



Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37379-2000

November 10, 1998

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

Gentlemen:

In the Matter of) Docket Nos. 50-328
Tennessee Valley Authority)

SEQUOYAH NUCLEAR PLANT (SQN) - REQUEST FOR DISCRETIONARY ENFORCEMENT FOR UNIT 2 TECHNICAL SPECIFICATION (TS) 3.8.2.1, ACTION b, FOR 120-VOLT ALTERNATING CURRENT (VAC) VITAL INSTRUMENT POWER BOARD 1-IV

This letter serves to document the basis for our verbal request for discretionary enforcement for Unit 2 TS 3.8.2.1, Action b, for 120-VAC Vital Instrument Power Board 1-IV.

During full power operation for both SQN units on November 9, 1998, 1-IV Vital Inverter failed resulting in a loss of power to 1-IV 120-VAC Vital Instrument Power Board. This loss of power resulted in an immediate Unit 1 reactor trip from the reactor trip system instrumentation. At the time of the board failure, one channel of the power range instrumentation and the associated overpower delta temperature function was tripped for testing. As a result of the board failure, another channel of this instrumentation conservatively failed to the trip condition and completed the two of four logic for initiation of a reactor trip. Unit 1 is in Hot Standby and Unit 2 remains at full power with both units in Action b of TS 3.8.2.1, which requires the return of the inverter to operable status within 24 hours.

We performed troubleshooting activities on the failed inverter to determine the cause of the event. The vendor provided us guidance for the failure analysis and a

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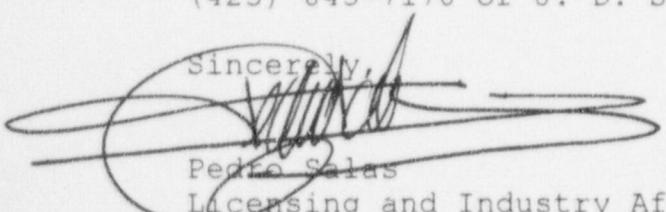
vendor representative was on site to provide further guidance for resolving the problem. We expected that the time required to detect and correct the problem could exceed the 24-hour action time to initiate shutdown of Unit 2 and the subsequent 36-hour requirement to continue the shutdown to Cold Shutdown.

In order to allow adequate time to complete the troubleshooting activities and the repair of the 1-IV Vital Inverter, we requested discretionary enforcement for an additional 48 hours, which is in addition to the 24-hour action provided by TS 3.8.2.1, Action b. Without this additional time, Unit 2 would be required to initiate shutdown at approximately 1139 Eastern standard time (EST) on November 10, 1998, and be in Cold Shutdown by approximately 2339 EST on November 11, 1998.

We completed the required repairs and testing for operability at 1156 EST on November 10, 1998, and did not require the use of the discretionary enforcement granted by NRC at approximately 1025 EST during a telephone conversation with TVA on November 10, 1998. We determined that the inverter failed due to a component failure in the bridge circuit. We replaced the components and returned the 120-VAC Vital Instrument Power Board 1-IV to operable status before unit shutdown was required in accordance with TS requirements without invoking the NRC approved discretionary enforcement.

Please direct questions concerning this issue to me at (423) 843-7170 or J. D. Smith at (423) 843-6672.

Sincerely,



Pedro Salas

Licensing and Industry Affairs Manager

Enclosure

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ENCLOSURE

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT (SQN)
UNITS 1 and 2
DOCKET NOS. 327 AND 328

Request for Discretionary Enforcement for 120-Volt
Alternating Current (VAC) Vital Instrument
Power Board 1-IV

Background

On November 9, 1998, at 1139 Eastern standard time (EST), the 1-IV Vital Inverter failed resulting in a loss of power to 120-VAC Vital Instrument Power Board 1-IV. Instrument Power Board 1-IV provides power to one channel of the nuclear power range instrumentation for Unit 1. Testing of another channel of power range instrumentation was in progress at the time of the board failure. This testing requires the channel to be placed in the tripped condition. The loss of power resulted in the de-energization of two protection racks and the conservative trip of another power range channel. This combination completed the two of four logic required to initiate a reactor trip of Unit 1. Unit 2 was not impacted because the 1-IV Board does not provide power to safety-related functions and power operation continued. The 120-VAC Vital Instrument Power Board 1-IV has been placed on the maintenance power supply that provides safety-related power from the same 480-V Shutdown Board as the normal supply to the inverter, but does not include backup power capability from the vital batteries.

