maximum variance of 425 GPM.

Copies of the referenced Relief Requests (RR-P-6 and RR-P-7) are enclosed for review. The only changes necessary for GPC to be in compliance with the proposed testing are revision to instrument calibration procedures which will be implemented by May 1, 1994.

Should you have any questions in regard to this issue, please advise.

Sincerely,

J. T. Beckham, Jr.

DGA/cr
004550

Enclosures: (See next page.)

Enclosures:
Relief Request RR-P-6
Relief Request RR-R-7

cc: *Georgia Power Company*
Mr. H. L. Sumner, General Manager - Nuclear Plant
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. S. D. Ebneter, Regional Administrator
Mr. L. D. Wert, Senior Resident Inspector - Hatch

PUMP RELIEF REQUEST

RR-P-6

SYSTEM: Standby Liquid Control
Residual Heat Removal
Residual Heat Removal Service Water
Core Spray
High Pressure Coolant Injection
Reactor Core Isolation Cooling (optional)
Plant Service Water

PUMP(S): 1(2)C41-C001A,B (Positive Displacement Pumps)
1(2)E11-C001A-D (Vertical Line Shaft Pumps)
1E11-C002A-D (Centrifugal Pumps)
2E11-C002A-D (Vertical Line Shaft Pumps)
1E21-C001A,B (Centrifugal Pumps)
2E21-C001A,B (Vertical Line Shaft Pumps)
1(2)E41-C001 (Centrifugal Pumps)
1(2)E51-C001 (optional) (Centrifugal Pumps)
1(2)P41-C001A-D (Vertical Line Shaft Pumps)
2P41-C002 (Vertical Line Shaft Pump)

CLASS: 2 and 3

TEST REQUIREMENT: Perform pump IST in accordance with ASME Section XI Subsection IWP

BASIS FOR RELIEF: It has been recognized within the industry that the OM Code requirements for pump IST are more suitable than those of ASME XI IWP.

ALTERNATE TESTING: The testing requirements of the OM Code 1990, Section ISTB will be utilized for pump IST for those pumps required to be tested by ASME Section XI except as identified in the continuation sheet.

The RCIC system is included for information purposes only. The RCIC pump is not required to be tested in accordance with ASME XI.

VIBRATIONAL POINTS

In lieu of the requirements of ISTB 4.6.4, vibration measurements will be taken as outlined below.

a. On centrifugal pumps measurements will be taken in a plane approximately perpendicular to the rotating shaft in two orthogonal directions. These measurements shall be taken on each accessible pump bearing housing. Measurements shall also be taken in the axial direction on each accessible pump thrust bearing housing. If no pump bearing housings are accessible due to pump design or physical interference, then the measurements will be taken at the accessible location that gives the best indication of lateral/axial pump vibration. This location is either on the pump casing, the motor bearing casing, or the motor casing.

b. On vertical line shaft pumps measurements will be taken in three orthogonal directions, one of which is in the axial direction in the area of the upper pump bearing housing (pump to motor mounting flange). This is the closest accessible location to a pump bearing housing and should provide readings which are at least as representative of pump mechanical condition as those required by the OM Code which are to be taken on the top of the pump motor.

   The OM Code required vibration measurements on the upper motor-bearing housing are impractical because of the following reasons.

   1. Plant design did not include permanent scaffolding or ladders which provide access to the top of the motors for the subject pumps. (All but Standby Plant Service Water Pump)

   2. Physical layout of the pumps and interference with adjacent components does not allow for the installation of temporary scaffolding or ladders which are adequately safe for routine use. (All but Standby Plant Service Water Pump)

   3. There is a relatively thin cover plate bolted to the top-center of each motor which prevents measurements in line with the motor bearing. Measurement on the edge of the motor housing would be influenced by eccentricity and may not be representative of actual axial vibration.

   4. Special tools (extension rod) for placing the vibration transducers are not practical because placement would not be sufficiently accurate for trending data.

   5. The Standby Plant Service Water Pump is accessible, but the motor has a cooling fan mounted at the top which is attached to the rotating shaft. The fan is protected by a relatively thin cover plate which prevents access to the motor housing for vibration measurements. Removing the cover does not provide for transducer placement since the rotating fan would still be in the way.

