Georgia Power Company
Post Office Box 282
Waynesboro, Georgia 30830
Telephone 404 554-9961, Extension 3413
404 724-8114, Extension 3413

P. D. Rice
Vice President
Vogtle Project

Georgia Power
the southern electric system

January 27, 1988

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

File: X7BG03-M141
Log: GN-1428

Reference: Vogtle Electric Generating Plant - Unit 2; 50-425
Containment Electrical Penetration Assemblies
Letter GN-1421, dated December 22, 1987

In previous correspondence, Georgia Power Company notified the NRC of a potentially reportable condition associated with the protection of the Containment Electrical Penetration Assemblies. Georgia Power Company has completed its reportability evaluation and has determined that a reportable condition as defined by the reporting requirements of 10 CFR Parts 21 and 50.55(e) does exist. Based upon NRC guidance in NUREG-0302, Revision 1, and other NRC correspondence, Georgia Power Company is reporting this condition pursuant to the reporting requirements of 10CFR50.55(e). A summary of our evaluation for Unit 2 is attached. This condition is also being evaluated for reportability under 10CFR21 for Unit 1.

This correspondence contains no proprietary information and may be placed in the NRC Document Room.

P. D. Rice

PDR/wkl
Attachment

xc: USNRC - Region II
Suite 2900
101 Marietta Street, NW
Atlanta, GA 30323

H. G. Baker
J. P. O'Reilly
R. H. Pinson
E. D. Groover
R. M. Bellamy

D. R. Altman
J. A. Bailey
G. Bockhold, Jr.
C. E. Belflower
J. F. D'Amico
D. Feig (GANE)
G. A. McCarley

L. T. Gucwa
C. W. Hayes
R. W. McManus
Sr. Resident (NRC)
C. C. Garrett (OPC)
J. E. Joiner (TSLA)
NORMS

IE27
.1/

EVALUATION OF A POTENTIALLY REPORTABLE CONDITION
CONTAINMENT ELECTRICAL PENETRATION ASSEMBLIES

Initial Report: On December 3, 1987, Mr. C. W. Hayes, Vogtle Quality Assurance Manager, notified Mr. M. V. Sinkule of the USNRC-Region II of a potentially reportable condition under 10CFR50.55(e) associated with protection of the containment electrical penetration assemblies (EPAs). In subsequent correspondence with the NRC, Georgia Power Company indicated that a final report on this issue would be submitted prior to January 30, 1988.

Background Information: The purpose of the EPAs is to pass electrical conductors through the containment wall while maintaining containment pressure boundary integrity before, during, and after plant design basis accidents. Regulatory Guide 1.63 states that, "The electric penetration assembly should be designed to withstand, without loss of mechanical integrity, the maximum short-circuit current vs. time conditions that could occur given single random failures of circuit overload protection devices." To assure integrity of the EPA conductors in the event of an overcurrent condition, redundant protective devices are designed for each circuit which has sufficient capacity to potentially damage a penetration.

During a review of project calculation X3CM01 it was discovered that approximately 20 non-safety related power circuits did not have redundant protective devices sized adequately to always protect the EPA. These 120 Vac circuits were connected to #10 AWG penetration conductors. The primary protective device for these circuits was a 15 ampere (A) branch circuit breaker and the secondary protective device was a 50A panel incoming circuit breaker. However, the time-current curve of the secondary protective device was not adequately enveloped by the thermal damage limit curve of the EPA conductor.

Engineering Evaluation: A detailed engineering review of the calculation was performed. This review was performed for each power and control circuit shown on the EPA wiring diagrams. Instrumentation circuits were not included in this review due to the absence of potentially damaging fault current resulting from the low energy nature of these circuits. The root cause was determined to be an oversight in transferring data from calculation X3CM01 to the design drawings. The data in the calculation was found to be correct, but the design drawings showed the affected circuits connected to EPA conductors which were too small.

Broadness Review: This review entailed a detailed verification that each power and control circuit that passes through the penetrations as shown on the EPA wiring diagrams has adequate electrical protection to preclude damage to the penetrations. A comparison of data in the calculation against data in the circuit and raceway schedule, one-line diagrams, elementary diagrams, and vendor drawings was performed. The circuit breaker trip setpoints and thermal overload heater selection data were also included in this review to assure accuracy of the calculations associated with these devices.

