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Vice President, Sequoyah Nuclear Plant

May 7, 1992

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

Gentlemen:

In the Matter of ) Docket Nos. 50-327  
Tennessee Valley Authority ) 50-328

SEQUOYAH NUCLEAR PLANT (SQN) - DETAILED CONTROL ROOM DESIGN REVIEW  
(DCRDR) IMPLEMENTATION STATUS REPORT (TAC NO.#51203/51204)

- References:
1. TVA letter to NRC dated November 25, 1987, "Sequoyah Nuclear Plant (SQN) - Detailed Control Room Design Review (DCRDR) Supplement to Summary Report"
  2. TVA letter to NRC dated November 26, 1986, "Sequoyah Nuclear Plant (SQN) - Detailed Control Room Design Review"

The purpose of this letter is to inform NRC of the implementation status of resolutions for DCRDR human engineering deficiencies (HEDs). The resolutions of these HEDs are commitments documented in the references.

During the Units 1 and 2 Cycle 4 refueling outages, TVA implemented resolution of the Category 1 HEDs. In addition, many Category 2 and 3 HEDs involving modifications on the same panels affected by the Category 1 HEDs were implemented. The documentation supporting the resolution of the Category 1 HEDs has been verified and is maintained in retrievable status.

During the Unit 1 Cycle 5 refueling outage, the remaining Unit 1 Category 2 HEDs were resolved. TVA reviewed the Category 2 HEDs identified in Reference 2 to verify the appropriate categorization in view of facility changes since the original DCRDR evaluations. This review identified four Unit 1 Category 2 HEDs that were no longer considered to constitute Category 2 HEDs based on modifications completed and operational considerations as detailed in Enclosure 1. Two of these HEDs have been downgraded to Category 3 and additional actions for resolution will be

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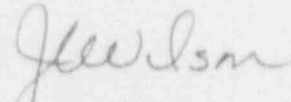
evaluated and implemented as necessary by the end of the Unit 1 Cycle 6 refueling outage. The other two HEDs were downgraded to Category 3, but have since been evaluated and determined to require no further actions. These two HEDs have been closed. Five Category 2 HEDs were associated with common equipment and are being resolved during the present Unit 2 Cycle 5 refueling outage as stated in TVA's commitment. Enclosure 2 identifies these HEDs. Two Category 2 HEDs for Units 1 and 2 were determined to require no action for resolution. The details of these determinations are contained in Enclosure 3.

TVA will resolve the remaining HEDs that meet the criteria for Category 2 by the end of the present Unit 2 Cycle 5 refueling outage. TVA will review the remaining Category 3 HEDs to verify they still meet the DCRDR criteria. These HEDs will be evaluated for cost-benefit considerations, and TVA management will determine the HEDs to be resolved by the end of the Cycle 6 refueling outages. TVA will provide NRC with the results of the HED evaluation and the justification for HEDs deleted from the DCRDR resolution efforts.

Enclosure 4 provides the new commitment contained in this letter.

Please direct questions concerning this issue to Keith Weller at (615) 843-7527.

Sincerely,



J. L. Wilson

Enclosures

cc (Enclosures):

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## ENCLOSURE 1

### UNIT 1 CATEGORY 2 HUMAN ENGINEERING DEFICIENCIES (HEDs)

#### REEVALUATED AS CATEGORY 3

The following Unit 1 HEDs were downgraded to Category 3 before start-up from the Unit 1 Cycle 5 refueling outage. Further evaluations to determine the final resolution of these HEDs will be continued as Category 3 items and will be completed by the end of the Unit 1 Cycle 6 refueling outage.

#### **HED 3173**

Need better annunciation for Phase A, Phase B, and containment vent and indication of reset.

#### PROPOSED CORRECTION

Provide consistent Phase A, Phase B, and containment vent isolation and/or reset indication on a signal basis.

This HED is considered to have a partial correction because the recommendation for reset indication (addition of amber and blue light circuits) was determined to be unnecessary. The clearing of an annunciator window will provide indirect indication whenever a signal has been reset.

#### BASIS FOR CATEGORY 3 CLASSIFICATION

The Category 2 corrective action for HED 3173 was to add annunciation for Train A or B actuation of containment isolation Phase A, containment vent isolation, and auxiliary building isolation on main control room (MCR) Panel 1-M-6. Deletion of trained annunciation for control room isolation on MCR Panel 0-M-27B (two windows) and addition of a single window for Train A or B on MCR Panel 1-M-6 were implemented. The above annunciators were placed together with containment isolation Phase B and feedwater isolation on MCR Panel 1-M-6. Further actions beyond this grouping on MCR Panel 1-M-6 will be evaluated as a Category 3 item.