Research within the industry revealed that vibration monitoring of vertical line shaft pumps has been of limited benefit for detecting mechanical degradation due to problems inherent with pump design. The OM Code imposes more stringent

hydraulic acceptance criteria on these pumps than for centrifugal or positive displacement pumps. This more stringent hydraulic acceptance criteria would place more emphasis on detection of degradation through hydraulic test data than through mechanical test data.

Therefore, application of the OM hydraulic testing criteria along with radial and axial vibration monitoring in the area of the top pump bearing housing should provide adequate data for assessing the condition of the subject pumps and for monitoring degradation.

c. On reciprocating pumps, a measurement will be taken on the bearing housing of the crankshaft, approximately perpendicular to both the crankshaft and the line of the plunger travel. (As required by the OM Code.)

VIBRATION ACCEPTANCE CRITERIA

In lieu of the requirements of TABLE ISTB 5.2-2a, ranges for vibration acceptance criteria for smooth running pumps will be as outlined below.

Small absolute changes in vibration for smooth running pumps (e.g. $\leq$.075 in./sec.) would potentially result in Alert and Required Action Ranges being declared for exceeding the 2.5Vr or 6Vr limits even though the pump is operating satisfactorily.

The Alert Range for smooth running pumps will be > 0.19 to 0.45 in./sec. and the Required Action Range starts at any value above 0.45 in./sec.

FREQUENCY RESPONSE RANGE OF VIBRATION INSTRUMENT

The OM Code (ISTB 4.6.1(f)) requires a frequency response range of one-third pump operating speed to at least 1000 Hertz. The Standby Liquid Control (SBLC) Pumps operate at 370 RPM (6.2 HZ), therefore the instrument frequency response range of the Plant Hatch IST Program instrumentation does not satisfy the code requirement.

In lieu of the requirements of ISTB 4.6.1(f), the vibration measuring instrument frequency response range utilized for the Standby Liquid Control Pumps will be as described below.

1. An I.R.D. Model 810 with accuracy of ±5% full scale over a frequency response range of 5.8 - 2,000 HZ for displacement measurements and 5.8 - 10,000 HZ for velocity measurements is utilized for IST.

2. The I.R.D. Model 810 lower frequency response limits result from high-pass filters which eliminate low-frequency elements associated with the input signal from the integration process. These filters prevent low frequency electronic noise from distorting vibration readings thus any actual vibration occurring at low frequencies is filtered out.

3. The SBLC pumps are Union Pump Company reciprocating pumps. The subject pumps utilize roller bearings instead of sleeve bearings. Sleeve bearings can exhibit vibration at subsynchronous frequencies when a condition of oil whirl is present. However, oil whirl does not occur in roller or ball bearings.

Roller and ball bearing degradation symptoms typically occur at 1X shaft rotational frequency and greater. Therefore, vibration measurements at frequencies less than shaft speed would not provide meaningful data relative to degradation of the pump bearings.

4. The SBLC pumps are standby pumps only. They are only operated during Technical Specification Surveillance and Inservice Testing which results in very little run time. In the unlikely event that the system is required to perform its safety function, the pump run time would only be from 19 to 74 minutes to exhaust the volume of the sodium pentaborate storage tank.

5. In addition to the IST vibration monitoring program, these pumps are included in the site maintenance department vibration program. This program has the capability to perform spectral analysis with equipment which would satisfy the frequency response range requirement of the OM Code. The maintenance vibration monitoring is not performed at a frequency equivalent to that required for IST, but based on the infrequent operation of these pumps, the likelihood that a vibration problem would go undetected by both programs is minimal. The maintenance vibration program will also be utilized to analyze any IST vibration data which placed the pumps in the ALERT or ACTION Ranges. The need for any corrective actions would be based on evaluation of IST and maintenance testing program data.

6. Based on the pump bearing design, the combination of vibration monitoring implemented and the limited operation time, it seems unlikely that a vibration problem not detectable by the equipment being utilized would prevent these pumps from fulfilling their design safety function.

Use of the existing vibration monitoring equipment which is calibrated to at least ±5% full scale over a frequency response range of 5.8 -2000 Hz (SBLC pump nominal shaft speed = 6.2 Hz) should provide sufficient data for monitoring the mechanical condition of the SBLC pumps. This equipment will provide accurate vibration measurements over the frequency range in which typical roller bearing vibration problems occur. This monitoring program should meet the intent of the code and will relieve the utility from the burden and expense involved with procurement, calibration, training and administrative control of new testing equipment which seems unjustified for assessing the mechanical condition of the subject pumps.