The 1-IV Inverter was found to have four blown fuses. The blown fuses included two annunciator circuit fuses, one blown fuse indication circuit, and one fuse associated with the direct current (DC) voltage supply to the inverter bridge circuit. TVA has performed a systematic check of the inverter circuits to determine the potential source of these failures. This effort has isolated various portions of the inverter or replaced cards to identify the source of the problem. Several configurations have been checked to verify portions of the inverter that are not causing fuse failure. The fuses associated with the annunciator and indication circuits were replaced and did not continue to blow during the troubleshooting efforts. The bridge circuit fuse continued to experience failures indicating additional

circuit problems that had not been corrected. TVA continued the troubleshooting efforts with the assistance of a vendor representative and determined the problem to be defective firing circuits in the bridge of the inverter. The circuits were replaced and the inverter and associated power board were returned to service.

At the time the enforcement discretion was requested, TVA did not know the cause of the inverter failure, but was continuing a systematic circuit evaluation that would ultimately identify the source. TVA expected this effort, and any repairs associated with returning the inverter to operable conditions, to be completed within 48 hours after the TS 3.8.2.1, Action b interval of 24 hours is completed. This would have resulted in a maximum action time of 72 hours for an inoperable 120-VAC Vital Instrument Power Board for Unit 2 only. TVA made the repairs and returned the Vital Inverter IV to service without having to invoke the notice of enforcement discretion.

TS Compliance

TS 3.8.2.1, Action b allows a 120-VAC Vital Instrument Power Board to be inoperable for 24 hours provided that the inoperability is the result of an inoperable inverter and the board is placed on the maintenance power supply within 8 hours. After 24 hours in this condition, a shutdown to Hot Standby is required within 6 hours and continued shutdown to Cold Shutdown within the following 30 hours. Unit 1 was in Hot Standby and would have been required to be in Cold Shutdown by approximately 1739 EST on November 11, 1998, if the problem had not been corrected. Unit 2 was in power operation and would have been required to initiate shutdown to Hot Standby by 1139 EST on November 10, 1998. The 120-VAC Vital Instrument Power Board 1-IV was returned to operable status at 1156 EST before this shutdown action was required to be completed and before using the NRC approved enforcement discretion. Cold Shutdown would have been required for Unit 2 by 2339 EST on November 11, 1998.

Safety Consequences

The vital 120-VAC control power system is a Class 1E safety-related system, which provides instrumentation and control power for engineered safety features equipment and other essential AC powered equipment. The system capacity is sufficient to supply these loads during normal operation

and to permit safe shutdown and isolation of the reactor in any emergency, including a loss of offsite power condition. Distribution of power is accomplished without automatic transfers between redundant load groups and without automatic load stripping or sequencing. The system is designed to perform its safety function subject to any single failure within the system.

Each unit has four identical power channels, 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. The eight inverters are located in the Auxiliary Building at Elevation 749. Channels I and II inverters are located in the Unit 1 area and Channels III and IV inverters are located in the Unit 2 area. Channels I and II inverters are separated from Channels III and IV inverters by reinforced concrete block wall, extending to the ceiling. Channel I and Channel III inverters are separated from Channel II and Channel IV inverters, respectively, by a distance of about 60 feet.

Each channel has access to three power sources; a 480-VAC source, a 125-VDC source, and a 120-VAC maintenance source. Each inverter has an auctioneered solid-state transfer switch between the 480-VAC and 125-VDC sources. An automatically synchronized manual transfer between the output of the inverter and the 120-VAC 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 a single branch circuit fault.

