



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

**REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET SW SUITE 23T85  
ATLANTA, GEORGIA 30303-8931**

**JANUARY 24, 2001**

Tennessee Valley Authority  
ATTN: Mr. J. A. Scalice  
Chief Nuclear Officer and  
Executive Vice President  
6A Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

**SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INSPECTION REPORT NO.  
50-327/00-11 AND 50-328/00-11**

Dear Mr. Scalice:

On December 15, 2000, the NRC completed a team inspection at the Sequoyah facility. The enclosed report presents the findings of this inspection which were discussed on December 15, 2000, with Mr. D. Koehl and other members of your staff.

This inspection was an examination of activities conducted under your license as they relate to the identification and resolution of problems, and compliance with the Commission's rules and regulations and the conditions of your operating license. Within these areas, the inspection involved selected examination of procedures and representative records, observations of activities, and interviews with personnel.

On the basis of the sample selected for review, there were no findings of significance identified during this inspection. The team concluded that problems were properly identified, evaluated and resolved within the problem identification and resolution programs. The inspection found some minor problems identified by the licensee that were not entered into the corrective action program. The licensee was aware of areas where corrective action had not been effective and appeared to be applying appropriate attention.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS.index.html> (the Public Electronic Reading Room).

Should you have any questions concerning this letter, please contact us.

Sincerely,

**/RA/**

Mark S. Lesser, Chief  
Maintenance Branch  
Division of Reactor Safety

Docket Nos. 50-327, 50-328  
License Nos. DPR-77, DPR-79

Enclosure: NRC Inspection Report 50-327, 328/00-11

Attachments: (1) List of Persons Contacted  
(2) List of Documents Reviewed

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-327, 50-328  
License Nos: DPR-77, DPR-79

Report No: 50-327/2000011, 50-328/2000011

Licensee: Tennessee Valley Authority (TVA)

Facility: Sequoyah Nuclear Plant, Units 1 & 2

Location: Sequoyah Access Road  
Hamilton County, TN 37379

Dates: November 27 through December 15, 2000

Inspectors: J. Blake, Senior Project Manager  
J. Coley, Reactor Inspector  
D. Starkey, Resident Inspector

Approved by: M. Lesser, Chief  
Maintenance Inspection Branch  
Division of Reactor Safety

## **Summary of Findings**

### **Adams Template:**

IR 05000327-00-11, IR 05000328-00-11, on 11/27-12/15/2000, Tennessee Valley Authority, Sequoyah Nuclear Plant, Units 1 & 2, annual baseline inspection of the identification and resolution of problems.

The inspection was conducted by a team consisting of a Region II Senior Project Manager, a Sequoyah Resident Inspector, and a Region II Reactor Inspector. No findings of significance were identified.

### **Identification and Resolution of Problems:**

The team determined that the licensee was effective at identifying problems and entering them into the corrective action program. Licensee site senior management, in the form of a management review committee (MRC) reviewed all problem evaluation reports (PERs) shortly after identification and all root cause analyses, when required by the classification level of the PER, or when requested by the MRC. The level of interest and involvement shown by the senior management was reflected in the number of problems and issues reported. The team found that problems entered into the corrective action program were adequately evaluated and appropriate corrective actions were identified. Formal root cause evaluations for the more significant PERs were thorough and detailed. Licensee audits and assessments have adequately identified deficiencies in the corrective action program and audit findings were consistent with the NRC's observations. Based on review of selected documents and discussions with licensee personnel, the licensee's employees had no reservations about identifying and reporting nuclear safety issues. Some examples were identified for failing to enter issues into the corrective action program and therefore did not receive thorough investigation and development of corrective actions. These involved issues that were of very low safety significance. Corrective actions for significant problems were effective. Management attention was appropriately being applied to areas where corrective action had not been effective.

