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Reference: Vogtle Electric Generating Plant - Unit 2; 50-425
Cable Separation Within Panels
Letter GN-1403, dated October 6, 1987
Letter GN-1414, dated November 19, 1987

In previous correspondence, Georgia Power Company notified the NRC of a potentially reportable condition involving the electrical cable separation criteria. 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 on Unit 1.

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

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EVALUATION OF A POTENTIALLY REPORTABLE CONDITION
CABLE SEPARATION WITHIN PANELS

Initial Report: On September 9, 1987, Mr. R. E. Folker, Vogtle Project Quality Assurance Engineer, notified Mr. M. V. Sinkule of the USNRC - Region II of a potentially reportable condition under 10CFR50.55(e) involving the electrical separation criteria specified in Construction Specification X3AR01. In subsequent correspondence with the NRC, Georgia Power Company (GPC) indicated that a final report on this issue would be submitted prior to March 1, 1988.

Background Information: Readiness Review Finding 2RRF-006-011 determined that portions of the Construction Specification X3AR01 were not in agreement with the FSAR concerning electrical cable separation requirements inside panels. The Construction Specification provides detailed direction to be followed for physical separation of electrical components in accordance with the criteria in IEEE 384 and NRC Regulatory Guide (R.G.) 1.75. In addition, the Construction Specification provides criteria for reduced cable separation distances based on testing performed by Wyle Laboratories. The reduced separation distances of the Wyle Lab's test were reviewed and accepted by the NRC as documented in Supplement No. 4 to the Vogtle Safety Evaluation Report (SSER 4). The electrical cable separation requirements are included in the Wyle Lab Test Report, FSAR, Design Criteria, Construction Specification, and Field Procedure.

Engineering Evaluation: An engineering evaluation of the Readiness Review Finding revealed that the Construction Specification was less restrictive than the FSAR with respect to certain reduced cable separation criteria which was incorporated as a result of the Wyle Lab test. Specifically, the Construction Specification allowed reduced separation within enclosures for 480 Vac cable, for 125 Vdc and 120 Vac control cables without limiting the size to No. 8 AWG or smaller, and for cable-to-barrier separation of less than 1 inch. The root cause for this non-conservative inconsistency was determined to be misinterpretation of the test program results and inadequate verification that changes to the Construction Specification properly reflected the results of the electrical cable separation test program.

Broadness Review: An engineering study on electrical separation requirements was implemented to determine the full scope of discrepancies by comparing R.G. 1.75, IEEE 384, and the Wyle Lab test report with the FSAR, Design Criteria, and Construction Specification. Results of the engineering study revealed that there were several more instances of criteria discrepancies in addition to the original Readiness Review Finding. A comparison was also made between the Construction Specification and the Electrical Department Field Procedure. This comparison revealed a small number of additional discrepancies. The general types of discrepancies found in the various documents include:

- 1) Cable voltage or size limitations not specified,
- 2) Spatial configuration not in accordance with test report for use of silicon dioxide cloth,
- 3) Cable separation distances not consistent with test results, and
- 4) Criteria for internal panel separation applied to external panel separation, and vice versa, without documented engineering justification.

Analysis of Safety Implications: GPC's evaluation has identified discrepancies which could have resulted in electrical cables being installed with separation distances less than allowed by R.G. 1.75, IEEE 384 or the configurations tested by Wyle Labs for Plant Vogtle, and accepted by the NRC in SSER 4. Inadequate cable separation could jeopardize the safe operation of the plant due to postulated damage to required circuits caused by faults in non-safety related circuits or redundant train related circuits. Considering this event plus an independent single failure, the capability of the plant to prevent or mitigate consequences of accidents might be degraded such that a safety limit could be exceeded. Therefore, GPC has concluded that this condition, if left uncorrected, could potentially have created a significant deficiency or substantial safety hazard and is therefore reportable under 10CFR50.55(e) and 10CFR21.

Evaluation of Quality Assurance Program Breakdown: The root cause of this problem was misinterpretation of the Wyle Lab Test Program results and inadequate verification that changes to the Construction Specification properly reflected the results of the Wyle Lab separation test program, the design criteria, and the commitments in the FSAR. To a lesser extent, the problem also involves some instances of incomplete incorporation of Wyle Lab Test program restrictions into the FSAR and the Design Criteria. The broadness review also revealed that inadequate verification was given to changes in the field procedure. Review indicates that these discrepancies were essentially limited to the particular effort to modify separation requirements as a result of the Wyle Lab Test Program. Therefore, it has been concluded that no programmatic changes are required in the change review cycle and this condition does not constitute a significant breakdown in the Project Quality Assurance Program.

Conclusion: A complete review of the project electrical cable separation criteria documentation has been completed. The proper documentation or change notices have been initiated to insure that the correct criteria and procedures are in place for future work. Inspections are being performed as described in the corrective action section to insure that the potentially affected cables and raceways are separated adequately.

Inadequate cable separation could potentially lead to a significant deficiency or substantial safety hazard. 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, GPC is reporting this event per the criteria of 10CFR50.55(e).

Corrective Action: The engineering study on electrical separation has been completed, including a formal review, so there is a high degree of assurance that all discrepancies have been identified. The study also documents engineering justification for any logical extensions of test results that were made to similar cable configurations. Logical extensions of test results to non-tested configurations consist of justifying that the potential for damage or the temperatures expected at target cables in an untested configuration are less than or equal to those experienced by cables actually tested.

Change notices have been initiated to bring all documentation into agreement. The field procedure was revised and reissued on December 16, 1987, to prevent the discrepancies found from affecting future installations.

Additional testing has been completed at Wyle Labs to extend the results of the

previous Wyle Lab testing for Plant Vogtle. This testing was conducted in accordance with the same criteria previously approved by the NRC in SSER 4. All test results were acceptable and the tested cables experienced no damage with one exception. That exception involved swelling of a cable jacket, but it did not prevent the cable from passing the acceptance criteria, and the damage was less severe than that previously accepted by the NRC. GPC currently anticipates submitting this additional test report to the NRC with proposed FSAR changes in March 1988. The design and construction documents currently in use do not take credit for the results of this additional testing and the additional testing does not affect the conclusions of this evaluation for reportability. However, the inspections described below which are currently ongoing do incorporate the results of this additional testing by Wyle Labs.

The inspection program is designed to envelop all known cases of cable installation where the criteria justified by R.G. 1.75, IEEE 384, or the two Wyle Lab tests might not have been met. A one-hundred percent inspection will be performed on the following items installed before the field procedure was corrected:

1. Class 1E 4.16 KV cables,
2. Class 1E and non-1E 480V and lower voltage power and control, non-armored cables larger than #2/0 AWG,
3. Class 1E and non-1E control service level, non-armored cables #6 AWG through #2/0 AWG,
4. Raceways which were inadvertently omitted from a list of raceways which did not meet the requirements for reduced separation and should have followed R.G. 1.75 separation criteria, and
5. All multi-channel panels regardless of installation date where the reduced separation criteria of the Wyle Lab tests could have been utilized.

Items one through four of the above list are scheduled to be reinspected by June 1, 1988. The multi-channel panel inspection will be completed as part of the normal, established construction inspection program and is forecast to be complete October 31, 1988.

All discrepancies to the separation criteria that are found in any of the inspections will be documented and dispositioned by approved Project methods. Modifications will be made as required commensurate with the Unit 2 construction schedule prior to fuel load.