PUMP RELIEF REQUEST

RR-P-7

SYSTEM: Residual Heat Removal, Core Spray, High Pressure Coolant Injection, Reactor Core Isolation Cooling and Plant Service Water Systems

PUMP(S): 1(2)E11-C002A-D 1(2)E21-C001A,B 1(2)E41-C001
1(2)E51-C001 2P41-C001A-D

CLASS: 2

TEST REQUIREMENT: ASME OM Code, 1990, Section ISTB 4.6.1 and Table ISTB 4.6.1-1 define the required accuracy and full-scale range for each instrument used to measure the test parameters.

BASIS FOR RELIEF: The original installed instrumentation associated with these pumps was not designed with the instrument accuracy and ranges of OM Code ISTB Table 4.6.1-1 taken into consideration. The actual instrument ranges and loop accuracies are itemized on the attached sheets. These attached sheets provide information relative to the range, individual accuracy and total loop accuracy of those instruments that do not satisfy the OM requirements.

ALTERNATE TESTING: Test gages calibrated to ± 0.5 % accuracy will be utilized for RHR and Core Spray pump inlet pressure measurement. For all other pump parameters the installed instrumentation will be utilized. The installed instrumentation should provide data that is sufficiently accurate to allow assessment of pump condition and to detect pump degradation.

See continuation sheets for individual evaluations and data relevant to accuracy of each instrument loop.

The RCIC System is included for information purposes only. The RCIC pump is not required to be tested in accordance with ASME XI.

INSTRUMENT	RANGE	TEST RANGE	ALLOWABLE RANGE	ACCURACY
1E11-PI-R003A-D	0-600 psig	≈ 182 psig	0-546 psig	± 2 % (2)
1E11-FI-R603A(B)	0-25000 gpm	≈ 7700 gpm	0-23100 gpm	± 1.66 % (2)
1E21-PI-R600A(B)	0-500 psig	≈ 290 psig	0-870 psig	± 2.06 %
1E41-SI-R610	0-6000 rpm	≈ 3810 rpm	0-11430 rpm	± 2 % (1)
1E41-PI-R004	15"HG-100 psig	≈ 27 psig	0-81 psig	± 1 % (2)
1E41-FI-R612	0-5000 gpm	≈ 4250 gpm	0-12750 gpm	± 2.12 %
1E51-SI-R610	0-6000 rpm	≈ 4250 rpm	0-12750 rpm	± 2 % (1)
1E51-PI-R002	15"HG-100 psig	≈ 24 psig	0-72 psig	± 1 % (2)
1E51-FI-R612	0-600 gpm	≈ 400 gpm	0-1200 gpm	± 2.12 %
2E11-PI-R003A-D	0-600 psig	≈ 186 psig	0-558 psig	± 2 % (2)
2E11-FI-R603A(B)	0-25000 gpm	≈ 7850 gpm	0-23550 gpm	± 1.22 % (2)
2E21-PI-R600A(B)	0-500 psig	≈ 308 psig	0-924 psig	± 2.06 %
2E41-SI-R610	0-6000 rpm	≈ 3800 rpm	0-11400 rpm	± 2 % (1)
2E41-PI-R004	15"HG-100 psig	≈ 30 psig	0-90 psig	± 1 % (2)
2E41-FI-R612	0-5000 gpm	≈ 4250 gpm	0-12750 gpm	± 2.12 %
2E51-SI-R610	0-6000 rpm	≈ 4250 rpm	0-12750 rpm	± 2 % (1)
2E51-PI-R002	15"HG-100 psig	≈ 30 psig	0-90 psig	± 1 % (2)
2E51-FI-R612	0-600 gpm	≈ 400 gpm	0-1200 gpm	± 2.12 %

NOTES:

1. An electronic speed element provides a signal to the speed indicator which is calibrated to ± 2 % of full scale. Therefore speed indication should satisfy the requirements of TABLE ISTB 4.6.1-1.