## Report Details

### 4. Other Activities (OA)

#### **4OA2** Problems Identification and Resolution

##### a. Effectiveness of Problem Identification

###### (1) Inspection Scope

To assess the effectiveness of the licensee's problem identification program, the team selected several systems from the licensee's listings of "top ten risk reduction worth systems" and "top ten risk achievement worth systems" for review. The review included examination and evaluation of the problem evaluation reports (PERs) for each system and corrective maintenance work orders (WOs) for activities on the same system. The review of PERs and WOs was to determine if significant and/or repeat maintenance activities had been captured in the licensee's corrective action program.

The team also reviewed the results of the licensee's process for evaluating operating experience items; Cause Determination Evaluation Forms (CDEF) and PERs associated with maintenance preventable functional failures (MPFF) concerning Maintenance Rule (MR) component failures; and selected self-assessments, audits, and recommendations from the offsite review committee for examples of effective problem identification.

The team reviewed 63 PERs and WOs associated with the Reactor Protection System, Reactor Coolant Pump Seal section of the Reactor Coolant System, the 125 VDC System, the Standby Diesel Generator System, the Emergency Raw Cooling Water System and the Component Cooling Water System.

The team reviewed Self-Assessment Report SQN-OPS-00-007, Operator Work Arounuds, dated 11-30-00, and noted that the self-assessment identified areas in the Operator Work Around program which needed improvement and that PERs were initiated to address those issues.

###### (2) Issues and Findings

The team determined that the licensee was generally effective at identifying problems and documenting them. This was evidenced by the relatively few deficiencies identified by external organizations (including the NRC) that had not been previously identified by the licensee, during the review period. Licensee audits and assessments were of good depth and identified issues similar to those that were self-revealing or raised during NRC inspections. Also, during this inspection there were no instances where conditions adverse to quality were being handled outside of the corrective action program.

During the review of the selected risk significant systems the team found only one instance of repeat corrective maintenance that appeared to meet the licensee's criteria for corrective action but had not been documented with a PER. This instance involved repeat corrective maintenance on the same traveling screen on the service water intake. PER 00-0010846-000 was written to document that issue.

The team's review of operating experience turned up an issue concerning potential thermal fatigue of Residual Heat Removal (RHR) piping connections that was originally determined not to be applicable to the Sequoyah site, but was later included for augmented inspection by the licensee's inservice inspection (ISI) program. A PER was not generated for this issue until the team's discussions with the licensee during this PI&R inspection in mid-December, even though a PER was recommended by the licensee's Nuclear Safety Review Board in August 2000, when the issue was added to the ISI program. The licensee's extent of condition review for this PER resulted in the generation of several more PERs concerning problems associated with the licensee's reviews of operating experience.

The team noted that the threshold for identifying problems in the licensee's corrective action program could be more clearly defined. The definition was still under development. The licensee procedure for generation of Work Requests, SPP-6.1, states that "Conditions adverse to quality" should be documented in PERs and refers to the Corrective Action Procedure, SPP-3.1, for definition of these conditions. SPP-3.1 refers to identifying problems and adverse conditions through initiation of a PER. While it defines adverse conditions, it does not define or establish a threshold for problems which should be documented.

b. Prioritization and Evaluation of Issues

(1) Inspection Scope

A sample of 62 PERs were evaluated for agreement with the classification level descriptions in licensee procedure SPP-3.1. The classification requirements from the procedure were reviewed for clarity and consistency, and the licensee's management review committee (MRC) meetings were attended to observe the final selection of classification levels for emerging PERs. (The licensee program requires that all PERs are reviewed by the MRC within three days of initiation, and that if required, the classification level would be adjusted at the direction of the MRC.)

The team also reviewed corporate and site audits and assessments for licensee observations concerning prioritization and evaluation activities.

(2) Issues and Findings

The team noted that the August 2000 revision of SPP-3.1, which added attachment tables to provide classification level categorization guidance, did not appear to require the consideration of risk in the establishment of a PER severity level. The team recognized that some of the consideration factors listed in the SPP-3.1 attachment tables appeared to be risk-based considerations, although they were not flagged as such.

