



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

John H. Garrity  
Vice President, Watts Bar Nuclear Plant

SEP 19 1991

WBRD-50-390/86-50  
WBRD-50-391/86-47

10 CFR 50.55(e)

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

Gentlemen:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - STANDBY DIESEL GENERATOR  
DESIGN DEFICIENCY - WBRD-50-390/86-50, WBRD-50-391/86-47 - REVISED  
FINAL REPORT

The subject deficiency was initially reported to NRC Region II Inspector Gordon Hunegs on April 21, 1986, in accordance with 10 CFR 50.55(e), as Significant Condition Report (SCR) WBN EEB 8633. A final report was submitted on May 20, 1986. Subsequently, the corrective action for the SCR was revised, and the SCR was replaced by Significant Corrective Action Report (SCAR) SCR WBN EEB 8633 SCA. Enclosed is TVA's revised final report. This report contains no new commitments.

TVA considers 10 CFR Part 21 applicable to this deficiency.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

John H. Garrity

Enclosure  
cc: See page 2

9109260093 910919  
PDR ADOCK 05000390  
S PDR

FEZ 7

U.S. Nuclear Regulatory Commission

SEP 19 1991

cc (Enclosure):

INPO Record Center  
1100 Circle 75 Parkway, Suite 1500  
Atlanta, Georgia 30339

NRC Resident Inspector  
Watts Bar Nuclear Plant  
P.O. Box 700  
Spring City, Tennessee 37381

Mr. P. S. Tam, Senior Project Manager  
U.S. Nuclear Regulatory Commission  
One White Flint, North  
11555 Rockville Pike  
Rockville, Maryland 20852

Mr. B. A. Wilson, Chief, Project Chief  
U.S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

## ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
STANDBY DIESEL GENERATOR DESIGN DEFICIENCY  
SIGNIFICANT CORRECTIVE ACTION REPORT SCR WBN EEB 8633 SCA  
WBRD-50-390/86-50, 391/86-47 - 10 CFR 50.55(e)  
REVISED FINAL REPORT

### Description of Deficiency

A deficiency was identified at Watts Bar Nuclear Plant (WBN) which affects all five of the standby diesel generators and which could prevent the diesel generator system from performing its intended design function. During the normal shutdown cycle of a diesel generator, a 10-minute idle period at approximately 450 r/min is initiated prior to bringing the engine to a full stop. If, during the 10-minute engine idle period, an emergency start signal is received by the diesel generator system controls, the diesel generator will accelerate to 900 r/min, but the generator field will not be flashed. Since this prohibits the diesel generator from accepting a load, the design did not meet the requirements of WBN Design Criteria WB-DC-40-28.1 (currently System Description N3-82-4002) nor the design bases for WBN as stated in the WBN FSAR Section 8.3.

The cause of this deficiency was a design error by the manufacturer, MKW Power Systems (formerly Morrison-Knudson, Power Systems Division), Rocky Mount, North Carolina. The generator field flash reset circuit was interlocked with a relay contact (SS2X) which closes at approximately 200 r/min when engine speed is decreasing. Since this is below the 450 r/min idle speed, the field flash circuitry would not be reset.

The diesel generators at WBN were procured from MKW Power Systems on TVA procurement contract number 74C63-83090.

### Safety Implications

Since the subject deficiency affects all of the standby diesel generators at WBN, the potential existed for the ability to achieve and maintain a safe shutdown of the plant to be adversely affected. This could have adversely affected the safety of operations of the plant.

### Corrective Action

TVA has jumpered relay contact SS2X from the reset function associated with relay "LR" and has disconnected the voltage shutdown pushbutton located in the control panel for each diesel generator. This permits the reset signal to be independent of the engine speed. The voltage shutdown pushbutton is not essential to successful diesel generator operation. If a problem were to arise during diesel generator operation that required immediate voltage shutdown, use of the emergency stop pushbutton would cause the voltage to shut down as well as shutting down the engine. Engineering Change Notice (ECN) 6262 implemented the required design changes and field modifications.

MKW Power Systems Engineering Procedure (EP) 202 has been issued to require a secondary review of all safety-related design changes. The secondary review is to be performed by an individual or group other than those who performed the original design. MKW considers this action to be adequate to prevent recurrence of the subject deficiency.

As a result of discussions with the NRC concerning this deficiency, TVA performed a review of the diesel generator logic circuitry, the Preoperational Test Scoping Document and the Preoperational Test to determine the adequacy of the design and the testing program. The implementation of this review was tracked by the NRC as Unresolved Item (URI) 390, 391/86-14-01.

Independent of the actions associated with URI 390, 391/86-14-01, TVA initiated Quality Assurance Audit QWB-A-86-0017. The implementation of the corrective action plan for Quality Assurance Audit Finding QWB-A-86-0017-D01 resulted in a review of Preoperational Test Scoping Document TVA-13B, Onsite AC Power Distribution System (Diesel Generator Loading Logic). The corrective action plan for this audit finding was designed to identify inconsistencies in the test scoping documents and resolve those inconsistencies so that the scoping documents reflect the current design bases. Revision 1 of TVA-13B reflects the results of this review. Furthermore, a new Test Scoping Document TVA-73B, Onsite AC Power Distribution System (Additional Diesel Generator Loading Logic), was issued to define the test requirements for the additional diesel generator. These scoping documents were used, under requirements of the Prestart Test Corrective Action Program (CAP), as input to the Prestart Test Function Analysis Report (FAR) for TVA system 211, 6900 V Shutdown Power. The functions included in the FAR are to be validated by detailed test instructions which will also be developed under the Prestart Test CAP. TVA considers these actions appropriate to satisfy the actions tracked by URI 390, 391/86-14-01 for review of the Preoperational Test Scoping Document and the Preoperational Test.

In addition, the review of the diesel generator logic has been completed. The areas reviewed included remote/local start, idle start, normal stop, safety shutdown, field voltage, and emergency feeder breaker closure. Vendor drawing discrepancies identified during this review were resolved under Design Change Notice (DCN) S-16299-A.