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TENNESSEE VALLEY AUTHORITY

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5N 157B Lookout Place

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WBRD-50-390/86-17
WBRD-50-391/86-13

NOV 03 1986

U.S. Nuclear Regulatory Commission
Region II
Attention: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Dear Dr. Grace:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - LACK OF ADEQUATE CALCULATIONS TO DOCUMENT ELECTRICAL SYSTEM DESIGN BASIS - WBRD-50-390/86-17, WBRD-50-391/86-13 - FINAL REPORT

The subject deficiency was initially reported to NRC-Region II Inspector Art Johnson on December 23, 1985 in accordance with 10 CFR 50.55(e) as SCR WBN EEB 8571. Interim reports were submitted on January 28 and July 15, 1986. Enclosed is our final report.

If there are any questions, please get in touch with J. A. McDonald at (615) 365-8527.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R Gridley

R. Gridley, Director
Nuclear Safety and Licensing

Enclosure
cc (Enclosure):
Mr. James Taylor, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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Mr. G. G. Zech
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ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
LACK OF ADEQUATE CALCULATIONS TO DOCUMENT
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WBRD-50-390/86-17, WBRD-50-391/86-13
SCR WBN EEB 8571
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency

The Watts Bar Nuclear Plant (WBN) INPO review and TVA's Office of Quality Assurance audit identified specific electrical design calculations that have not been evaluated and documented. Due to these findings/deviations, problem identification reports (PIRs) WBN EEB 8527 and WBN EEB 8528 were initiated to correct the problems. In pursuing the corrective actions to resolve the PIRs, it was discovered that other calculations were also missing. This significant condition report (SCR) was written to address the fact that for WBN, TVA had failed to identify the minimum set of electrical calculations (calculations on safety-related systems required to shut down the plant), to revise existing calculations to incorporate subsequent design changes, and had issued design documents and drawings without preparing or before completing supporting calculations. These calculations are necessary to ensure the technical adequacy and compliance with the plant design basis. Affected systems include; auxiliary and control power distribution, communications, instrument and control, lighting, raceway, switchyard and transformers.

This condition resulted primarily from inadequately defined requirements to formally document supporting design calculations and studies. At the time the deficiencies occurred no procedures were in place to define the required minimum set of calculations and studies for the electrical systems. Some calculations were completed and kept in an informal status. Those calculations that were formalized were not updated to support document and drawing revisions.

Safety Implications

All system designs must be supported by design calculations. Without a minimum set of calculations to support the safety-related electrical system design basis and technical adequacy, inadequate assurance exists that the components and systems will function as required. This deficiency represents a condition which could adversely affect the safe operation of the plant.

Corrective Action

A preliminary minimum set of calculations necessary to ensure the technical design adequacy and compliance with the plant design basis has been identified and compared to existing calculations. This resulted in the identification of additional calculations that need to be performed, and existing calculations that need to be revised before fuel loading. TVA is proceeding to perform these calculations based on this preliminary set.

Sargent and Lundy was contracted to provide an independent assessment to ensure that the calculations for the electrical, instrumentation and control systems necessary to support the design basis had been identified and that all the necessary calculations existed and were current and retrievable. This effort has been completed and a final report was provided to TVA detailing calculation status including adequate and inadequate calculations.

As a result of the Sargent and Lundy review, TVA's Electrical Engineering Branch (EEB) has issued a branch Policy Memorandum (PM) 86-02 regarding the performance of electrical calculations. This policy memorandum identified all EEB - controlled electrical calculations necessary to fully document the design basis of a standardized TVA nuclear plant. In addition, it identified the set of calculations which must be completed in order to support fuel loading and the set of calculations which can be performed after fuel loading.

PM 86-15 has also been issued regarding documentation of calculation status. This policy requires that a checklist be prepared for each calculation listed in PM 86-02 and any additional plant-specific calculations identified per the requirements of PM 86-02. The preparation of the checklist will identify the current status of all required calculations and will provide a method for monitoring the resolution of all identified deficiencies and the completion of all required calculations. Any required new calculation(s) or deficiency resolutions identified by the above exercise to ensure that safety-related equipment can perform its intended designed functions under design basis conditions will be completed before fuel load of the respective units. The balance of the plant (BOP) calculations will be completed after fuel loading. The performance of the calculations will establish the adequacy of the existing design documents and drawings and will also baseline the calculations for future revisions. Any deficiencies identified by the performance of these calculations will be handled separately and evaluated per the Nuclear Engineering Procedure (NEP)-9.1 "Corrective Action".

In order to prevent recurrence, PMs 86-02 and 86-15 will be incorporated into the Watts Bar Engineering Project Manual as a revision to the requirements of Engineering Procedure (EP)-43.09 "Procedure for Identifying the Calculations Required to Support Electrical Design." Once PM 86-15 has been implemented, an assignment of responsibility for each identified calculation will be made to WBEP principal electrical engineers by fuel load of unit 1. This assignment of responsibility involves an acknowledgement of the calculations required to support the electrical system designs and ensures that the calculations are maintained in accordance with NEP-3.1, "Calculations" and NEP-6.1, "Change Control." In addition, PM 86-24 has been issued to detail and clarify the existing design process at the working level.