Each channel supplies the following types of loads: reactor protection system, reactor system instrumentation, separation and interlock relay panels, and other panels and equipment associated with reactor instrumentation and control systems. Nonsafety-related loads are supplied from Class 1E breakers located on the Class 1E instrument power board to provide qualified fault isolation.

The normal supply of AC power to the distribution panels is from the inverter in each channel. The inverter consists of three major subassemblies: a DC power supply, an

auctioneering circuit, and an inverter circuit. The DC power supply converts the 480-VAC normal inverter input to DC. The auctioneering circuit accepts the DC power supply (normal supply) and battery (emergency supply) inputs and permits a switchless bidirectional transfer between them in the event of a 480-VAC supply failure and restoration. The DC output of the auctioneering circuit is converted to AC by the inverting circuit. AC power input for each inverter is derived from the station auxiliary power system via two physically and electrically independent circuits. If the normal circuit supplying an inverter is unavailable, the other circuit may be selected by a manual transfer. The emergency DC power input for each inverter is from the corresponding channel DC distribution panel and associated vital battery. The inverter is a solid-state type, which converts three-phase 480-VAC and 125-VDC inputs to a nominal 120-VAC output having a related capacity of 167 amperes for load power factors from 0.8 to 1.0.

Unit 2 does not have safety-related loads that are fed from 120-VAC Vital Instrument Power Board 1-IV. An evaluation of the loads supplied by this board has revealed one Unit 2 and some common nonsafety-related loads that affect Unit 2; however, these loads do not support required safety functions. These loads included functions associated with the fuel oil, condenser circulating water, component cooling water, essential raw cooling water, waste disposal, control air, and emergency gas treatment systems. TVA has reviewed the circuits in these systems and have determined that these circuits are primarily indication and alarm circuits. The emergency gas treatment system circuits were reviewed in detail at the request of Plant Operations Review Committee (PORC) and were confirmed to involve indication and alarm functions only. Since this board was on a maintenance supply that is powered from a safety-related power source, the Unit 2 functions were maintained sufficiently to support Unit 2 operation. The proposed extension of the 24-hour action to 72 hours would not have affected the safety-related functions for Unit 2 and mitigation functions for postulated events were not impacted.

Since this extension would not have impacted Unit 2 safety functions, the impact to core damage frequency and large early release frequency is not impacted. The probabilistic safety analysis is unaffected by this extension request of 48 hours to the existing action for TS 3.8.2.1, Action b.

TVA implemented restricted access to the switchyard, relay room, emergency diesel generators, and the vital battery rooms. The vital battery rooms are included to protect the AC and DC vital power boards as well as the maintenance supply switchgear that was supplying power to the

1-IV 120-VAC Vital Instrument Power Board. These provisions are similar to the actions that are implemented for reduced reactor coolant system inventory during refueling outages to minimize the impact to safety functions. These compensatory measures provided additional assurance by use of physical barriers, signs, and control of access by the Operation's group such that other critical systems would not be impacted and enhance the availability of the offsite and emergency power supplies to plant systems.

TVA's request for a 48-hour extension of the 24-hour action of TS 3.8.2.1, Action b, was based on durations that could have been required to resolve the inverter problems. TVA had completed nearly 24 hours of troubleshooting at the time of the verbal request. The problem had not been confirmed at that time and an additional period of up to 24 hours could have been required to reevaluate portions of or all of the inverter circuits to identify the problem. An additional period of 24 hours was proposed to allow for repair activities and testing to return the board to operable status. These durations were considered reasonable based on the complex interaction of circuits in the inverter and the potential for having to repeat many of the checks previously performed.

