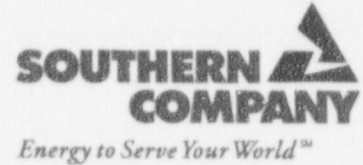


Lewis Sumner
Vice President
Hatch Project Support

Southern Nuclear
Operating Company, Inc.
40 Inverness Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Tel 205.992.7279
Fax 205.992.0341



April 15, 1998

Docket No. 50-366

HL-5610

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

Edwin I. Hatch Nuclear Plant - Unit 2
Licensee Event Report
Assembly Error Leads to Malfunctioning Governor
Causing Emergency Diesel Generator Inoperability

Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(i), Southern Nuclear Operating Company is submitting the enclosed Licensee Event Report (LER) concerning a malfunctioning governor which caused an emergency diesel generator inoperability.

Sincerely,

H. L. Sumner, Jr.

IFL/eb

Enclosure: LER 50-366/1998-002

cc: Southern Nuclear Operating Company
Mr. P. H. Wells, Nuclear Plant General Manager
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. L. N. Olshan, Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. B. L. Holbrook, Senior Resident Inspector - Hatch

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TITLE (4)

Assembly Error Leads to Malfunctioning Governor Causing Emergency Diesel Generator Inoperability

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER(S)				
03	18	98	98	002	00	04	15	98		05000				
<p>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 7: (Check one or more of the following) (11)</p>														
OPERATING MODE (9)			20 402(b)			20 405(c)			50 73(a)(2)(iv)			73 71(b)		
POWER LEVEL (10)			20 405(a)(1)(i)			50 36(c)(1)			50 73(a)(2)(v)			73 71(c)		
			20 405(a)(1)(ii)			50 36(c)(2)			50 73(a)(2)(vi)			OTHER (Specify in Abstract below and in Text, NRC Form 366A)		
			20 405(a)(1)(iii)			50 73(a)(2)(i)			50 73(a)(2)(vii)(A)					
			20 405(a)(1)(iv)			50 73(a)(2)(ii)			50 73(a)(2)(vii)(B)					
			20 405(a)(1)(v)			50 73(a)(2)(iii)			50 73(a)(2)(x)					

LICENSEE CONTACT FOR THIS LER (12)

NAME								TELEPHONE NUMBER (include area code)			
Steven B. Tipps, Nuclear Safety & Compliance Manager, Hatch								9 1 2 3 6 7 - 7 8 5 1			

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
A	E	K	S	O	L	W	2	9	0	Y

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-space typewritten lines) (16)

On 01/20/98 at 0930 EST, Unit 2 was in the Run mode at 100% rated thermal power. During performance of Technical Specifications surveillance SR 3.8.1.2 for the 2C emergency diesel generator (DG) a successful start was not achieved. The 2C DG was considered inoperable, requiring entry into Technical Specifications Condition 3.8.1.B. After investigation, the DG governor was replaced, and the DG was started successfully.

The cause of the start failure was a sticking shutdown solenoid on the DG governor. This was determined after the removed governor was tested at the DG vendor testing facility. After receipt of the test report on 03/18/98, it was concluded the 2C DG could not have started from 12/23/97 at 1047 EST, which is the time it was shutdown prior to the failed start in January 1998. Therefore, the DG was inoperable for a length of time greater than the completion time allowed in Technical Specifications 3.8.1.

A vendor assembly error coupled with component aging caused the solenoid malfunction. This is a personnel error in not following the references for assembly of the solenoid. Corrective actions are notification of this event to the vendor personnel involved in solenoid assembly and establishing a periodic replacement schedule for the solenoid.

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TEXT (If more space is required, use additional copies of NRC Form 366A)(17)

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor

Energy Industry Identification System codes are identified in the text as (EIIS Code XX).

DESCRIPTION OF EVENT

On 01/20/98 at 0930 EST, Unit 2 was in the Run mode at a power level of 2557 CMWT (100% rated thermal power). An operating crew was performing Technical Specifications surveillance requirement (SR) 3.8.1.2 for the 2C emergency diesel generator (DG), (EIIS Code EK). This surveillance, performed at a frequency of every 31 days, is to verify the DG starts from standby condition, achieves steady state voltage, and operates at load for 60 minutes. When the crew attempted to start the DG, its air start system functioned properly, "rolling" the engine, but a successful start was not achieved. Technical Specifications 3.8.1 Condition B was entered for "one Unit 2 or the swing DG inoperable," requiring restoration of the DG to operable status within 72 hours.

Subsequent investigation determined that the DG governor (Woodward model UG8) was malfunctioning by not initially holding the engine's fuel rack in its open position, thus not allowing proper fuel flow to the engine. When the fuel rack was manually held open (in effect overriding the governor), the engine started. The governor was then replaced with a unit in stock, and the DG successfully started on demand. The Technical Specifications surveillance was completed satisfactorily, and the Technical Specifications condition was exited.

The removed governor was sent to the test facility of Coltec, the supplier of the Hatch DGs, to determine the cause of the governor failure. Testing revealed that a component of the governor, the shutdown solenoid, was not functioning properly. Normally, this solenoid, when energized even momentarily, will shut the engine down by downward movement of its solenoid plunger (which is connected to the governor). The solenoid then returns upward to its de-energized position automatically by spring force, allowing the engine to subsequently be started. However, the malfunctioning solenoid was found to be sticking in its shutdown position, even after the coil was de-energized. The engine could not start with the solenoid in this position.

