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November 6, 1986

the southern electric system

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Senior Vice President

United States Nuclear Regulatory Commission
Region II
Suite 2900
101 Marietta Street, Northwest
Atlanta, Georgia 30323

File: X7BG03-M99
Log: GN-1165

Reference: Vogtle Electric Generating Plant-Units 1 and 2; 50-424, 50-425;
Instrument Cable Insulation Resistance;
Letters GN-887 dated 5/1/86; GN-973 dated 6/30/86;
GN-1056 dated 8/25/86; and GN-1119 dated 10/15/86.

Attention: Mr. J. Nelson Grace

In previous correspondence, Georgia Power Company described a potentially reportable condition concerning instrument cable insulation resistance. Georgia Power Company has completed its evaluation and determined that a reportable condition as defined by the reporting criteria of Part 10 CFR 50.55(e) and Part 10 CFR 21 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 Part 10 CFR 50.55(e). A summary of our evaluation is attached.

This response contains no proprietary information and may be placed in the USNRC Public Document Room.

Yours truly,

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R. E. Conway

REF/REC/tdm
Attachment

xc: U. S. Nuclear Regulatory Commission
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EVALUATION OF A POTENTIALLY REPORTABLE CONDITION
INSTRUMENT CABLE INSULATION RESISTANCE

Initial Report: On April 1, 1986, Mr. R. E. Folker, Vogtle Project Quality Assurance Engineer, informed Mr. W. H. Rankin of the USNRC Region II of a potentially reportable condition concerning instrument cable insulation resistance. In subsequent correspondence to the NRC, Georgia Power Company indicated that a final report on this condition would be submitted by November 7, 1986.

Background Information: The cables associated with Class 1E instruments are required to be functional during and/or after an accident to transmit signals to the main control room. These signals provide indication of critical process parameters and/or initiate various safety functions to keep the plant in a safe condition. Signal degradation as a result of additional current flow due to reduced instrument cable insulation resistance may contribute to instrument loop error during or following a design basis accident.

Readiness Review Finding 22-F16 indicated that the project did not address the acceptability of cable insulation resistance (IR) values during LOCA conditions and that the project does not have documentation to show that the IR values per foot of cable during LOCA are acceptable based on installed cable lengths and instrument accuracy requirements. Specifically, the Readiness Review Team was concerned that the leakage resistance of VEGP instrument cable inside the Containment Building had not been factored into the design. Because of this, there is a concern that instrument loop error, during an accident condition, could exceed allowable tolerances of the associated process systems.

Engineering Evaluation: To evaluate the potential impacts of this condition, a list of the Class 1E instrument loops and non-Class 1E post-accident monitoring circuits was developed as shown on Table 1 (207 total) and Table 2 (52 total), for inside and outside the containment, respectively. Class 1E instrument loops that are required to function during or following a design basis accident and non-Class 1E post-accident monitoring circuits that are environmentally qualified, were identified from Table 1 and Table 2 and analyzed. Inside the Containment Building, a total of 150 instrument loops were identified. Six of these instrument loops inside the Containment Building were designed by Bechtel Power Corporation, while 144 loops were designed by Westinghouse. Outside the Containment Building, 35 instrument loops were designed by Bechtel and 17 were designed by Westinghouse. The contribution of the instrument cable insulation leakage current was factored into these analyses to determine the maximum expected instrument loop error. The instrument loop is considered unacceptable if the error exceeds the allowable tolerance for that instrument loop.

Bechtel's analyses concluded that no unacceptable degradation exists in the six instrument loops within its scope inside containment. One instrument loop required a span change out of the 35 loops within Bechtel's scope outside the containment. Westinghouse's analyses

concluded that 43 of the 144 instrument loops in their scope inside the containment have the potential for exceeding the allowable instrument loop tolerance during accident conditions. Westinghouse's analyses also concluded that the 17 instrument loops outside the containment were acceptable. Excessive instrument loop error during and/or following a design basis accident could result in delayed or erroneous mitigation actions and therefore, could possibly adversely impact plant safety.

Evaluation of Quality Assurance Program Breakdown: A review of the applicable portions of the Bechtel and Westinghouse quality assurance programs determined that this condition was caused by not defining the minimum acceptance criteria for instrument cable insulation resistance in the cable purchase specifications. Normally, cable has an insignificant contribution to circuit leakage current and negligible effect on instrument accuracy. Therefore it has been generally accepted in the nuclear industry to not consider contributions from cable in overall instrument loop accuracy analyses. For this reason, it has been concluded that this condition does not represent a significant quality assurance program breakdown.

