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

10 CFR 50.90

MAR 0 7 2001

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

Gentlemen:

In the Matter of) Docket No. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - REQUEST FOR NOTICE OF ENFORCEMENT DISCRETION FOR TECHNICAL SPECIFICATION 3.8.7, INVERTERS - OPERATING

The purpose of this letter is to formally document TVA's verbal request for discretionary enforcement concerning WBN Technical Specifications for the Vital Inverters. In a teleconference with NRC management on March 6, 2001, at approximately 2:30 p.m. EST, TVA verbally requested NRC to issue a Notice of Enforcement Discretion (NOED) to prevent having to enter Action B of Limiting Condition for Operation (LCO) 3.8.7, "Inverters - Operating." Entry into this action would have required that a plant shutdown be initiated. The shutdown would have been required if the 24 hour Completion Time of LCO 3.8.7, Action A, had not been achievable due to anticipated additional time needed to complete repairs and testing for Unit 1 Vital AC Inverter 1-I. As discussed in the teleconference, a failure of the of 120 Volt AC Vital Inverter 1-I occurred at approximately 1:30 a.m. on March 6, 2001.

At 4:48 p.m., on March 6, 2001, NRC's Mr. Kerry Landis notified me that following a briefing with the NRC Region II Administrator, the NOED was approved. The approval was effective immediately and would expire as soon as the 1-I Inverter is declared operable and returned to service. TVA was requested to submit a written request for the NOED within 48 hours. As discussed during the teleconference, the repair was progressing ahead of schedule but TVA believed additional time was needed to address post-maintenance testing and any potential unforeseen circumstances. However, the actual work was completed and Vital Inverter 1-I declared operable and

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returned to service at 1:15 a.m. on March 7, 2001, within the original required Action Completion Time of 24 hours. Therefore, the subject NOED is not needed and was not used.

Enclosed please find the information documenting TVA's earlier verbal request for the NOED. If you should have any additional questions, please contact me at(423) 365-1824.

Pursuant to 28 U.S.C. § 1746 (1994), I declare under penalty of perjury that the foregoing is true and correct.

Sincerely,

P. L. Pace, Manager
Licensing and Industry Affairs

Executed on this 7th day of March , 2001.

Enclosure
cc (Enclosure):
NRC Resident Inspector
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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNIT 1

TVA Discussion of Questions in NRC Administrative Letter 95-05, Revision 2

1. The TS or other license conditions that will be violated.

On March 6, 2001, at 0132 EST, with WBN Unit 1 at 100% reactor power, WBN entered TS Limiting Condition for Operation (LCO) 3.8.7, Action A due to removing Vital Inverter 1-I (Train A) from service. At 0120 EST, it was noticed that the Vital Inverter 1-I smelled hot with an orange glow coming from the interior of the inverter. A small amount of smoke was also confirmed coming from the inverter. Due to the imminent failure of Inverter 1-I, Vital Power Board 1-I was manually transferred to the alternate power supply and LCO 3.8.7, Action A was entered with a Completion Time of 24 hours to repair and restore the inverter to operable status. LCO 3.8.7 Action A has a Note requiring entry into the Conditions and Required Action for LCO 3.8.9, "Distribution Systems-Operating." This requirement is to ensure that the associated Vital Power Board is reenergized within 2 hours. However, since the Board was manually transferred to the alternate power supply, the Board was not deenergized, therefore, no entry into LCO 3.8.9 was necessary.

If unable to meet the Action Completion Time, Action B requires the plant to be placed in Mode 3 within 6 hours and Mode 5 within 36 hours. The inverters are required to be Operable in Modes 1, 2, 3, and 4 to ensure that acceptable design limits and reactor coolant pressure boundary limits are not exceeded, adequate core cooling is provided, and containment operability and other vital functions are maintained in the event of a postulated design basis accident. As discussed in Item 3 below, shut down of the unit within 24 hours to complete the repair, post modification testing, and restore the inverter to operable status introduces an unnecessary plant transient which is not commensurate with the public health and safety for the given condition. Therefore, WBN is requesting enforcement discretion to extend the 24 hour LCO Action Completion Time. TVA is requesting an additional 24 hours for a total of 48 hours Completion Time as discussed in Item 7 below, for repairing, testing, and restoring the Vital Inverter 1-I to operable status.

2. The circumstances surrounding the situation, including root causes, the need for prompt action and identification of any relevant historical events.

