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*the southern electric system*

**W. G. Hairston, III**  
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HL-1312  
1129

October 1, 1990

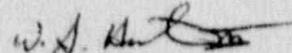
U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

PLANT HATCH -- UNIT 1  
NRC DOCKET 50-321  
OPERATING LICENSE DPR-57  
LICENSEE EVENT REPORT  
DIESEL GENERATOR OUTPUT BREAKERS  
CLOSE IN GREATER THAN 12 SECONDS

Gentlemen:

Georgia Power Company is submitting the enclosed voluntary Licensee Event Report (LER) due to the potential industry interest in the event. This event involves Plant Hatch - Units 1 and 2.

Sincerely,



W. G. Hairston, III

JJP/ct

Enclosure: LER 50-321/1990-017

c: (See next page.)

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c: Georgia Power Company

Mr. H. L. Sumner, General Manager - Nuclear Plant

Mr. J. D. Heidt, Manager Engineering and Licensing - Hatch

NORMS

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# LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <p style="text-align: center;">PLANT HATCH, UNIT 1</p>	DOCKET NUMBER (2) <p style="text-align: center;">05000321</p>	PAGE (3) <p style="text-align: center;">1 OF 8</p>
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TITLE (4)  
DIESEL GENERATOR OUTPUT BREAKERS CLOSE IN GREATER THAN 12 SECONDS

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQ NUM	REV	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)
08	29	90	90	017	00	10	01	90	PLANT HATCH, UNIT 2		05000366
									05000		

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (11)									
POWER LEVEL 100	<input type="checkbox"/>	20.402(b)	<input type="checkbox"/>	20.405(c)	<input type="checkbox"/>	50.73(a)(2)(iv)	<input type="checkbox"/>	73.71(b)		
	<input type="checkbox"/>	20.405(a)(1)(i)	<input type="checkbox"/>	50.36(c)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>	73.71(c)		
	<input type="checkbox"/>	20.405(a)(1)(ii)	<input type="checkbox"/>	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(vii)	<input checked="" type="checkbox"/>	OTHER (Specify in Abstract below)		
	<input type="checkbox"/>	20.405(a)(1)(iii)	<input type="checkbox"/>	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(viii)(A)				
	<input type="checkbox"/>	20.405(a)(1)(iv)	<input type="checkbox"/>	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(viii)(B)				
<input type="checkbox"/>	20.405(a)(1)(v)	<input type="checkbox"/>	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(x)		VOLUNTARY			

LICENSEE CONTACT FOR THIS LER (12)

NAME STEVEN B. TIPPS, MANAGER NUCLEAR SAFETY AND COMPLIANCE, HATCH	TELEPHONE NUMBER 912 367-7851
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COMPLETE ONE LINE FOR EACH FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORT TO NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORT TO NRPDS

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH DAY YEAR
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ABSTRACT (16)

On 8/29/90 at approximately 0330 CDT, Units 1 and 2 were in the Run mode at approximate power levels of 2436 CMWT and 2436 CMWT, respectively. At that time, it was determined Diesel Generator (D/G, EIIIS Code AK) 2R43-S001A would not energize its emergency 4160-volt bus within 12 seconds of receipt of a start signal as expected. Subsequent testing of the four remaining D/Gs performed between 8/30/90 and 9/3/90 revealed they would not energize their respective 4160-volt emergency busses within 12 seconds either. This testing was being performed in anticipation of receipt of a Technical Specifications amendment requiring periodic verification of this time. Bus energization times of up to 24 seconds were assessed by Plant Hatch's Architect/Engineer and General Electric. The 24 second energization time had no significant impact on the results of the licensing basis analyses; therefore, the operability of the D/Gs had not been impacted by the test results. This report is being submitted voluntarily because this event may be of interest to plants whose D/G Technical Specifications do not currently require them to test for emergency bus energization time.

The cause of this event was less than adequate design documentation. A time delay relay in the permissive logic for D/G output breaker closure was not required to be set at its minimum value.

Corrective actions for this event included setting the time delay relays to their minimum value and re-testing the D/Gs to ensure they met the 12 second procedural acceptance criterion.

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PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor  
Energy Industry Identification System codes are identified in the text as (EIIS Code XX).