Conclusion: Based on the results of the above engineering evaluation, the plant safety could possibly have been impacted had the condition gone uncorrected. Therefore, Georgia Power Company has concluded that a reportable condition as defined by the reporting criteria of Part 10 CFR 50.55(e) and Part 10 CFR 21 does exist. Based on the guidance in NUREG-0302, Revision 1, concerning duplicate reporting of an event, Georgia Power Company is reporting this event per the criteria of Part 10 CFR 50.55(e).

Corrective Action:

o Unit 1

1. Cables Inside Containment

Forty-three (43) cables in the Unit 1 Containment Building have been replaced by means of CCP F10135E. The cable type utilized for replacement exhibits acceptable leakage resistance values for the installed lengths, and is acceptable to Westinghouse.

2. Cables Outside Containment

Evaluation of the contribution of Class 1E instrument and non-Class 1E post-accident monitoring cable insulation leakage current to the instrument loop error in harsh environments outside the Containment Building has been completed. A total of 52 instrument loops (see Table 2) were evaluated (17 Westinghouse and 35 Bechtel designed instrument loops) which identified

one Bechtel loop (PT-11741) which will require an instrument span change. Design change Y-FCRB-431N was issued on September 25, 1986, against the Unit 1 and 2 instrument data sheets for pressure transmitters PT-11741 to recalibrate the instruments in order to reduce the span.

o Unit 2

1. Cables Inside and Outside Containment

PCW Action Item Number 2B1557 was initiated to track the actions required for revising the Unit 2 cable block diagrams to reflect the use of cable with acceptable leakage resistance values. Completion of this Unit 2 effort will be by November 30, 1986, which is consistent with the project's scheduled completion date in support of the start-up turnover date for the system involved.

TABLE 1

INSTRUMENT CABLE ANALYSIS
- INSIDE CONTAINMENT -

<u>INSTRUMENT TAG NUMBER</u>	<u>INSTRUMENT LOOP DESIGNER</u>	<u>REPLACE YES/NO</u>	<u>REQUIRED TO FUNCTION IN A HARSH ENVIRONMENT</u>
1FT-0406	W	NO	Y
1FT-0407	W	NO	Y
1FT-0512	W	NO	Y
1FT-0513	W	NO	Y
1FT-0522	W	NO	Y
1FT-0523	W	NO	Y
1FT-0532	W	NO	Y
1FT-0533	W	NO	Y
1FT-0542	W	NO	Y
1FT-0543	W	NO	Y
1LT-0459	W	NO	Y
1LT-0460	W	NO	Y
1LT-0461	W	NO	Y
1LT-0501	W	NO	Y
1LT-0502	W	NO	Y
1LT-0503	W	NO	Y
1LT-0504	W	NO	Y
1LT-0517	W	YES	Y
1LT-0518	W	YES	Y
1LT-0519	W	YES	Y
1LT-0527	W	YES	Y
1LT-0528	W	YES	Y
1LT-0529	W	YES	Y
1LT-0537	W	YES	Y
1LT-0538	W	YES	Y
1LT-0539	W	YES	Y
1LT-0547	W	YES	Y
1LT-0548	W	YES	Y
1LT-0549	W	YES	Y
1LT-0551	W	YES	Y
1LT-0552	W	YES	Y
1LT-0553	W	YES	Y
1LT-0554	W	YES	Y
1PT-0455	W	YES	Y
1PT-0456	W	YES	Y
1PT-0457	W	YES	Y
1PT-0458	W	YES	Y
1PT-0960	W	NO	Y
1PT-0962	W	NO	Y
1PT-0964	W	NO	Y

TABLE 1
(Continued)

INSTRUMENT CABLE ANALYSIS
- INSIDE CONTAINMENT -

<u>INSTRUMENT TAG NUMBER</u>	<u>INSTRUMENT LOOP DESIGNER</u>	<u>REPLACE YES/NO</u>	<u>REQUIRED TO FUNCTION IN A HARSH ENVIRONMENT</u>
1PT-0966	W	NO	Y
1TE-0413A	W	NO	Y
1TE-0413B	W	NO	Y
1TE-0423A	W	NO	Y
1TE-0423B	W	NO	Y
1TE-0433A	W	YES	Y
1TE-0433B	W	NO	Y
1TE-0433C	W	NO	Y
1TE-0443A	W	NO	Y
1TE-0443B	W	NO	Y
1TE-1313	W	NO	Y
1TE-1314	W	NO	Y
1TE-1315	W	NO	Y
1TE-1316	W	NO	Y
1TE-1317	W	NO	Y
1TE-1318	W	NO	Y
1TE-1319	W	NO	Y
1TE-1323	W	NO	Y
1TE-1324	W	NO	Y
1TE-1325	W	NO	Y
1TE-1326	W	NO	Y
1TE-1327	W	NO	Y
1TE-1328	W	NO	Y
1TE-1329	W	NO	Y
1ZT-0442A	W	NO	Y
1ZT-0442B	W	NO	Y
1ZT-0943A	W	NO	Y
1ZT-0943B	W	NO	Y
1TE-0410A	W	YES	Y
1TE-0410B	W	YES	Y
1TE-0411A	W	YES	Y
1TE-0411B	W	YES	Y
1TE-0420A	W	YES	Y
1TE-0420B	W	YES	Y
1TE-0421A	W	YES	Y
1TE-0421B	W	YES	Y
1TE-0430A	W	YES	Y
1TE-0430B	W	YES	Y
1TE-0431A	W	YES	Y
1TE-0431B	W	YES	Y
1TE-0440A	W	YES	Y
1TE-0440B	W	YES	Y
1TE-0441A	W	YES	Y
1TE-0441B	W	YES	Y