As discussed above, at 0132 hours, Inverter 1-I was removed from service in accordance with SOI-235.01, "120V AC Vital Power System 1-I," and the above TS Condition entries were made.

Subsequent investigation confirmed that one of two constant voltage transformers (CVTs) within the subject inverter had visible damage (15 KVA transformer). A replacement plan for this transformer, as well as the parallel 5KVA transformer (for reliability) and the associated chokes, has been established using spare CVTs available from the on site

warehouse. As discussed in Item 7 below, this replacement task and the associated post-maintenance testing are expected to last approximately 35 hours (which includes an estimated 4 hour heat-up time to ensure output voltage and frequency are within required specifications). The schedule also includes a thirteen hour contingency period. Therefore, as discussed above, WBN requests a 24-hour extension of the current 24-hour TS Completion Time, for a total of 48 hours.

WBN has not experienced a failure of the Vital Inverters since becoming licensed in November 1995. One other CVT was replaced on Vital Inverter 1-IV during WBN Preoperational Test Activities in 1993. This CVT was not faulted, but was replaced at the recommendation of the vendor due to adjustment/tuning issues with the harmonic signal.

Testing

To date, maintenance and surveillance periodic testing and inspection performed for the WBN Vital Inverters and the Vital AC Distribution System has not indicated any potential for degradation of the CVTs. In summary, testing of the Vital Inverter and associated Vital 120V AC Control Systems includes:

- Every 36 months the following testing is performed in accordance with Maintenance Instruction (MI) 235.002, "120 VAC Vital Inverter Automatic Transfer Test.":

  - The output voltage and frequency of each inverter is verified during load testing.

  - Full Load Transfer Test of the Auctioneering circuit - The capability of the inverter to deliver 100 percent of its output while operating on either the normal or emergency supplies. In the test, the inverter is loaded to 20kW at 1.0 power factor and transferred to the emergency 125V dc supply while maintaining voltage and frequency. The inverter is also inspected for signs of overheating (using thermography), damaged components, loose connections, and excessive dust.

  - The panel and board mounted instruments are calibrated

  The most recent performance of MI-235.002 for the 1-I Inverter was during WBN's Unit 1, Cycle 3 Refueling Outage, September/October 2000.

- In addition to the above, the auctioneering circuit of WBN's inverters is cycled on an 18 month frequency under accident load conditions during station blackout testing performed in accordance with the following Surveillance Instructions (SIs):

0-SI-82-3	18 Month Loss of Offsite Power with Safety Injection - DG 1A-A
0-SI-82-4	18 Month Loss of Offsite Power with Safety Injection - DG 1B-B
0-SI-82-5	18 Month Loss of Offsite Power - DG 2A-A
0-SI-82-6	18 Month Loss of Offsite Power - DG 2B-B

Even though there is no specific verification that the auctioneering circuit functioned during the performance of these SIs, a loss of a channel of vital AC would be signaled in the main control room by instrumentation monitoring the system.

- The performance of 0-SI-0-3, "Weekly Log," fulfills Surveillance Requirement (SR) 3.8.7.1. This SR verifies once each seven days the voltage and frequency of the inverters along with verifying that the inverters are properly aligned to the AC vital buses.

For the auctioneering circuit portion of the inverters, WBN has not experienced a failure of this circuit during either the startup and test program prior to initial fuel load or during commercial operation and subsequent testing. The 10 CFR 50.65 Maintenance Rule performance and monitoring criteria at WBN is controlled by Technical Instruction (TI) 119, "Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting." Any failure to maintain voltage on the inverter's output bus during the load transfer testing of the auctioneering circuit would be classified as Maintenance Rule Functional Failure. On April 24, 1999, Vital Inverter 2-I experienced a failure of a frequency meter. This was considered a functional failure. As stated previously, there have been no failures of the auctioneering circuits at WBN and the system is currently classified in (a) (2) status.

3. The safety basis for the request, including an evaluation of the safety significance and potential consequences of the proposed course of action. This evaluation should include at least a qualitative risk assessment derived from the licensee's PRA.

120V Vital AC System:

The ac control power system has eight identical power channels (designated as Channels 1-I, 1- II , 1-III, 1-IV, 2-I, 2-II, 2-III, and 2-IV), with the equipment of each channel being electrically and physically independent from the equipment of other channels. Each channel consists of an inverter and a distribution panel which facilitates load grouping and provides circuit protection. Each channel has access to a normal, a standby, and a maintenance supply.