#### **HED 5020**

Use of zone coding.

#### PROPOSED CORRECTION

Implement a plant standard for zone coding to be used on MCR and auxiliary control room meters; implement a plant procedure for the application of zone coding.

## HED 5020 (Continued)

### BASIS FOR CATEGORY 3 CLASSIFICATION

The Category 2 corrective actions for HED 5020 are as follows:

A design standard (E18.1.22) has been implemented that provides a standard for zone coding to be used on MCR and auxiliary control room indicating meters that are under design control. This is referred to as "color banding" in this standard.

For coding not within design control, SQN Standard Practice (SQA) 142, Revision 11, "Control of Operator Aids," has been written. If associated with SQA 142, zone coding will be classified as an "operator aid" and controlled as such.

Zone coding has been added to indicators (1-EI-57-33, 1-EI-57-49, 1-EI-57-60, and 1-EI-57-76) located on MCR Panel 1-M-1. Because 1-EI-57-39 & 66 have been replaced with updated digital meters, coding on these meters is not required.

Further evaluations to address operational concerns for zone coding of specific instrumentation will be continued for this HED as a Category 3 item.

The following Unit 1 HEDs were downgraded to Category 3 before start-up from the Unit 1 Cycle 5 refueling outage. Further evaluations have determined that the corrective actions taken have adequately resolved these concerns and no further actions will be required. These HEDs have been closed.

## HED 379

Main steam line radiation monitors are needed.

### PROPOSED CORRECTION

Modify scope of Engineering Change Notice L6539 to include installation of equipment that detects steam generator (SG) tube leakage.

### BASIS FOR CLOSURE

Radiation monitors were installed in close proximity of the main steam lines with indication provided on MCR Panel 1-M-30 and recording on MCR Panel 1-M-31. The radiation monitors are primarily used for postaccident monitoring of large tube leaks.

In addition to the radiation monitors, Abnormal Operating Instruction (AOI) 24, Revision 13, "Steam Generator Tube Leak," has been revised to instruct operators in dealing with two sizes of SG tube leaks:

1. Leaks large enough to cause an increase in charging flow, but pressurizer level is maintained.

2. Leaks small enough to not have a noticeable affect on charging flow, but large enough to be detected by condenser vacuum exhaust and SG blowdown radiation monitors.

Symptoms of a tube leak could be any of the following alarms or indications:

1. Condenser vacuum pump air exhaust monitor high radiation alarm
2. SG blowdown liquid monitor high radiation alarm
3. SG blowdown liquid sample monitor high radiation alarm
4. Main steam line monitor high radiation alarm
5. Charging flow increases to maintain pressurizer level
6. Increased make-up to volume control tank

The instruction details the following methods for identifying an SG with tube leakage:

1. SG blowdown radiation monitoring
2. Chemistry laboratory sampling
3. Unexpected rise in SG level
4. Radiation survey of main steam or blowdown lines

For small leaks, AOI 24, Appendix A, details a system of SG tube leakage monitoring using existing plant equipment that is capable of responding to rapidly propagating SG tube cracks without reliance on time-consuming chemistry sampling. SG blowdown and condenser vacuum radiation monitors have an output correlation to SG tube leakage detailed by the figures in the appendix.

#### **HED 3015**

There are many alarms that require the operator to send for information to determine required action.

#### PROPOSED CORRECTION

Perform a further evaluation of annunciators that require information from outside the control room for determining required actions.

#### BASIS FOR CLOSURE

- A. A new annunciator system has been installed that has the capability to separately identify multiple input points that previously went to a common alarm window.

- B. The new system enhances the ability of the operator to identify inputs of discrete points that go to common windows, by adding cathode ray tubes in the MCR that will show the description of the point. This includes those points that were previously only recorded on the communications room sequence of events recorder.
  
- C. Alarms with multiple field contacts feeding a single signal path normally require personnel to be dispatched to the area for observation and initiation of any required corrective action. For example, blown fuse indicators require visual confirmation and fuse replacement at the fuse panel, as a minimum. Since additional alarm information would not significantly change actions taken or personnel involvement in such cases, no further corrective action was deemed necessary to resolve this HED.

ENCLOSURE 2

CATEGORY 2 HUMAN ENGINEERING DEFICIENCIES (HEDs)

ASSOCIATED WITH COMMON EQUIPMENT

HED 217

Layout, demarcation, grouping and order discrepancies on Panel O-M-27B.