2. Exceeds code allowable range limit of three times reference value.

COMPONENT/ ACCURACY	COMPONENT/ ACCURACY	COMPONENT/ ACCURACY	TOTAL LOOP ACCURACY PER OM ISTB 1.3
1E11-FT-N015A,B 0.5 %	1E11-K600A,B 0.5 %	1E11-FI-R603A,B 1.5 %	1.66 %
1E21-PT-N001A,B 2 %	1E21-PI-R600A,B 2 %	N/A N/A	2.06 %
1E41-FT-N008 0.5 %	1E41-K601 0.5 %	1E41-FI-R612 2.0 %	2.12 %
1E41-SI-R610	N/A	N/A	2 % (1)
1E51-FT-N003 0.5 %	1E51-K601 0.5 %	1E51-FI-R612 2.0 %	2.12 %
1E51-SI-R610	N/A	N/A	2 % (1)
2E11-FT-N015A,B 0.5 %	2E11-K600A,B 0.5 %	2E11-FI-R603A,B 1 %	1.22 %
2E21-PT-N001A,B 0.5 %	2E21-PI-R600A,B 2 %	N/A N/A	2.06 %
2E41-FT-N008 0.5 %	2E41-K601 0.5 %	2E41-FI-R612 2.0 %	2.12 %
2E41-SI-R610	N/A	N/A	2 % (1)
2E51-FT-N003 0.5 %	2E51-K601 0.5 %	2E51-FI-R612 2.0 %	2.12 %
2E51-SI-R610	N/A	N/A	2 % (1)

See page 5-8d for notes.

1(2)E11-PI-R003A-D exceed the range limit of three times the reference value, however the additional gage range results in approximately 1 psig maximum allowable variance in the measured parameter. (i.e. .02 x 546 = 11 versus .02 x 600 = 12)

1(2)E11-FI-R603A(B) exceed the Code allowable full scale range limit of three times the reference value. The indicator range includes consideration for LPCI flow rate (17,000 gpm for two pumps), whereas the IST pump flow rate is 7,700 gpm for Unit 1 and 7,850 for Unit 2. The code maximum allowable variance in measured flow rate would be 462 gpm (i.e. .02 x 23,100) for Unit 1 and 471 gpm (i.e. .02 x 23,550) for Unit 2. Whereas the actual maximum variance in measured flow is 425 gpm (i.e. .017 x 25,000) for Unit 1 and 325 gpm (i.e. .013 x 25,000) for Unit 2. Therefore, the actual accuracy of the installed flow indicators is greater than allowed by the Code, thus the range of the indicator exceeding the Code limit of three times the reference value is of no consequence.

1(2)E21-PI-R600A(B) exceed the maximum code allowable total loop accuracy however the indicator used has a full scale range less than that allowed. The maximum code allowable variance in measurement is 17 psig (.02 x 870) for unit 1 and 18 psig for unit 2 (.02 x 924). However, by using a gage with a range less than allowed, the actual maximum allowable variance is 11 psig (.021 x 500). Therefore the actual accuracy is within the code allowable for the maximum allowable range.

1(2)E41-PI-R004 exceed the range limit of three times the reference value. However, the gages are calibrated to ± 1 % full scale accuracy which results in the final variance being within the maximum allowable by the code (i.e. 1.6 psig versus 1 psig for unit 1 and 1.8 psig versus 1 psig for unit 2).

1(2)E41-FI-R612 exceed the maximum code allowable total loop accuracy however the indicator used has a full scale range less than that allowed. The maximum variance allowable by the code is 255 gpm (.02 x 12750) whereas the actual maximum variance is 106 gpm (.0212 x 5000). Therefore the actual accuracy of the instrument loop is better than that allowable by the code.

1(2)E51-PI-R002 exceed the range limit of three times the reference value. However, the gages are calibrated to ± 1 % full scale accuracy which results in the final variance being within the maximum allowable by the code (i.e. 1.4 psig versus 1 psig for unit 1 and 1.8 psig versus 1 psig for unit 2).

1(2)E51-FI-R612 exceed the maximum code allowable total loop accuracy however the indicator used has a full scale range less than that allowed. The maximum variance allowable by the code is 24 gpm (.02 x 1200) whereas the actual maximum variance is 13 gpm (.0212 x 600). Therefore the actual accuracy of the instrument loop is better than that allowable by the code.