SUMMARY OF EVENT

On 8/29/90 at approximately 0330 CDT, Unit 1 was in the Run mode at an approximate power level of 2436 CMWT (approximately 100% of rated thermal power) and Unit 2 was in the Run mode at an approximate power level of 2436 CMWT (approximately 100% of rated thermal power). At that time, it was determined Diesel Generator (D/G, EIIS Code EK) 2R43-S001A would not energize its emergency 4160-volt bus within 12 seconds of receipt of a start signal as expected. Subsequent testing of the four remaining D/Gs performed between 8/30/90 and 9/3/90 revealed they would not energize their respective 4160-volt emergency busses within 12 seconds of receipt of a start signal either. Testing of emergency bus energization time was being performed in anticipation of receipt of a Technical Specifications amendment requiring periodic verification of this time. Bus energization times of up to 24 seconds were assessed by Plant Hatch's Architect/Engineer and General Electric. The 24 second energization time had no significant impact on the results of the licensing basis analyses; therefore, the operability of the D/Gs had not been impacted by the test results. This report is being submitted voluntarily because this event may be of interest to plants whose D/G Technical Specifications do not currently require them to test for emergency bus energization time.

The cause of this event was less than adequate design documentation. A time delay relay in the permissive logic for D/G output breaker closure was not required to be set at its minimum value.

Corrective actions for this event included setting the time delay relays to their minimum value and re-testing the D/Gs to ensure they met the 12 second procedural acceptance criterion.

DESCRIPTION OF EVENT

In response to an issue raised during a Safety System Functional Inspection of the Plant Hatch's D/Gs, Georgia Power Company submitted on 1/10/90 a request to revise the Unit 1 and Unit 2 Technical Specifications. Among the requested changes was a change to the diesel start test. Presently, the Plant Hatch Technical Specifications (specifically Section 4.9.A.2.a.2 for Unit 1 and Section 4.8.1.1.2.b for Unit 2) require a periodic test of each D/G's ability to reach synchronous speed within 12 seconds of receipt of a start signal. The revised Technical Specifications will require a periodic test (on an 18 month frequency) of each D/G's ability to energize its emergency bus within 12 seconds of receipt of a start signal. The revised specifications will, as a result, be more consistent with the BWR/4 Standard Technical Specifications in this area.

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In anticipation of eventual receipt and implementation of this Technical Specifications amendment, efforts were initiated to develop the required surveillance test procedures. During this effort site engineering personnel recognized that there was a potential that the D/Gs might not be able to meet the proposed Technical Specifications criterion of tying to the emergency bus within 12 seconds. This qualitative assessment was based on past testing experience.

At this point an initial operability assessment for the D/Gs was performed to evaluate the potentially deficient condition. The safety function of the D/Gs, as defined for the 'design basis of the plant', was reviewed. The D/Gs mitigate the consequences of the Design Basis Accidents (DBAs), which assume a coincident Loss of Offsite Power (LOSP), by providing a reliable and independent source of onsite electrical power to selected emergency loads. Evaluation of the emergency loads which might be affected by a brief delay in energization of the emergency bus indicated the key loads potentially impacted were the Core Spray System (CSS EIIS BM) pump and injection valves, the Residual Heat Removal (RHR EIIS BO) pumps in their Low Pressure Coolant Injection (LPCI) mode, and the Primary Containment Isolation Valves (PCIVs EIIS JM).

The two licensing basis analyses whose results establish the acceptance limits for the performance of the above systems are the Loss of Coolant Accident (LOCA) and the High Energy Line Break (HELB) analyses. In the original LOCA analysis for Plant Hatch 12 seconds was the input assumption for emergency bus energization time. However, the current LOCA analysis for Plant Hatch was performed in 1986 using a newer model and methodology as well as a 24 second input assumption for emergency bus energization time. The current LOCA analysis was approved by the NRC in 1987. Therefore, with respect to the LOCA analysis, as long as the as-found emergency bus energization time was within 24 seconds there existed no potential operability concern. The HELB analysis still used an input assumption of 12 seconds for the emergency bus energization times; this was an arbitrary assumption made when the HELB analysis was originally performed for Plant Hatch to be consistent with the then current LOCA analysis. However, an initial conservative assessment of the sensitivity of the HELB analysis results to emergency bus energization time demonstrated that values as high as 19 seconds did not have any significant impact. Consequently, it was concluded that potential exceedance of the 12 second test criterion by as much as 7 seconds did not present any immediate operability concerns.

To assure no further potential operability concerns existed and to facilitate verification of test methods to be used when the proposed Technical Specifications requirement was implemented, it was decided to check the actual emergency bus energization time for each D/G. The test was performed with the following two special purpose procedures: 42SP-072090-OI-1-1S, "Diesel Generator 1A, B, 1C Data Collection," and 42SP-072690-OI-1-2S, "Diesel Generator 2A, B, 2C Data Collection." These procedures timed the D/G start sequence from the receipt of the start signal to the point the D/G output breaker received its permissive signal to close. This time was then compared to a procedural acceptance criterion of 12 seconds.

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Upon receipt of a start signal (degraded voltage, low reactor water level, or high drywell pressure), the D/Gs start automatically. Voltage relays and frequency relays detecting conditions of normal D/G voltage, proper D/G frequency, zero emergency bus voltage, and tripping of the supply breakers to the startup transformers (the normal ac power supply) initiate the closing of the D/G output breakers to energize the respective emergency bus. The output breaker closure permissive logic is such that all of the above conditions must be met before the output breaker will close.