HED 219

Layout of Panel O-M-27A is confusing because of mirror imaging, disassociation of controls, and the presence of "depowered" hand switches.

HED 320

Control room communications (horseshoe areas).

HED 2008

Communications - sound-powered phone system - improve system and equipment.

HED 2010

Communications - hand-held radios - do not provide complete coverage of plant site.



## ENCLOSURE 3

### CATEGORY 2 HUMAN ENGINEERING DEFICIENCIES (HEDs)

#### DETERMINED TO REQUIRE NO ACTION

#### HED 210

The main feedwater (FW) bypass valves do not have control room indication of their status.

#### PROPOSED CORRECTION

Add open and close limit switches to the FW bypass valves, and add status lights to main control room (MCR) Panel M-3 that utilizes a 2 by 4 matrix of MSC 800s with push to test circuits. Alternative: Provide feedback of actual valve position.

#### BASIS FOR CLOSURE

FW from the pumps and heaters passes through the FW regulator valves; Flow Control Valves (FCV) -3-35, 48, 90, and 103; and Bypass Valves FCV-3-35A, 48A, 90A, and 103A through FW flow indication Loops F-3-35, 48, 90, and 103. From here, FW enters the steam generators (SGs) that are equipped with level transmitters (LTs) to indicate SG level and alarm out-of-tolerance conditions.

The concern associated with this HED is the "operator not knowing if valve does not close on a FW isolation" signal. Also stated in the HED is: "The only main FW bypass valve position indication is from the demand indicators on the valve controllers. This is only a demand signal and not an actual position. Even though the controller was sending a close signal, the operator has no immediate way of identifying that the valve is not closed."

Further investigation of this HED revealed that the concern above is not a significant problem. The operator can verify valve closure and FW isolation three ways:

1. If FW isolation does not occur, the level in the SG will rise and be indicated by the level changes detected by the LTs and displayed on various loop-associated instrumentation.
2. If FW isolation does not occur, flow through the FW flow indication loops will be displayed on MCR Panel M-4 and be available via the Technical Support Center and P250 computer.
3. If bypass valve closure does not occur, FW isolation can still be achieved by way of FW Isolation Valves FCV-3-33, 47, 87, and 100, which have valve position indication at their respective hand-switch controls on MCR Panel M-4.

SG level indication, FW flow indication, and FW isolation valves indication are provided in the control room. No additional indication is required for main FW bypass valves, as the operator can use any one of the above indications to determine FW bypass valve status.



## HED 210 (Continued)

This HED was downgraded to Category 3 before start-up from the Unit 1 Cycle 5 refueling outage. Further evaluation by plant management has determined that there are no actions required to resolve this concern and this HED has been closed.

## HED 2001

Communications - Paging System.

### PROPOSED CORRECTION

For each concern below, the following corrective actions are recommended:

Paging systems cannot be heard and/or understood in some areas (2001, 0283).

- Provide loudspeaker with specialized functions to improve intelligibility. Place them in appropriate designated areas.

Distortion in paging system and telephone system is not acceptable (2002, 2003).

- Provide intelligible and compatible paging and telephone systems.

A fast and reliable method of contacting auxiliary operators is required (2013).

- Provide an efficient and reliable personnel paging system.

This HED is considered to have a partial correction because the proposed corrective actions are contingent upon the further in-depth study of the communication system recommended by the assessment team in the report entitled, "A Preliminary Evaluation of the Communication System at the Sequoyah Nuclear Plant, (July 1986)." The detailed design study will allow corrective actions for the communication system to be implemented on an integrated basis.

### BASIS FOR CLOSURE

The basis for closure of the paging system HED is that the correction for plant radios (HED 2010) will provide new higher-wattage radios to assistant unit operators. In addition, new battery chargers have been purchased and the customer group is providing the Operations department with a program to properly maintain the batteries. This action is the resolution of the results of a test performed by the customer group on March 17, 1992, that identified inadequate radio battery maintenance as the root cause of the radio coverage problem. These improvements to the plant radio system will provide acceptable communication to Operations personnel in the plant and will eliminate the need to improve the plant paging system. This alternate corrective action for the concern on the plant paging system has been evaluated by experienced operators and was found to be acceptable. In summary, this HED has been closed based on the actions being implemented for the plant radio system.

ENCLOSURE 4

TVA will provide NRC with the results of the evaluation of Sequoyah Nuclear Plant human engineering deficiencies and the justification for deletions from the detailed control room design review resolution effort by February 5, 1993.