The licensee procedure requires root cause reviews for Level A and B PERs but only requires probable cause determination for Level C and D PERs. The team noted that in the recent past MRC had requested root cause reviews on selected Level C PERs without elevating the classification level, or otherwise defining how thorough a root

cause determination was expected. In several of these cases, the root cause reviews were not as thorough as would be required for a Level B PER. They tended to focus on the cause(s) for a specific event or problem; however, such things as reviews of previous events for potential common cause errors and/or corrective action failures were generally not explored. Inclusion of some of these non-typical, Level C PER root cause evaluations in a Corporate Nuclear Assurance assessment resulted in a finding that the licensee's root cause program was of marginal quality. The team considered this finding by Corporate Nuclear Assurance to be very self-critical, since root cause reviews for PERs of lower significance are not required. The team found that the root cause determinations for the Level A and Level B PERs reviewed were very thorough.

c. Effectiveness of Corrective Actions

(1) Inspection Scope

The team reviewed the selected PERs, WOs and licensee audits and assessments to evaluate the effectiveness of corrective actions. The PERs selected included the system PERs and WOs discussed previously, as well as a selection of human performance PERs attributed to Operations, Engineering, and Maintenance personnel. The team also held discussions with licensee management concerning their perceptions as to the effectiveness of their corrective actions program.

The team also reviewed the corrective actions associated with NCV 2000-02-01, "Failure to Correct Identified Deficiencies in Administrative Controls for the Handling and Storage of Bulk Lubricants Contributing to the Installation of Wrong Lubricants into ECCS and Other Safety-Related Systems" and NCV 2000-02-05, "Failure to Perform Response Time Test for RWST Level Transmitter 1-LT-63-53."

(2) Issues and Findings

Based on the sample of PERs selected for review, the team found that for the most part, the licensee's corrective actions on significant issues was effective. Licensee management did indicate that there were a few areas that they were concerned about that would need additional attention. Examples of these areas were as follows:

- PER 00-011349-000 identified a corrective action problem concerning the fact that corrective actions for a previously identified problem with scheduling of Preventive Maintenance (PM) activities for Maintenance Rule Heating, Ventilation and Air Conditioning (HVAC) equipment had not been effective in that continued rescheduling of PMs had resulted in the MR HVAC equipment exceeding unavailability goals and forced the system into category a(1).
- Operations and site management had been concerned about an apparent continuing problem with "reactivity event" issues. During calendar year 2000, special emphasis had been placed on corrective actions in this area. At the time of the inspection, the team was told that licensee management felt that there had been a distinct change in the severity of events being experienced, but they were still not satisfied with the frequency. The team's review of Human Performance



issue PERs in the area of Operations, noted that along with the reactivity issues, there had been other PERs documenting actions that Operators should have had better control of.

The team found that corrective action on significant issues was effective. The team noted that the licensee was aware of areas where corrective action had not been effective and that management attention was being applied.

d. Assessment of Safety-Conscious Work Environment

(1) Inspection Scope

The team reviewed licensee audits and assessments, issues in PERs and WOs, and held discussions with various licensee employees to assess if an environment conducive to the identification of issues existed.

(2) Issues and Findings

During the review of PERs, the team noted that several months ago, there appeared to be a lowering of the threshold for identification of issues with PERs. This was indicated by a significant increase in the number of PERs written. A mid-year licensee assessment, in the area of operations, reported that operations personnel stated that their normal approach when identifying problems had been to initiate WOs to fix the problems rather than to initiate a PER, but if management wanted PERs written, then they would write PERs. The team found that there appeared to be no reluctance to identify safety issues.

LIST OF PERSONS CONTACTED

J. Beasley, Site Quality Manager  
H. Butterworth, Operations Manager  
R. Driscoll, Training Manager  
J. Hamilton, Performance & Analysis Manager  
D. Koehl, Plant Manager  
M. Lorek, Assistant Plant Manager  
R. Purcell, Site Vice President  
P. Salas, Manager of Licensing and Industry Affairs  
J. Valente, Engineering & Support Services Manager