While meeting of the 12 second procedural acceptance criterion had been demonstrated not to be necessary to maintain operability of the D/Gs, as a conservative operational measure Unit 1 and Unit 2 Design Change Requests (DCRs) 1H90-153 and 2H90-154, respectively, were written to change the voltage permissive time delay relay's setting to its minimum value should the 12 seconds be exceeded. This time delay relay actuates upon the D/G reaching the proper voltage value.

On 8/29/90, testing performed per special purpose procedure 42SP-072690-OI-1-2S on D/G 2R43-S001A (the first D/G so tested) indicated the D/G would energize its 4160-volt emergency bus in approximately 18.5 seconds. Because this time was greater than the procedural acceptance criterion of less than or equal to 12 seconds, a deficiency card (DC 2-90-2453) was written as required by plant administrative control procedures. Maintenance Work Orders (MWOs) 2-90-2301 and 2-90-2304 were written and released to implement DCR 2H90-154 on the voltage time delay relays for the D/G 2R43-S001A output breaker closure logic. These MWOs were worked on 8/29/90. The D/G was then retested per special purpose procedure 42SP-072690-OI-1-2S to verify emergency bus energization time was less than or equal to 12 seconds; actual time following implementation of the DCR was approximately 9.6 seconds.

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TEXT

Subsequent testing of the four remaining D/Gs, performed in the same manner between 8/30/90 and 9/3/90, revealed that they also would not energize their respective 4160-volt emergency busses within 12 seconds of receipt of a start signal. Their voltage time delay relays were reset to the minimum value per the applicable DCR and MWOs, and the D/Gs were retested. Pertinent information is summarized in the table below.

D/G	Test Date	As-Found Test Time	DC	DCR	MWOs	ReTest Date	ReTest Time
2R43-S001C	8/30/90	16 sec.	2-90-2475	2H90-154	2-90-2308 2-90-2307 1-90-5725	8/31/90	9 sec.
1R43-S001C	8/31/90	17.1 sec.	1-90-5650	1H90-153	1-90-5723 1-90-5726	9/01/90	8.9 sec.
1R43-S001A	9/01/90	22.1 sec.	1-90-5641	1H90-153	1-90-5721 1-90-5724	9/01/90	9.2 sec.
1R43-S001B (1F bus)*	9/01/90	>32** sec.	1-90-5653	1H90-153	1-90-5722 2-90-2306	9/02/90	9.2 sec.
1R43-S001B (2F bus)*	9/03/90	14.8 sec.	2-90-2521	2H90-154	2-90-2305	9/03/90	9 sec.

\* D/G 1R43-S001B is a shared diesel generator; therefore, it has a time for its output breaker to close onto the Unit 1 emergency bus and a time for it to close onto the Unit 2 emergency bus.

\*\* A loose wire in the D/G output breaker permissive logic, in conjunction with the manner in which the test equipment for measuring the emergency bus energization time was connected to the logic, resulted in the D/G failing to tie to the bus. Therefore the as-found bus energization time was not determined; the voltage time delay relay was set to minimum value when the loose wire was repaired. The loose wire alone would not have impacted the operability of the D/G.

Concurrent with the receipt of the D/G test results, the previously referenced operability assessment was revised to reflect the acceptability of a 24 second emergency bus energization time for the HELB analysis (supporting documentation for the HELB analysis was also revised to reflect the new 24 second input assumption - none of the analysis results were affected). The operability assessment was finalized in a safety evaluation dated 9/12/90 by Plant Hatch's Architect/Engineer (A/E), Bechtel Corporation. Further details of this final operability assessment are described in the following section titled "Reportability Analysis and Safety Assessment."

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**TEXT**

#### CAUSE OF THE EVENT

The cause of this event was less than adequate design documentation. The voltage time delay relay in the permissive logic for D/G output breaker closure was not required by Plant Hatch Relay Data Sheets, a design document, to be set at a value consistent with the applicable, bounding licensing basis analyses. A contributing factor to delaying identification of this issue was the existing Plant Hatch D/G Technical Specifications requirement which only required testing the D/Gs' ability to reach synchronous speed and voltage within 12 seconds, not testing the actual emergency bus energization time.

#### REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This report is being submitted voluntarily because this event may be of interest to those plants whose D/G Technical Specifications surveillance requirements are similar to Plant Hatch's. Evaluation of this event demonstrated that the operability of the D/Gs was never compromised as a result of the response time of the voltage permissive time delay relays. As such, it is not reportable under 10 CFR 50.72 (b)(2)(iii) or 50.73 (a)(2)(v) since the ability of the standby AC power system to fulfill its safety system function was not impacted.