The proposed extension of the 24-hour action for an inoperable Vital AC Power Board 1-IV for 48 hours would not have impacted the safety functions for Unit 2. This is based on the 1-IV Board not providing any safety-related functions for Unit 2. Requiring a shutdown of Unit 2 for this condition would have involved the completion of actions that could have challenged safety system unnecessarily. Keeping Unit 2 in a steady-state condition at power is less likely to result in a transient that could require safety system actuation. Therefore, the proposed extension was reasonable based on Unit 2 being able to support design functions for postulated events and the health and safety of the public would have continued to be acceptable.

TVA has performed an evaluation of the proposed extension in accordance with the requirements of 10 CFR 50.59. The results are provided below:

- 1. The probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; or**

No. The proposed action extension for Unit 2 did not result in an impact to safety-related functions. The accident and malfunction initiators would not have been altered by the 1-IV Board inoperability or a 48-hour

extension of the TS 3.8.2.1, Action b. This is based on the plant systems for Unit 2 not being changed or placed in a condition that would result in a change in the design functions. Therefore, the probability of an accident or malfunction is not increased. Since the safety functions for Unit 2 are not impacted, the consequences of a accident or malfunction were not increased because systems that are required for mitigation would have continued to perform their function. Likewise, the offsite dose potential associated with the proposed extension is not altered for postulated accidents or malfunctions.

- 2. A possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report may be created; or**

No. The proposed extension will not alter the functions of or the response of Unit 2 functions. Some nonsafety-related functions will not have full power supply redundancy with the vital board on the maintenance supply but are still capable of providing the associated functions. These conditions would not result in accident initiators or system malfunctions different from those previously evaluated for Unit 2 operation.

- 3. The margin of safety as defined in the basis for any technical specification is reduced.**

No. This extension request would not have altered any plant systems or the setpoints designed to initiate functions for the mitigation of postulated events. In addition, the plant conditions assumed at the initiation of an accident would not have been different because the Unit 2 systems were fully capable of performing their intended design functions based on the power requirements from the 1-IV Vital Power Board. Therefore, the margin of safety would not have been reduced by the proposed 48 hour addition to TS 3.8.2.1, Action b.

TVA has performed an evaluation of the proposed extension in accordance with the requirements of 10 CFR 50.92. The results of the significant hazards evaluation are provided below:

- 1. Involve a significant increase in the probability or consequences of an accident previously evaluated.**

No. The probability or consequences of an accident are not impacted or increased by the proposed change. This is based on a 48-hour extension of TS 3.8.2.1, Action b

of 24 hours for the 120 VAC Vital Instrument Power Board 1-IV not resulting in an impact to Unit 2 safety-related functions. The functions provided by this power supply for Unit 2 supports nonsafety-related functions that are not required for maintaining assumed initial conditions for postulated events or functions that initiate to mitigate these events.

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

No. The 120-VAC Vital Instrument Power system is not considered to be the initiator of postulated accidents. In addition, the extension of the action time for a power supply that does not support safety-related functions for Unit 2 will not create a new or different kind of accident. Therefore, a new accident is not created by the proposed extension based on the functions for Unit 2 not being altered by this request and power supplies being maintained to support design functions.

3. Involve a significant reduction in a margin of safety.

No. Plant systems, components, and operating practices will not be changed to implement the proposed extension. Plant setpoints are also unaffected by the proposal such that plant design feature actuations will continue to control plant systems to maintain the margins of safety. The power supplies for safety-related Unit 2 components are unaffected by this request and continues to support required functions. The margin of safety is not reduced by the proposed extension for Unit 2 based on plant functions being maintained without change.

Also, the action does not involve an unreviewed environmental question because it does not increase any adverse environmental impacts, change effluents or power levels, or result in unreviewed environmental matters. In addition, the proposed request has been approved by the PORC. This enforcement discretion meets Criterion 1(a) of Section B of Inspection Manual, Part 9900. This criteria is satisfied in that a unit shutdown and associated undesirable transients would be avoided.

A line-item improvement to the TSS or the Improved Standard Technical Specification would not have alleviated the need for this notice of enforcement discretion request. This is based on the time constraints in the ITS being consistent with the requirements currently in the SQN TSS.