## PARTIAL LIST OF DOCUMENTS REVIEWED

### Procedures

SPP-3.1 Corrective Action Program, Rev. 2, 8/14/2000  
SPP-6.1 Work Order Process Initiation, Rev. 0, 12/01/1998  
SPP-2.5 Vendor Manual Control, Rev. 3, 10/26/2000  
NADP-3 Managing the Operating Experience Program, Rev. 2  
M&AI-7.1 Cable Terminations and Repairing Damaged Cables, Rev. 19, 8/7/00  
0-TI-PDM-000-057.6 Lubrication, Rev. 4, 11/8/00  
0-TI-PMT-000-000.0 Pre-Post Maintenance Testing Matrices, Rev. 7, 8/31/00  
OPDP-1 Conduct of Operations, Rev. 0, 6/12/98  
ODM 3.7 Operator Work Arouds, Rev. 6, 8/10/00

### Audits, Self-Assessments, and Safety Review Committee Minutes

SQN-OPS-00-007, Operator Work Arouds, 11/30/00  
Associated PERs: PER 00-010830-000, PER 00-010831-000, PER 00-010832-000  
NA-SQ-00-19, Nuclear Assurance - PER Closure and Corrective Action Plan,  
11/01/2000  
SQN-P&A-01-001, Corrective Action Program, 10/25/2000  
SSA0002, SQN Functional Area Audit (Maintenance) 6/14/2000  
SQN-SIT-00-003, Site Human Performance, 4/24-28/2000  
SQN-M&M-00-007, Conduct of Maintenance, 5/1-12/2000  
SQN-M&M-00-008, Rework/Repeat Maintenance, 8/21-25/2000  
SQN-RP-00-002, High Radiation Area Controls, 1/10-17/2000  
Nuclear Safety Review Board Meeting Minutes No. 160, 2/3-4/2000  
Nuclear Safety Review Board Meeting Minutes No. 161, 8/3-4/2000

### Operating Experience Evaluation Packages Reviewed

SOER 99-001, Loss of Grid  
INFO GRAM-IG-00-003, Nuclear Instrumentation System Power Range Channel  
Fine Gain Potentiometers  
WAT-D-10720 : Nuclear Safety Advisor Letter (NSAL) 00-002,  
Regenerative Heat Exchanger Tubesheet  
NSAL-99-011, Potential Wire Damage  
10CFR Part 21, Trip Roller - HK Circuit Breakers ABB Part No. 180097A00  
INPO SER 00-001, RCS Leak Resulting From Residual Heat Removal Piping  
Failure  
NER No. 36429 (10CFR Part 21) Potential Non-operability of Cutler -Hammer DS and DSL  
Circuit Breaker Due to Over Torquing

NER No. 36428 (10CFR Part 21) Potential Non-operability of Cutler-Hammer DS & DSL  
Circuit Breaker Due to Zinc Chromate Plating of Hardened  
Parts

Operating Experience Evaluation Packages Reviewed (continued)

NER No. 000853	Westinghouse Technical Bulletin W-TB-00-003, Rev. 0, Stationary/Moveable Gripper Blocking Diodes
Johnston Pump Company, Nuclear Service Division OE No. 00-0543-001	Hydraulic Pump Test Results Suggest that Pump Flow may have been Overstated OE Evaluation of W-TB-00-0001, Westinghouse DS Breaker Issues
NRC IN 2000-14,	Non-Vital Bus Fault Leads to Fire and Loss of Offsite Power
NRC IN 2000-17,	Crack in Weld Area of Reactor Coolant System Hot Leg at V.C. Summer

Corrective Action Program Problem Evaluation Reports (PERs)

PER 00-009635-000	PER 00-009636-000	PER 00-009637-000
PER 00-009638-000	PER 00-009084-000	PER 00-000181-000
PER 99-008424-000	PER 99-012181-000	PER 99-011601-000
PER 00-011405-000	PER 00-000410-000	PER 00-000410-000
PER 00-008611-000	PER 00-009592-000	PER 00-009330-000

Human Performance PERs

PER 99-009454-000	PER 00-000636-000	PER 00-001295-000
PER 00-001298-000	PER 00-001511-000	PER 00-002973-000
PER 00-005083-000	PER 00-005731-000	PER 00-005663-000
PER 00-006128-000	PER 00-006492-000	PER 00-006844-000
PER 00-008077-000	PER 00-008499-000	PER 00-008691-000
PER 00-008956-000	PER 00-010310-000	