TABLE 1
(Continued)

INSTRUMENT CABLE ANALYSIS
- INSIDE CONTAINMENT -

<u>INSTRUMENT TAG NUMBER</u>	<u>INSTRUMENT LOOP DESIGNER</u>	<u>REPLACE YES/NO</u>	<u>REQUIRED TO FUNCTION IN A HARSH ENVIRONMENT</u>
1FT-0414	W	NO	N
1FT-0415	W	NO	N
1FT-0416	W	NO	N
1FT-0424	W	NO	N
1FT-0425	W	NO	N
1FT-0426	W	NO	N
1FT-0434	W	NO	N
1FT-0435	W	NO	N
1FT-0436	W	NO	N
1FT-0444	W	NO	N
1FT-0445	W	NO	N
1FT-0446	W	NO	N
1FT-2043	W	NO	N
1FT-15212A	W	NO	N
1FT-15212B	W	NO	N
1FT-15212C	W	NO	N
1FT-15212D	W	NO	N
1FT-15216A	W	NO	N
1FT-15216B	W	NO	N
1FT-15216C	W	NO	N
1FT-15216D	W	NO	N
1FT-19052	W	NO	N
1FT-19054	W	NO	N
1FT-19056	W	NO	N
1FT-19058	W	NO	N
1LT-0950	W	NO	N
1LT-0951	W	NO	N
1LT-0952	W	NO	N
1LT-0953	W	NO	N
1LT-0954	W	NO	N
1LT-0955	W	NO	N
1LT-0956	W	NO	N
1LT-0957	W	NO	N
1PT-0403	W	NO	N
1PT-0405	W	NO	N
1PT-0961	W	NO	N
1PT-0963	W	NO	N
1PT-0965	W	NO	N
1PT-0967	W	NO	N
1PT-2041	W	NO	N
1RE-13135A	W	NO	Y
1RE-13135B	W	NO	Y
1RE-51104A	W	NO	N
1RE-51104B	W	NO	N
1RE-51105A	W	NO	N

TABLE 1
(Continued)

INSTRUMENT CABLE ANALYSIS
- INSIDE CONTAINMENT -

<u>INSTRUMENT TAG NUMBER</u>	<u>INSTRUMENT LOOP DESIGNER</u>	<u>REPLACE YES/NO</u>	<u>REQUIRED TO FUNCTION IN A HARSH ENVIRONMENT</u>
1RE-51105B	W	NO	N
1RE-51106A	W	NO	N
1RE-51106B	W	NO	N
1RE-51107A	W	NO	N
1RE-51107B	W	NO	N
1RE-51100	W	NO	N
1RE-51101	W	NO	N
1RE-51102	W	NO	N
1RE-51103	W	NO	N
1RE-002	W	NO	N
1RE-003	W	NO	N
1RE-005	W	NO	Y
1RE-006	W	NO	Y
1TE-2563	W	NO	N
1TE-2612	W	NO	N
1TE-2613	W	NO	N
1TE-10001	W	NO	Y
1TE-10002	W	NO	Y
1TE-10003	W	NO	Y
1TE-10004	W	NO	Y
1TE-10005	W	NO	Y
1TE-10006	W	NO	Y
1TE-10007	W	NO	Y
1TE-10008	W	NO	Y
1TE-10009	W	NO	Y
1TE-10010	W	NO	Y
1TE-10011	W	NO	Y
1TE-10012	W	NO	Y
1TE-10013	W	NO	Y
1TE-10014	W	NO	Y
1TE-10015	W	NO	Y
1TE-10016	W	NO	Y
1TE-10017	W	NO	Y
1TE-10018	W	NO	Y
1TE-10019	W	NO	Y
1TE-10020	W	NO	Y
1TE-10021	W	NO	Y
1TE-10022	W	NO	Y
1TE-10023	W	NO	Y
1TE-10024	W	NO	Y
1TE-10025	W	NO	Y
1TE-10026	W	NO	Y
1TE-10027	W	NO	Y