Physical Arrangement of Components:

The eight inverters are located in the Auxiliary Building at Elevation 772. The Channels I and II inverters are located in the Unit 1 area and the Channels III and IV inverters are located in the Unit 2 area. The Channels I and II inverters are separated from Channels III and IV inverters by an 8-inch reinforced concrete wall, extending to the ceiling. The Channel I and the Channel III inverters are separated from the Channel II and the Channel IV inverters respectively by a distance of 60 feet.

System Reliability:

The system incorporates features which serve to increase the overall reliability. Each channel has access to three power sources: a 480V ac source, a 125V dc source, and a 120V ac maintenance source. Each inverter has a solid-state transfer switch between the 480V ac and 125V dc sources. An automatically synchronized manual transfer between the output of the inverter and the 120V maintenance supply is provided so that the inverter may be taken out of service for maintenance without interrupting power to the loads. The current limiting feature of the inverter provides self-protection from load faults. The inverter and instrumentation power board are monitored to alert the operator of abnormalities. The distribution bus is sectionalized with coordinated fuses to prevent losing the entire board due to failure of a single branch circuit breaker.

The inverters are the preferred source of power for the AC vital buses because of the stability and reliability they achieve. There is one inverter per AC vital bus making a total of eight inverters. The function of the inverter is to provide AC electrical power to the AC vital buses. The inverters can be powered from an internal AC source/rectifier or from the vital battery. The vital battery provides an uninterruptible power source for the instrumentation and controls for the Reactor Protective System (RPS) and the Engineered Safety Feature Actuation System (ESFAS).

In addition, TVA grid stability is considered reliable for the proposed period with sufficient generation margin over expected demand, and no inclement weather forecast. Additional measures to ensure availability of the preferred offsite power system are discussed in response to Question No. 6.

Risk Considerations:

The increase in risk for having the 120V AC Vital Inverter 1-I out of service 24 additional hours was determined in accordance with the guidelines established in Regulatory Guide 1.174, "*An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant Specific Changes to the Licensing Basis*" and Regulatory Guide 1.177, "*An Approach for Plant-Specific Risk informed Decision Making: Technical Specifications.*" The WBN baseline core damage frequency(CDF) with expected equipment unavailabilities is 4.43×10^{-5}/reactor-year as stated in Revision 2 to the WBN Probabilistic Safety Assessment (PSA) model. The WBN CDF for the zero-maintenance

condition is 4.12×10^{-5}. The zero maintenance model was used to calculate the change in CDF because all other equipment is currently available. To determine the increase in LERF the base model was used.

To determine the risk increase with 120V AC Vital Inverter 1-I out of service the basic event for vital inverter 1-I was failed and the zero maintenance model was requantified. The truncation level for both models is 1×10^{-10}. The resultant CDF was 9.81×10^{-5}

The incremental conditional core damage probability (ICCDP) for the proposed increase to a 48-hour completion time is as follows:

$$ICCDP = (9.81 \times 10^{-5} - 4.12 \times 10^{-5})[(48-24)/8760] = 1.56 \times 10^{-7}$$

This ICCDP is less than the 5.0 E-7 criteria listed in Regulatory Guide 1.177 and so may be considered small for a single TS Action Completion Time change.

The WBN baseline large early release frequency (LERF) with expected equipment unavailabilities is 1.35 E-6/reactor-year as stated in Revision 2 to the WBN Probabilistic Safety Assessment (PSA) model.

The incremental conditional large early release frequency (ICLERF) for the proposed 24-hour increase is as follows:

$$ICLERF = (1.47 \times 10^{-5} - 1.35 \times 10^{-6})[(48-24)/8760] = 3.66 \times 10^{-8}$$

This ICLERF is less than the 5.0 E-8 criteria listed in Regulatory Guide 1.177 and so may be considered small for a single TS Action Completion Time change.

The WBN PSA has not yet undergone a PEER review. The WBN Individual Plant Evaluation (IPE) was submitted on September 1, 1992. The IPE was also independently reviewed by Dr. Ian Wall. WBN submitted Revision 1 to the IPE on May 2, 1994, and a safety evaluation was received on October 5, 1994. Since that time the PSA has undergone one additional revision. Revision 2 to the WBN PSA is the basis for this submittal and it was prepared for TVA by ERIN Engineering Inc. The use of ERIN Engineering by TVA for Revision 2 also served as an independent check of the original model created by PLG, Inc. TVA has performed a self-assessment of the current model in preparation for a Westinghouse Owners Group (WOG) PEER review currently scheduled for next spring. Revisions to the PSA model are in progress as a result of this self assessment, however the results are not finalized.