ERCW System PERs and Work Orders

PER 00-008076-000	PER 00-008072-000	PER 00-008073-000
WO 00-008086-000	WO 00-004096-000	WO 00-006611-000
WO 00-005992-000	WO 00-003130-000	WO 00-000911-000

125 VDC System PERs and Work Orders

PER 00-000281-000	PER 00-003175-000	PER 00-006741-000
PER 00-007871-000	PER 00-006453-000	PER 00-009083-000
PER 00-009645-000	PER 00-009567-000	WO 00-010752-000
WO 00-007748-000	WO 00-003399-000	WO 00-001220-000
WO 00-001064-000		

Reactor Protection System PERs and Work Orders

PER 00-001472-000	PER 00-002162-000	PER 00-000095-000
PER 00-008135-000	WO 00-010312-000	WO 00-005921-000
WO 00-002144-000	WO 00-002017-000	WO 00-001924-000

Reactor Coolant Pump Seals Work Orders

WO 00-009119-003	WO 00-009119-001	WO 00-008965-000
WO 00-003769-000		

Component Cooling System PERs and Work Orders

PER 00-001954-000	PER 00-002657-000	PER 00-002700-000
PER 00-003099-000	PER 00-001245-000	PER 00-001580-000
PER 00-004723-000	WO 00-009904-000	WO 00-009423-000
WO 00-009340-000	WO 00-008206-000	WO 00-004786-000
WO 00-004034-000	WO 00-003085-000	WO 00-001583-000
WO 00-001582-000	WO 00-000219-000	

Standby Diesel Generators Work Orders

WO 00-010505-000	WO 00-010154-000	WO 00-007088-000
WO 00-005037-000	WO 00-004704-000	WO 00-004371-000
WO 00-003636-000	WO 00-003635-000	WO 00-002902-000
WO 00-002480-000	WO 00-000079-000	

Maintenance Preventable Functional Failure (MPFF) Cause Determination Evaluation Forms (CDEF) and PERs

CDEF 1057	CDEF 1170	CDEF 1001
PER 00-004399-000	PER 00-009572-000	PER 00-000637-000

Non-Cited Violations (NCV) and Associated PERs

NCV 2000-02-01	NCV 2000-02-05	
PER 00-000241-000	PER 00-011170-000	PER 00-000430-000
PER 00-010254-000	PER 00-002083-000	

PRA Information Provided by the Licensee

## Top 10 Systems ranked by Risk Achievement Worth (RAW)

- Emergency Raw Cooling Water
- Reactor Trip Circuitry
- Safety Injection System
- 6.9 kV Shut Down Board
- Auxiliary Feedwater System
- 480 V Shut Down Board
- 125 VDC Power
- Reactor Coolant Pump Seals
- Component Cooling System
- Residual Heat Removal System

## Top 10 Systems ranked by Risk Reduction Worth

- Safety Injection System
- Auxiliary Feedwater System
- Reactor Coolant Pump Seals
- 6.9 kV Shut Down Board
- 125 VDC Power
- Residual Heat Removal System
- Emergency Diesel Generators
- Emergency Raw Cooling Water
- Component Cooling System
- Reactor Trip Switchgear

## Top 10 Operator Actions

- DHARR1 - Operators fail to perform sump swapover (ES-1.2)
- DHADS2 - Cooldown and Depressurize RCS, SGTR with Isolation
- DHARH1 - Operators fail to perform hot leg recirculation
- DHAMU1 - Operators fail to open manual valves 506 & 507 and start pumps
- DHDAR1 - Operators fail to switch to spare battery charger
- DHASE2 - Operators fail to stop RCPs on loss of Train A CCS
- DHAEB1 - Operators fail to align for Emergency Boration
- DHARL1 - Operators fail to manually initiate swapover
- DHASE1 - Operators fail to fails to stop RCPs on Phase B Containment Isolation
- DHART1 - Operators fail to provide manual trip