This review identified other areas where inadequate penetration protection was provided. These areas involve the Neutron Flux Mapping System (FMS) and Fuel Transfer System (FTS). Both of these non-safety related systems are "black box" systems supplied by Westinghouse in which power circuits are brought to the Westinghouse panels and, via panel internal wiring and protective devices, 120 Vac control service level circuits are brought through containment EPAs.

In the FMS, two sets of three de-humidifiers are powered via two separate sets of series connected 50A and 35A circuit breakers which are then connected to #12 AWG EPA conductors. Should a 35A breaker fail to operate properly, the 50A breaker may not operate quickly enough to preclude damage to the #12 AWG penetration conductors.

The FMS also has a 120 Vac circuit to a leak detection switch via #14 AWG EPA conductors. This circuit is protected by a combination of a 40A circuit breaker and a 1A fuse. Should the fuse fail to operate properly, the 40A breaker may not operate quickly enough to preclude damage to the EPA conductors.

The FTS has several circuits which provide connections between the FTS consoles located inside and outside containment. These circuits, which are powered via a 480/120V control transformer in each FTS console, are protected by a single 5A fuse with no secondary protective device provided. Should this fuse fail to operate properly, there may not be adequate protection to prevent damage to the assoiated #14 AWG EPA conductors.

The root cause for inadequate protection being provided for the FMS and FTS circuits passing through the EPAs was determined to be engineering oversight.

Analysis of Safety Implications: Conax Buffalo Corporation, the EPA fabricator, was contacted to quantify the extent of damage that could occur to the EPA seals under faulted conditions. Their response indicates a degree of uncertainty associated with the EPA failure mode and extent. They have determined that under the worst case VEGP faulted conditions, (i.e., at the worst case point of overlap between the thermal damage limit curve of the EPA conductor and the secondary protective device curve), the EPA copper conductor could melt. A melted conductor within an EPA could potentially result in an unanalyzed leak rate in excess of the leakage allowed by IEEE 317 as endorsed by Regulatory Guide 1.63.

All of the affected circuits serve non-safety related functions and no special provisions were made in their design to protect them from the effects of a design basis accident within containment. Therefore, a loss of coolant accident could cause one or more of these non-safety related circuits to short circuit. Then considering a random failure of the primary protective device, and a fault current sufficient to melt the EPA conductor, the pressure retaining capability of the EPA is indeterminate. As a result, GPC has determined that this deficiency, had it remained uncorrected, could potentially have resulted in post-accident containment leakage in excess of that assumed in the safety

analysis and could possibly result in offsite radiation doses in excess of 10CFR100 guidelines.

Consequently, these deficiencies are considered to be reportable under the requirements of 10CFR50.55(e) and 10CFR21 for Unit 2. A separate evaluation is being conducted for Unit 1.

Evaluation of Quality Assurance Program Breakdown: The root cause of this concern is engineering oversight. Inadequate verification was performed to ensure the actual designed EPA conductor size matched the values in the calculation for 22 of the cables. An additional 11 cables were affected because a complete review to ensure that adequate protection was provided to the EPA conductors for circuits associated with vendor supplied "black box" equipment was not performed sufficiently.

An evaluation of the Project Quality Assurance Program determined that since this is a unique subject, isolated to one calculation, it is not indicative of a quality assurance program breakdown. Bechtel Western Power Company is the architect/engineer for this design.

Conclusion: It has not been determined if the containment pressure boundary requirements would be maintained after a postulated short-circuit and random breaker failure in one of the affected circuits. This is due to the uncertainity involved with the extent of damage and failure mode of an EPA when the thermal damage limit curve of the EPA conductor is exceeded.

Therefore, GPC has concluded that a reportable condition as defined by the criteria of 10CFR50.55(e) and 10CFR21 does exist. Based on the guidance in NUREG-0302, Revision 1, concerning duplicate reporting of an event, Georgia Power is reporting this event per the criteria of 10CFR50.55(e).

Corrective Action: Adequate dual protective devices will be provided for each of the affected EPA conductors. Three types of corrective action are being taken, either:

1) Replace the secondary circuit breaker with a smaller circuit breaker, or

2) Re-design for termination of the associated cable to a larger EPA conductor, or

3) Add another fuse in series with the existing protective device.

The design for these changes has a forecast completion of March 1, 1988.

Project calculation X3CM01, Revision 3, which documents the protection provided for the EPA's has been issued. An FSAR change notice is being prepared to incorporate the results of this calculation revision. The FSAR change is currently under review and is planned to be incorporated into a subsequent update of the FSAR.

The construction changes will be made commensurate with the Unit 2 construction schedule prior to fuel load on Unit 2.