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USNRC REGION II
ATLANTA, GEORGIA

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the southern electric system



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United States Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

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Attention: Mr. James P. O'Reilly

Reference: Vogtle Electric Generating Plant - Units 1 and 2
50-424, 50-425; HVAC Duct Supports; Design Inconsistencies

Gentlemen:

On September 30, 1982, Mr. C. W. Hayes of Georgia Power Company reported a potential deficiency to Mr. John Rogge of the USNRC concerning design inconsistencies between Bechtel duct support detail drawings and Pullman Construction Industries fabrication drawings. On February 25, 1983, Georgia Power Company submitted an interim report on this subject.

Georgia Power Company has concluded its evaluation and determined that this concern is reportable under 10CFR50.55 (e) and 10CFR21. Enclosed is our report for this item.

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

Very truly yours,

D. O. Foster
D. O. Foster

DOF/REF/cc

attachment

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EVALUATION FOR A SUBSTANTIAL SAFETY HAZARD
EVALUATION FOR A SIGNIFICANT DEFICIENCY

HVAC DUCT SUPPORTS - DESIGN INCONSISTENCIES

Initial Report:

On September 30, 1982, Mr. C. W. Hayes of Georgia Power Company reported a potential deficiency to Mr. John Rogge of the USNRC concerning design inconsistencies between Bechtel duct support detail drawings and Pullman Construction Industries (PCI) fabrication drawings. On February 25, 1983, Georgia Power Company submitted an interim report on this subject. A final report was scheduled for August 5, 1983.

Background Information:

During a Georgia Power Company quality assurance audit, it was noted that the contractor erecting HVAC duct supports, Pullman/Kenith-Fortson (P/K-F), was not following the installation procedure. Furthermore, ambiguities were noted on the design drawings which were subject to misinterpretation.

Georgia Power Company Quality Assurance (GPC QA) also determined that P/K-F was not reviewing the PCI shop drawings relative to GPC engineering design drawings as was required by P/K-F design control procedure V-3.1.F.

GPC QA also identified ambiguities in the Bechtel Power Corporation (BPC) engineering design drawings which required clarification by GPC to eliminate possible misinterpretation by P/K-F and GPC during erection and inspection, as well as possible misinterpretation by PCI when developing the shop drawings.

The structural supports for all HVAC ducts are represented by approximately 200 standard types. Each of the approximately 9200 individual supports are categorized into one of the standard types and the specific information for each support (i.e., member sizes and lengths, connection details and options, support location, etc.) is provided on engineering design drawings in the form of plans, detail sheets and schedules. The supports are essentially composed of structural steel angle sections, structural steel tube sections, and steel plates, with either bolted or welded connections. PCI produces individual shop drawings for each support and fabricates the supports which are installed by P/K-F.

Given the conditions as described above, the potential existed that some HVAC duct supports as-built conditions, shop drawings, and engineering design drawings were not in agreement with each other. Disagreements could exist in member sizes and lengths, bolt sizes, weld sizes and lengths, and information may be missing.

Engineering Evaluation:

Bechtel Power Corporation, the architect/engineer for the Vogtle Electric Generating Station, initiated a task force to review all HVAC duct support standard design drawings to identify, evaluate, and remove any ambiguities

and to make any necessary improvements in clarity and completeness. This task force met with GPC and P/K-F to conduct in-depth discussion and review of these drawings which resulted in revisions to approximately 30 of the 200 standard support types. The revisions consisted of approximately equal parts of (1) missing or conflicting information, (2) clarification of details which were not always necessary but which were requested by GPC or P/K-F in order to eliminate any possibility of misinterpretation, and (3) additional detail to assist construction as requested by GPC and P/K-F.

GPC has reviewed the PCI shop drawings pertaining to all of the supports either installed as of September 24, 1983, or fabricated but not installed as of September 24, 1982. This consisted of reviewing shop drawings for a total of 2090 installed supports and 2620 fabricated but not installed supports. With the exception of 120 supports, the discrepancies found in the shop drawings were of a minor cosmetic nature (i.e., missing details, incorrect support elevations and bills of material, larger than required member sizes, and individual dimensions that do not add up to the total length) and met design requirements. The discrepancies observed in the other 120 supports included the use of member sizes, weld sizes and/or bolt sizes smaller than those specified on the design drawings, and in some cases, misinterpretation of bracing requirements. Only two items in the category of missing or conflicting information in shop drawings were identified as possible contributors to the discrepancies observed in these 120 duct supports.

Review of Reportability Requirements:

If these discrepancies in the P/K-F shop drawings had remained undiscovered, the ability of some safety-related HVAC systems and components to perform their designed function may have been adversely affected. While it can be concluded that failures are possible under postulated environmental conditions such as earthquake conditions, the likelihood of any safety-related functions being impacted is very low for the following reasons:

- Only a limited number of supports contained design deficiencies; and,
- Duct supports have a considerable reserve strength considering their inelastic behavior since they are made up of structural steel which is inherently ductile.

Additionally, an evaluation has been conducted to determine if there has been a breakdown in the quality assurance program. This evaluation has determined that there was a significant breakdown in the quality assurance program of P/K-F. At the site, P/K-F was responsible for review of shop detail drawings to assure conformance to the Bechtel design drawings for standard type supports. Although adequate procedures existed at the site for this activity, the execution of these procedures was incomplete, improper, or completely ignored. As part of the overall corrective action, this activity will now be accomplished by Bechtel in lieu of P/K-F. Bechtel was responsible for producing and reviewing the design drawings for the standard types of duct supports from which the specific fabrication detail drawings were made in the shops. The incidences of missing or conflicting information on the design drawings are attributable to occasional incomplete execution of adequate procedures and not an inadequate quality system.

Additionally, the concern with the design of the 120 HVAC duct supports represents a significant deficiency in the final design as approved and released for construction such that the design does not conform to the criteria and basis stated in the safety analysis report.

Conclusion:

The above discussed concern is reportable under 10 CFR 50.55(e) due to the quality assurance program breakdowns at Pullman/Kenith-Fortson Company, the improper design of the 120 duct supports, and the consequences of the failure of the safety-related HVAC system to perform its intended safety function. Additionally, the potential failure of the safety-related HVAC duct supports represents a substantial safety hazard since the potential failure of the duct supports could lead to the postulated failure of other safety-related equipment requiring an air supply within certain areas. Based upon guidance supplied in NUREG-0302, Revision 1, October 1977 and other related documents, Georgia Power Company is reporting this concern to the NRC under the requirements of 10 CFR 21.

Corrective Action:

All duct support standard design drawings have now been reviewed and revised as necessary by Bechtel after coordination with GPC to clarify any ambiguities, include missing information, and provide additional details as requested by GPC and P/K-F. All future issues of new duct support standard design drawings will be given a similar review to prevent recurrence of this problem. All Bechtel personnel involved in the design and drafting of duct support standards have been made fully aware of the potential problems and have been instructed on how to avoid these problems in the future.

The shop drawings with design inconsistencies are being revised by PCI to conform to the design requirements. These revised drawings will be reviewed by Bechtel and, on approval, the associated 120 supports will be modified accordingly.

Work on all supports fabricated or installed by P/K-F after September 24, 1982, has been and will be allowed to proceed only after the PCI shop drawings for such supports have been reviewed and permission given by GPC for the work to proceed.