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**APR 07 1003**

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Gentlemen:

In the Matter of the Application of )  
Tennessee Valley Authority ) Docket Nos. 50-390  
50-391

WATTS BAR NUCLEAR PLANT (WBN) - NRC INSPECTION REPORT 390, 391/93-04 - REPLY  
TO NOTICE OF VIOLATION 390, 391/93-04-01

This letter responds to Inspection Report 390, 391/93-04 dated March 8, 1993,  
which identified a violation related to design control associated with  
modifications to WBN's 6.9KV Shutdown Power System. TVA's response is  
provided in the enclosure.

If you have any questions, please telephone P. L. Pace at (615) 365-1824.

Very truly yours,

William J. Museler

Enclosure  
cc: See page 2

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
REPLY TO NRC'S MARCH 8, 1993 LETTER TO TVA  
VIOLATION 390, 391/93-04-01

DESCRIPTION OF VIOLATION

10 CFR 50 Appendix B Criterion III and the licensee accepted Quality Assurance Program, TVA-NQA-PLN 89-A, Nuclear Quality Assurance Plan, Revision 2, Section 7.2, Program Elements, require that measures shall be established to assure that applicable regulatory requirements and design basis, as defined in Paragraph 50.2, and as specified in the license applications for those structures, systems and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. The design control measures shall provide for verifying or checking the adequacy of design such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. The license Quality Assurance Program endorses the requirements of ANSI N45.2.11-1974, Quality Assurance Requirements for the Design of Nuclear Power Plants. This standard, Section 4.0 requires that design activities shall be prescribed and accomplished in accordance with procedures of a type sufficient to assure that applicable design inputs are correctly translated into specifications, drawings, procedures, or instructions. Methods shall provide for relating the final design back to the source of design input. Additionally, the design activities shall be documented in sufficient detail to permit verification and auditing as required by this standard.

Site Standard Practice (SSP)-9.03, Design Change Control, Revision 5, contains requirements for design changes, and plant modifications based on design changes, at Watts Bar Nuclear Plant. Section 2.2.B.4 of this procedure specifies that design requirements shall be appropriately translated via design process documents (e.g., calculations or analysis) into design output documents. Additionally, Section 2.2.D.1 specifies that design output documents shall accurately reflect design requirements and shall be prepared, reviewed, and approved in accordance with the design engineering program.

Engineering Administrative Instruction EAI-3.05 Design Change Notices, Revision 10, provides requirements for the use of Design Change Notices (DCNs) at Watts Bar Plant and implements the requirements of SSP-9.03. Section 5.1.8.g of this procedure requires that the Responsible Lead Engineer shall ensure the problem solution/change is technically correct, adequate, and complete.

Contrary to the above, on December 6, 1992, DCN M21675A, Revise Fast Transfer Scheme for 6.9KV Shutdown Boards, was approved and issued for use without complying with the requirements of SSP-9.03 and EAI-3.05 in that the following design deficiencies were contained in the DCN:

- Failure to include post-modification test acceptance criteria and analysis which demonstrated acceptable dead bus transfer time.
- Failure to provide a jumper to establish continuity in 6.9KV Circuit Breaker closing circuits.
- Failure to identify the use of a 2B-B Shutdown Board auxiliary contact in the Essential Raw Cooling Water Control Valve circuit which resulted in the possible interconnection of the 120 VAC and 125 VDC power systems.
- Failure to correctly back circle design changes involving auxiliary contacts.
- Failure to correctly identify auxiliary contacts as coming from the 2B2-B Shutdown Board.
- Failure to correctly identify a 6.9KV Shutdown Board trip signal to the 480 V Shutdown Board bus-tie breaker.

This is a Severity Level IV violation (Supplement II).

#### REASON FOR VIOLATION

The violation occurred as a result of inadequate design preparation and design verification of DCN-M-21675-A, with two key contributing factors including inappropriate use of design replication and the use of work-at-risk methods (advanced authorizations) for making functional changes to equipment. In addition, the subject design change contained marginal specifics regarding the post-modification test acceptance criteria and documentation demonstrating acceptable dead bus transfer times. Of the six deficiencies cited in the violation, five of these were identified by TVA during modification and preliminary test activities prior to placing the equipment in service.

TVA performed an analysis of the above design preparation/verification issues as documented by a report entitled "Management Assessment of Watts Bar Nuclear Plant - Problem Evaluation Report (PER) WBP920284," January 21, 1993. As noted in the subject NRC Inspection Report, the results of this assessment were reviewed by NRC staff. The key contributor to the problems documented by the PER involved inappropriate use of design replication in developing design changes for multiple, similar breaker schemes. DCN M-21675-A involved modifying the manual fast transfer scheme for each of 12 breakers (normal, alternate, and maintenance feeder breakers; three per shutdown board) associated with WBN's four 6.9KV Shutdown Boards. The detail design was essentially the same for each of the 12 breakers; however, there existed specific wiring differences between the 12 breakers that should have been recognized.

