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September 10, 1996

LCV-0773-A

Docket No. 50-424

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

Ladies and Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT  
LICENSEE EVENT REPORT 1-96-1, Revision 1  
PIPE FATIGUE LEADS TO  
NUCLEAR SERVICE COOLING WATER SYSTEM INOPERABILITY

In accordance with the requirements of 10 CFR 50.73, Georgia Power Company (GPC) hereby submits the enclosed revised report. Completion of corrective action is being extended due to additional design changes, an unplanned unit outage that diverted manpower resources, and a delay in obtaining the necessary materials.

Sincerely,

  
C. K. McCoy

CKM/TEW

Enclosure: LER 1-96-1, Revision 1

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

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

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LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)

Vogtle Electric Generating Plant - Unit 1

DOCKET NUMBER (2)

5000424

LER NUMBER (6)

YEAR

96

SEQUENTIAL

YEAR

01

REVISION

NUMBER

01

PAGE (3)

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OF

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

## A. REQUIREMENT FOR REPORT

This report is required per:

- 1) 10 CFR 50.73 (a)(2)(i), because the unit operated in a condition prohibited by the Technical Specifications (TS),
- 2) 10 CFR 50.73 (a)(2)(v), because a condition existed that alone could have prevented the fulfillment of the safety function of the nuclear service cooling water (NSCW) system, and
- 3) 10 CFR 50.73 (a)(2)(vii), because a single condition caused independent trains to become inoperable in the same system.

## B. UNIT STATUS AT TIME OF EVENT

At the time of the discovery of this event on February 20, 1996, Unit 1 was operating in Mode 1 (power operation) at 92 percent of rated thermal power. Other than that described herein, there was no inoperable equipment that contributed to the occurrence of this event.

## C. DESCRIPTION OF EVENT

On February 17, 1996, nuclear service cooling water (NSCW) system pump 1 (Train A) was out of service for maintenance. Following a pump start, an equipment operator noticed a leak coming from the toe of the weld where the 4-inch bypass line weldolet joins the main 18-inch pump discharge line. Around this weldolet, two indications were found, one with through wall leakage. The indications were 180 degrees apart, each approximately 4 to 6 inches long at the surface, and were oriented roughly parallel to the axis of the 18 inch pump discharge line. Following inspection by a metallurgist, who determined that the indications appeared to be fatigue induced, repairs were initiated.

- .. On February 19, 1996, the same welds on the discharge lines of the other two pumps in NSCW Train A, the pump 3 and pump 5 discharge lines, were inspected with liquid penetrant and similar indications were found, but no leakage was observed. An engineering evaluation was initiated to support the interim operability determination that these pumps remained operable, even with indications.

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On February 20, 1996, at 1530 EST, liquid penetrant inspections were performed on the same discharge line welds on the NSCW Train B pumps 2, 4 and 6. Indications similar to those found on Train A were found at the toe of all three welds and water seepage was found on the pump 4 discharge line weld. These Train B indications were then included in the ongoing engineering evaluation.

Also, on February 20, 1996, at 1401 EST, pump 1 was returned to service, and repairs were initiated to the pump 3 discharge line weld. At 2225 EST, it was concluded that the engineering evaluation was unable to determine that pumps 1, 2, 5 and 6 could supply the flow required to perform their intended safety function following a seismic event. Unit operation per TS 3.0.3 was initiated because the TS requires at least two pumps in one train of NSCW to remain operable and, at that time, only pump 1 was considered operable. At 2242 EST, repairs were completed and pump 3 was returned to service and unit operation per TS 3.0.3 was ended. On February 21, 1996, at 0057 EST, the NRC Operations Center was notified because this condition could have resulted in a failure of both trains of NSCW in a postulated seismic event. Weld repairs were completed and all pumps were restored to operability by February 22, 1996, at 2310 EST.

## D. CAUSE OF EVENT

The cause of this event was a piping design that allowed fatigue indications and/or cracks to be induced in the NSCW discharge piping. The primary cause is attributed to hydraulic transients in the bypass line, which serves as a pump miniflow line, and as a slow fill line to help minimize hydraulic transients when the pump discharge valve opens. The hydraulic transients in the bypass lines were causing movement of the lines. These hydraulically induced loads occur when an NSCW pump is started or stopped. Testing performed on February 27 and 28, 1996, indicates that the most severe movements of the bypass line occur when one pump is started while the other two are in service. This movement is primarily caused by flow from the starting pump impacting a closed check valve which must open against pressure from the operating pumps.

Modifications to reduce effects from hydraulic transients were previously made subsequent to the discovery of a pipe stress problem identified during Unit 1 start-up testing. The corresponding Unit 2 piping was modified and flow orifices were added to the Unit 1 piping in an effort to reduce pipe stress. Unit 2 piping welds have been inspected with no indications found. However, all six affected Unit 1 locations showed indications as previously described.

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## E. ANALYSIS OF EVENT

NSCW is used to cool various safety-related components and represents the unit's ultimate heat sink. The indications that were found did not prevent the NSCW system from performing this function. Although one of the three locations on each train had through wall indications, the amount of leakage was insignificant and was quantified as "seeping." A review of the piping stresses at this location due to various loads and load combinations, i.e. weight, thermal, pressure, building differential settlement, seismic, hydraulic transients, etc. was performed. Testing determined that the most severe stresses were from the hydraulic transient loads resulting from starting a third pump while the other two pumps are in service. Although it is possible that a hydraulic transient could result in a complete severing of a 4-inch bypass pipe from one of the weld locations, the other two pumps of that train would most likely be unaffected, and the alternate train would also still be available. Based on these considerations, there was no adverse affect on plant safety or on the health and safety of the public as a result of this event.

## F. CORRECTIVE ACTIONS

- 1) All of the discharge line weld indications and/or cracks have been repaired. An evaluation of the repaired piping was performed based on field testing data, actual geometry of the connection, and appropriate safety factors. The results of this evaluation demonstrated that the weld repair can withstand a significant number of severe hydraulic transients. The remaining corrective actions described below will be implemented before the number of fatigue cycles calculated in this evaluation are exceeded.
- 2) Design changes have been implemented and the discharge spool pieces replaced on four of the six NSCW pumps. Pipe support enhancements, along with replacement of the discharge spool pieces for the remaining two pumps, will be completed by December 15, 1996.

## G. ADDITIONAL INFORMATION

- 1) Failed Components:  
Pipe spool at weldolet, 18-inch, stainless steel, 6 each, ASME Section III, Class 3, manufactured by Pullman Power Products, a division of Kellogg/Wheelabrator-Fry.
- 2) Previous Similar Events:  
None
- 3) Energy Industry Identification System Code:  
Nuclear Service Cooling Water System - BS