On 03/18/98, Plant Hatch received a report detailing the results of the testing at Coltec. At that time, based on the conclusions in the report, the determination was made that the 2C DG could not have started from the time it was shutdown previous to the failed start attempt on 01/20/98. Previously, the 2C DG was run on 12/23/97 to satisfy the same monthly surveillance, and was shutdown at 1047 EST on that date. Therefore, the DG was inoperable for approximately 28 days,

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which exceeds the Technical Specifications completion time to restore an inoperable DG to operable status.

CAUSE OF EVENT

The cause of the event was personnel error by the governor supplier. The shutdown solenoid was found to be sticking in its shutdown position due to a washer, called an "air gap washer," being omitted from its correct location in the solenoid. When the solenoid coil was removed at the test facility, the air gap washer fell out. The washer, when installed properly, has a solid rod, called a shutdown rod, extended through it in such a manner that it could not physically fall out or otherwise move from its normal position without first removing the rod. When properly assembled, neither vibration nor solenoid actuation could cause the washer to move from its required position.

The air gap washer function is to provide an air gap between the solenoid plunger and the plunger stop seat, preventing adhesion between the surfaces, and allowing spring force to push the solenoid plunger back to its start position. The governor (including the solenoid) was refurbished by the governor supplier, Woodward Governor Company, in 1988, and installed in the 2C DG in 1991. The solenoid had functioned properly for this service interval without the air gap washer, but over time the spring has gradually weakened, and a slight buildup of particulates (dust, oil, etc.) occurred on the plunger surface. Eventually, the increased friction within the solenoid from the particulate buildup and the reduced coil clearance, coupled with the plunger seat adhesion, overcame the ability of the spring to return the plunger to its start position. The solenoid then "stuck" in its shutdown position.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This report is required by 10 CFR 50.73(a)(2)(i) because a condition existed that was prohibited by the plant's Technical Specifications. The 2C DG was inoperable, and the Technical Specifications required action to restore operability was not met in the specified completion time of 72 hours. In the event the required actions are not met, the Technical Specifications require the unit to be in cold shutdown within 12 hours, but the unit remained in Run during this period.

Each unit at Plant Hatch has two DGs and an additional swing DG capable of serving either unit (a total of 5 DGs). During the time the 2C DG was inoperable, the other four DGs were operable and fully capable of meeting accident load demands. The operability of each was demonstrated by successful performance of Technical Specifications surveillance SR 3.8.1.2 within 24 hours of the 2C start failure.

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The DGs at Plant Hatch each have governor shutdown solenoids similar to that of the 2C DG. However, neither these nor the replacement governor solenoid for 2C can be reasonably expected to fail in a same manner for the following reasons. The omission of the air gap washer from its correct location in the solenoid during assembly is an isolated event. This conclusion is given in a letter to Plant Hatch from the Woodward Governor Company detailing the results of their investigation into the assembly error. The Woodward facility where the assembly took place is a qualified facility that has assembled literally hundreds of governors like the Hatch governor. The assembly is achieved by trained technicians using procedures and drawings. When questioned, the technicians each understood what the air gap washer was and where it belonged in the assembly. The assembly process is followed by a three step functional testing program that includes independent verification of the governor function. That the governor shutdown solenoid in question could pass these tests in spite of the washer being omitted from its correct location further supports that the event could occur only with the combination of the washer being omitted, together with the slight particulate buildup on the plunger and the aging of the spring. With the described controls and technician training in place at Woodward, the likelihood is remote of the washer being omitted on another solenoid.

As an additional check, a review was performed of NRC compliance and guidance documents, and NRC generic correspondence to determine if previous DG governor shutdown solenoid failures have occurred. Numerous examples were found of DG air system solenoid operated valve failures and of diesel muffler bypass solenoid failures, neither of which are of the same manufacture or design as the governor solenoids. There were no documented examples found of similar failures in Woodward shutdown solenoids. This adds further credence to the conclusion that the Plant Hatch failure was an isolated occurrence.

Therefore, the ability of the other DGs to perform their safety function is not in question.

Based upon this analysis, the conclusion is that this event did not adversely impact nuclear safety or the health and safety of the public.

CORRECTIVE ACTIONS

The personnel at the Woodward Governor facility were made aware of the event.

All Hatch governors and associated components will be changed out at a frequency of not more than every 9 years of service.

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ADDITIONAL INFORMATION

No systems other than the one mentioned in this report were affected by this event.

A previous DG start failure attributable to a failed governor component occurred at Plant Hatch on 11/24/97. In this instance, the 2C DG governor booster servomotor failed to perform its function of boosting governor oil pressure to assist the start function. Although the booster is a governor component, it is otherwise unrelated in function to the shutdown solenoid and thus is not significant in relation to the subject event. The cause of the booster failure was a malfunction of a check valve within the booster. The booster was replaced and no subsequent related problems have occurred. This event was not reportable because the problem was corrected within the specified Technical Specifications completion time.

No other similar events have occurred in the previous two years.

Plant Hatch intends to replace DG governors and associated components at an interval of not more than 9 years as long as the current governor design is used or until operational experience indicates otherwise.