Although the DCN received an independent review during the development phase, a lack of independence between the preparer and reviewer/verifier during comment resolution and final design appears to have contributed to some of the errors going undetected. The independent verification of the DCN resulted in numerous

comments which were resolved and agreed to between the preparer and verifier resulting in extensive redesign and drafting rework. In order to meet schedule requirements, the preparer and the verifier worked together in revising/creating the formal change paper which depicts the final design.

Additionally, during the preparation of DCN M-21675-A, it was not recognized that another outstanding design change (DCN F-21585-A) also affected the 6.9KV design scheme resulting in conflicting information. This F-DCN was a field identified change issued under the advanced authorization (AA) process to correct/supplement the original design. The AA process had been developed to allow "on-the-spot" field correction of design errors (at-risk) with subsequent design reviews/approvals. Although procedures and processes are in place to identify outstanding change documents against plant drawings, the methodology for tracking advanced authorized DCNs was found to be cumbersome and added to the difficulty of establishing baseline drawings for use in DCN preparation.

WBN Procedure SSP-9.03 requires in Section 2.2.H that DCN packages shall include design documentation commensurate with the nature of complexity of the change including reference to calculations required to support the technical adequacy of the change. Notwithstanding the above problems documented by WBP920284, TVA considers that the package contents for DCN-M-21675-A together with available design output information were sufficient to adequately transmit design requirements and were commensurate with the complexity of the design. The package contained vendor information which (although cumbersome), when used in conjunction with other approved design output for the 6.9KV Shutdown Power System (e.g., single line wiring diagram 1-45W724-1, etc.), allowed a determination of the breaker model and contact type and associated response times. Since the DCN M-21675-A did not alter the design criteria of six cycles (given by WBN Design Criteria WB-DC-30-28), that value remained the same. Further, post-modification test requirements were provided in Appendix H to DCN M-21675-A. Since the six-cycle acceptance criteria was not changed by the DCN package, it was not considered necessary to reiterate the six-cycle criteria within the DCN. In fact, the preoperational test PTI-211-01, "6.9KV Shutdown Power System," test instructions had included the Design Criteria WB-DC-30-28 as a source document and appropriately included the six-cycle test requirement within the test instructions both prior to the scheme modification and afterwards. TVA emphasizes that the WBN change program is established such that the DCN package includes only the required document changes. Simply stated, in addition to DCN requirements specific to a particular modification, existing design requirements must also be used in the implementation of design changes.

#### CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED

The Management Assessment Review Team concluded that the above condition is not pervasive in other issued DCNs. An independent review of six recently issued DCNs was performed to validate this conclusion. The review found no functional errors. The identified deficiencies were categorized as either an administrative or documentation discrepancy with no design impact. As a result, the corrective actions necessary to resolve this violation are limited to DCN M-21675-A.

The following F-DCNs were issued against DCN M-21675-A to correct the identified deficiencies: F-21935-A, F-22181-A, F-22256-A, F-22298-A, F-22368-A, and F-23174-A. These DCNs have been incorporated into M-21675-A and have been closed.

As an enhancement, to clearly address test requirements for the subject modification, the manual dead-bus transfer test requirements given in DCN-M-21675 Appendix H "Test Specification Form" were supplemented via F-DCN-23174-A with quantitative acceptance criteria (six cycles). Also, this F-DCN identified the pertinent information contained within the existing General Electric vendor information provided with the DCN package to correlate equipment capabilities to design input requirements (six cycles) for the fast transfer. Also, the test scoping document TVA-13A, "Onsite AC Power Distribution System (Diesel Board System Test)," was revised (Revision 3, change number 3) to include the fast bus transfer time acceptance criteria of six cycles.

#### CORRECTIVE STEPS TAKEN TO AVOID FURTHER VIOLATIONS

The following actions were taken:

1. Revised Engineering Administrative Instruction EAI-3.05 (Revision 11) to eliminate future initiation of advance authorized F-DCNs for changes to system logic, function, performance, operation, wire termination, system setpoint, and protective device ratings.
2. Performed classroom training for individuals involved in the design and design verification process. This training emphasized the following:
  - The importance of rigidly adhering to the design process and the importance of checking each and every component. Replication cannot be assumed.
  - The importance of maintaining the "arms length" separation of the design verification process.
  - To demonstrate the types of errors (using DCN M-21675-A as a "lessons learned" type document) that can be manifest if the foregoing are not followed.
  - Elimination of the practice of photocopying one Design Change Authorizations (DCA) (a drawing excerpt contained in a DCN) to make additional DCAs for the same or similar changes to other components.
3. The Engineering Manager issued a memorandum to each discipline lead and to Ebasco Services Incorporated requesting that F-DCNs that correct functional errors be fed back to the organization involved in preparing the original DCN, including discussion with the responsible individuals.

#### DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

With respect to the identified deficiencies, TVA is currently in compliance.