TABLE 1
(Continued)

INSTRUMENT CABLE ANALYSIS
- INSIDE CONTAINMENT -

<u>INSTRUMENT TAG NUMBER</u>	<u>INSTRUMENT LOOP DESIGNER</u>	<u>REPLACE YES/NO</u>	<u>REQUIRED TO FUNCTION IN A HARSH ENVIRONMENT</u>
1TE-10028	W	NO	Y
1TE-10029	W	NO	Y
1TE-10030	W	NO	Y
1TE-10031	W	NO	Y
1TE-10032	W	NO	Y
1TE-10033	W	NO	Y
1TE-10034	W	NO	Y
1TE-10035	W	NO	Y
1TE-10036	W	NO	Y
1TE-10037	W	NO	Y
1TE-10038	W	NO	Y
1TE-10039	W	NO	Y
1TE-10040	W	NO	Y
1TE-10041	W	NO	Y
1TE-10042	W	NO	Y
1TE-10043	W	NO	Y
1TE-10044	W	NO	Y
1TE-10045	W	NO	Y
1TE-10046	W	NO	Y
1TE-10047	W	NO	Y
1TE-10048	W	NO	Y
1TE-10049	W	NO	Y
1TE-10050	W	NO	Y
1TE-11980	W	YES	Y
1TE-11981	W	YES	Y
1TE-11982	W	YES	Y
1TE-11983	W	YES	Y
1TE-11984	W	YES	Y
1TE-11985	W	YES	Y
1LT-7777	B	NO	Y
1LT-7778	B	NO	Y
1LT-7789	B	NO	Y
1LT-0764	B	NO	Y
1LT-0765	B	NO	Y
1TE-10462	B	NO	Y

Y = YES
N = NO

TABLE 2

INSTRUMENT CABLE ANALYSIS
- OUTSIDE CONTAINMENT -

<u>INSTRUMENT TAG NUMBER</u>	<u>INSTRUMENT LOOP DESIGNER</u>	<u>REPLACE YES/NO</u>	<u>REQUIRED TO FUNCTION IN A HARSH ENVIRONMENT</u>
1FT-0132	W	NO	Y
1FT-0144	W	NO	Y
1FT-0145	W	NO	Y
1FT-0917	W	NO	Y
1FT-0922	W	NO	Y
1FT-11830	B	NO	Y
1FT-15152	B	NO	Y
1FT-15153	B	NO	Y
1FT-19722	B	NO	Y
1FT-19723	B	NO	Y
1FT-5152	B	NO	Y
1HY-0190	W	NO	Y
1LT-1310	W	NO	Y
1LT-1311	W	NO	Y
1LT-1312	W	NO	Y
1PT-0408	W	NO	Y
1PT-0438	W	NO	Y
1PT-0514	W	NO	Y
1PT-0515	W	NO	Y
1PT-0516	W	NO	Y
1PT-0534	W	NO	Y
1PT-0935	W	NO	Y
1PT-0937	W	NO	Y
1PT-11741	B	NO	Y
1PV-3000	B	NO	Y
1PY-3000	B	NO	Y
1PY-3030	B	NO	Y
1RE-13119	B	NO	Y
1RE-13120	B	NO	Y
1RE-13121	B	NO	Y
1RE-13122	B	NO	Y
1TE-15212A	B	NO	Y
1TE-15212B	B	NO	Y
1TE-15212C	B	NO	Y
1TE-15212D	B	NO	Y
1TE-15214A	B	NO	Y
1TE-15214B	B	NO	Y
1TE-15214C	B	NO	Y
1TE-15215A	B	NO	Y
1TE-15215B	B	NO	Y
1TE-15215C	B	NO	Y
1TE-15216A	B	NO	Y
1TE-15216B	B	NO	Y

TABLE 2
(Continued)

INSTRUMENT CABLE ANALYSIS
- OUTSIDE CONTAINMENT -

<u>INSTRUMENT TAG NUMBER</u>	<u>INSTRUMENT LOOP DESIGNER</u>	<u>REPLACE YES/NO</u>	<u>REQUIRED TO FUNCTION IN A HARSH ENVIRONMENT</u>
1TE-15216C	B	NO	Y
1TE-15216D	B	NO	Y
1TE-19722A	B	NO	Y
1TE-19722B	B	NO	Y
1TE-19722C	B	NO	Y
1TE-19722D	B	NO	Y
1TE-19723B	B	NO	Y
1TE-19723C	B	NO	Y
1TE-19723D	B	NO	Y

Y = YES
N = NO