For comparison, the change in mean core damage probability as discussed in the Electrical Power Research Institute (EPRI) Report EPRI TR-105396, "Probabilistic Safety Assessment (PSA) Applications Guide," was also determined. The change in mean core damage probability (ΔCDP) can be determined by multiplying the change in mean core damage frequency for the given condition by the length of time in the configuration.

For the case considering 120V AC Vital Inverter 1-I out of service the calculated mean core frequency is 9.81×10^{-5} events per year. The change in ΔCDP for the 24 additional hours (48 hours total, including the TS Action Completion Time) of maintenance is calculated as follows:

$$\Delta CDP = [(9.81 \times 10^{-5}) - (4.12 \times 10^{-5})] * (2/365) = 3.12 \text{ X } 10^{-7}$$

Based on Figure 4.3 of the PSA Applications Guide (EPRI TR-105396), this change in mean core damage probability is well below the threshold for potentially risk significant changes (1.0E-5). In fact, the determined ΔCDP is at the lower range of non-risk significant category (1.0E-7).

Since the submittal of the Individual Plant Evaluation, Revision 1, on May 2, 1994, WBN has worked to reduce risk due to equipment unavailability by performing maintenance and testing according to a 12-week rolling schedule defined by equipment trains. This schedule allows equipment to be removed from service concurrently with attendant equipment thereby reducing the number of times LCOs are entered. WBN procedure Technical Instruction (TI)-124, "Equipment to Plant Risk Matrix," provides guidance for reducing risk by not allowing any other equipment (which would increase the risk in conjunction with the inverter) to be removed from service concurrently with the 120V AC Vital Inverters.

The above analysis is conservative. For the purpose of this one time Action Completion Time extension, the analysis assumes an additional 24 hours of out of service time for the 120V AC Vital Inverter 1-I. The current technical specifications would allow the 120V AC Vital Inverters to be out of service for up to 24 hours. The 120V Vital AC Board is being supplied power from an alternate supply. This alternate supply is not credited in the PSA and for the purpose of this evaluation, is not assumed to be available. If this alternate supply were considered in the PSA the risk would decrease. This alternate supply could be credited for all initiators except loss of off-site power (LOOP).

4. **The basis for the licensee's conclusion that the noncompliance will not be of potential detriment to the public health and safety and that no significant hazard consideration is involved.**

As discussed above there is no safety significance associated with this NOED request. The three "no significant hazards" criteria are met as follows:

Involve a significant increase in the probability or consequences of an accident previously evaluated

Although the maintenance feed to the 120V AC Vital Instrument Board 1-I is not a qualified feed, the other three channels are operational and provide the required safety

functions. In addition, a PSA evaluation concluded that the risk contribution of the AOT extension is non-risk significant. Therefore, the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated. Accordingly there would be no impact on projected offsite doses.

Create the possibility of a new or different kind of accident from any accident previously evaluated.

The current TS allows continued operation with one inverter out of service for 24 hours. Because this NOED request only extends the allowable out of service time, no new or different kind of accident from any accident previously evaluated is created.

Involve a significant reduction in a margin of safety.

Although the maintenance feed to the 120V AC Vital Instrument Board 1-I is not a qualified feed, the other three channels are operational and provide the required safety functions. In addition, a PSA evaluation concluded that the risk contribution of the AOT extension is non-risk significant. Therefore, the proposed amendment does not involve a significant reduction in a margin of safety.

5. The basis for the licensee's conclusion that the noncompliance will not involve adverse consequences to the environment.

This action does not involve an unreviewed environmental question because it does not increase any adverse environmental impacts, change effluents or power level, or result in unreviewed environmental matters.

6. Any proposed compensatory measure(s).

At the time of the component failure, the plant was in a Train B work week. The Vital Inverter 1-I is classified as Train A equipment. Since the time of the component failure, work on other elements of the power distribution has been deferred. This work deferment effort will continue until Vital Inverter 1-I has been returned to service.