Further, the operability evaluation demonstrated that the as-found condition of the time delay relays and resultant emergency bus energization time had no significant impact on the results of the licensing basis calculations as documented in the Unit 1 and Unit 2 Final Safety Analysis Reports (FSARs). An unanalyzed condition which significantly compromised plant safety never existed since it was shown that licensing basis analyses results for LOCA and HELB remain valid even considering a 24 second time to emergency bus energization. The plant never operated outside the design basis of the plant since it was shown that accident fuel thermal limits and potential offsite radiological releases are bounded by the results of prior analyses. Therefore, this event is not reportable under 10 CFR 50.72 (b)(1)(ii) or 50.73 (a)(2)(ii).

The D/Gs are provided to mitigate the consequences of accidents, assuming a coincident loss of offsite power, by providing a reliable and independent source of onsite AC electrical power to selected emergency loads. There are five D/Gs at Plant Hatch: 1R43-S001A (1A), 1R43-S001B (1B), 1R43-S001C (1C), 2R43-S001A (2A), and 2R43-S001C (2C). They supply emergency ac power to 4160-volt emergency busses 1E, 1F, 1G, 2E, and 2G, respectively. In addition, the 1B D/G can supply bus 2F; the bus it supplies is dependent on whether the accident signal comes from Unit 1 or Unit 2.

In the event described in this report, the D/G output breaker permissive logic, due to a time delay relay in the voltage permissive portion of the logic, acted slower than expected resulting in the output breaker closing in greater than the procedural acceptance criterion of 12 seconds. Therefore, certain key emergency loads (e.g., CSS pumps and injection valves, LPCI pumps, and PCIVs) supplied by the emergency busses would receive power a few seconds later.

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The design for startup of the D/Gs upon a LOCA/LOSP signal was based on the need to provide water to the reactor vessel as quickly as possible during a postulated DBA-LOCA and to energize those systems required to mitigate the radiological consequences of the event.

The peak clad temperature (PCT) from the DBA is sensitive to the time at which water reaches the core. In 1986, General Electric reanalyzed the DBA-LOCA and a full spectrum of break sizes, types, and locations, assuming a 24 second diesel auto-start to bus energization time for the D/Gs. This LOCA reanalysis and associated revised PCT values have been approved by the NRC and is Plant Hatch's current licensing basis analysis, showing conformance to the acceptance criteria of 10 CFR 50.46 and Appendix K.

The HELB analyses were shown not to be affected by the longer bus energization time of 24 seconds by demonstrating that the original 12 second value was a conservative input parameter. Extensive reanalysis or a change to the NRC approved break flow methodology or computer codes for performing HELB analyses was not required or warranted. The "downstream" calculations of jet impingement, pipe whip, reactor building pressure-temperature response, environmental qualification, and radiological releases are not significantly impacted since the mass flux and energy released from the break did not increase.

The effects on the high energy line break analysis have been evaluated by Bechtel considering the delayed closure of the isolation valves. The evaluation currently reported in the FSAR considers that there is no reduction of mass flow through the break until the isolation valve is fully closed. This assumption is extremely conservative and is not required by the NRC approved methodology for HELB analysis. The operability evaluation considers the reduction in flow area during valve closure. It was shown that the total mass and energy release out the break does not exceed that currently assumed in the Unit 1 and Unit 2 FSARs.

Additionally, an assessment was made of the impact of the extended blowdown on the temperature profiles and radiation environments used in the EQ program. This assessment compared the existing temperature profiles to the expected profiles following an additional 12 second HPCI and RWCU valve isolation delay. The effect of a twelve second additional delay in completion of isolation valve closure has been determined to be enveloped by the existing temperature profile. The existing EQ radiation analysis was determined to be unaffected by an additional delay in the availability of emergency AC power.

Based on the above, this event had no adverse impact on nuclear safety. This analysis is based on worst-case conditions experienced during an accident from 100% rated thermal power. Therefore, it envelopes all operating conditions.

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TEXT

CORRECTIVE ACTION

All D/G voltage time delay relays in the output breaker closure permissive logic were set to their minimum values per the applicable revised Relay Data Sheets, modified in accordance with DCRs 1H90-153 and 2H90-154. The D/Gs were then retested to ensure they met the 12 second procedural acceptance criterion following adjustment of the time delay setting.

Plant Hatch's A/E performed an assessment of the effect of the longer D/G output breaker closure time on licensing basis analyses involving D/G operation. They concluded times up to 24 seconds did not impact the results of the existing licensing basis analyses.

ADDITIONAL INFORMATION

1. No plant systems other than the D/Gs were affected by this event
2. There have been no previous similar events in the last two years.
3. There were no component failures involved in this event.