In addition, an initiating event that could potentially threaten the plant at this time in this configuration is a loss of offsite power event. Preferred offsite power is supplied from TVA's 161-kV transmission grid at the Watts Bar Hydro Plant (WBH) switchyard over two separate transmission lines. Therefore, measures will be taken to protect the WBH and WBN switchyards to ensure offsite power supply reliability. A line item has been added to the replacement plan for Operations to verify with the load dispatcher that no work is being conducted on the offsite power system that could affect WBN during this activity. Emergency Diesel Generators 1A-A, 1B-B, 2B-B, and 2A-A are currently operable. No work will be allowed to be performed in the Diesel Generator building while

this repair effort is being performed to protect the EDGs in order to provide a source of power in the event an initiating event does occur.

As recommended by NRC Staff during the March 2001 teleconference, WBN Operations personnel performed a review to evaluate the potential merits of selecting alternate controlling instrument channels for affected functions while the 120V AC Vital Instrument Power Bd. 1-I was aligned to the 120V maintenance supply. The only controlled functions that present an option for alternate channels are: Control of Feedwater to Steam Generators, RCS Pressurizer pressure control, and RCS Pressurizer level control. The review indicated that the present alignment of controls is consistent with the assumptions of Abnormal Operating Instruction (AOI)-25.01, "Loss of 120V AC Vital Instrument Power BD 1-I," which addresses the selection of alternate channels. Considering loss of power scenarios both with and without emergency power available to the 120V AC Vital Power Bd 1-I, there was no appreciable benefit in swapping to the alternate channel for the three functions. Additionally, there is some small risk in perturbing the plant during a swap of some functions, e.g., S/G level control. Therefore, the current condition of Vital Power Bd. 1-I does not warrant a realignment of controls.

7. **The justification of the duration of the noncompliance.**

TVA has determined that approximately 24 additional hours are needed (beyond the existing TS 3.8.7 Action A time of 24 hours) to complete the repair effort which includes post maintenance testing. This additional time is justified by the estimated duration of the repair effort with margin added to preclude unforeseen problems. The repair effort critical path activities along with the associated expected duration are provided in the table below:

PLANNED REPAIR ACTIVITY	EXPECTED ACTIVITY DURATION (HOURS)
PLACE HOLD ORDER	1.0
PLAN WORK PACKAGE, STAGE TOOLS, BRIEF CREWS	5.0
DE-TERMINATION OF CABLING	3.0
REMOVE TRANSFORMERS FROM INVERTER	6.0
INSTALL NEW PARTS	8.0
RE-TERMINATION OF CABLING	4.0
POST-MAINTENANCE TESTING (PMT)	8.0
CONTINGENCY	13.0
TOTAL ESTIMATED TIME TO COMPLETE	**48.0**

8. **A statement that the request has been approved by the facility organization that normally reviews safety issues (Plant Onsite Review Committee, or its equivalent).**

This request was approved by the WBN Plant Operations Review Committee on March 6, 2001.

9. **The request must specifically address which of the NOED criteria for appropriate plant conditions specified in Section B is satisfied and how it is satisfied.**

This request is made under the criteria in Section B, Paragraph 2.0, Item 1.a in Attachment 1 of Administrative Letter 95-05, Revision 2. This criteria is satisfied in that WBN Unit 1 is online at 100 percent power and the potential risk of undesirable transients as a result of forcing compliance with the technical specifications provides no safety consequences given the minimal increase in risk associated with the extension.

10. **If a follow-up license amendment is required, the NOED request must include marked-up TS pages showing the proposed TS changes. The actual license amendment request must follow within 48 hours.**

Not applicable.

11. **For NOEDs involving severe weather or other natural events, the licensee's request must be sufficiently detailed for the staff to evaluate the likelihood that the event could affect the plant, the capability of the ultimate heat sink, on-site and off-site emergency preparedness status, access to and from the plant, acceptability of any increased radiological risk to the public and the overall public benefit. In addition to items 1-10 above as appropriate, the licensee must provide:**

a. **The name, organization, and telephone number of the official declaring the emergency.**

b. **Details of the basis and nature of the emergency; its potential consequences such as plant trip, controlled shutdown, delayed startup; the condition and operational status of the plant (equipment out of service or otherwise inoperable);**

c. **Status, and potential challenges to off-site and on-site power sources, and the impact of the emergency on plant safety.**

d. **Demonstrated actions taken to avert and/or alleviate the emergency situation, including steps taken to avoid being in the noncompliance, as well as efforts to minimize grid instabilities (e.g., coordinating with other utilities and the load dispatcher organization for buying additional power or for cycling load, shedding interruptible industrial or non-emergency loads).**

Not applicable.