UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8931

October 13, 2000

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 SAFETY SYSTEM DESIGN AND PERFORMANCE CAPABILITY INSPECTION REPORT 50-327/00-10, 50-328/00-10

Dear Mr. Scalice:

On September 15, 2000, the NRC completed a safety system design and performance capability inspection at your Sequoyah Units 1 & 2. The enclosed report documents the inspection findings which were discussed on September 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 safety and compliance with the Commission's rules and regulations and with the conditions of your license. The team reviewed selected procedures and records, observed activities, and interviewed personnel. No findings of significance were identified.

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).

Sincerely,

**/RA/**
Kerry D. Landis, Chief
Engineering Branch
Division of Reactor Safety

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

Enclosure: (See page 2)

Enclosure: NRC Inspection Report

cc w/Enclosure:
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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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| Docket Nos: | 50-327, 50-328 |
| License Nos: | DPR-77, DPR-79 |
| Report Nos: | 50-327/00-10, 50-328/00-10 |
| Licensee: | Tennessee Valley Authority (TVA) |
| Facility: | Sequoyah Nuclear Plant, Units 1 & 2 |
| Location: | Sequoyah Access Road<br>Soddy-Daisy, TN 37379 |
| Dates: | August 28, 2000 - September 15, 2000 |
| Lead Inspector: | E. Girard, Senior Reactor Inspector |
| Team: | H. Anderson, Mechanical Engineering Consultant<br>B. Gupta, Instrumentation and Controls Consultant<br>D. Rich, Resident Inspector<br>C. Smith, P.E., Senior Reactor Inspector |
| Other Personnel: | R. Carroll, Senior Project Engineer<br>R. Schin, Senior Reactor Inspector |
| Approved by: | K. D. Landis, Chief, Engineering Branch<br>Division of Reactor Safety |

# SUMMARY OF FINDINGS

IR 50-327/00-10, IR 50-328/00-10, on 08/28-09/15/00, Tennessee Valley Authority, Sequoyah Nuclear Plant, Units 1 & 2.

This safety system design and performance capability inspection was conducted by regional inspectors, a resident inspector, and contractors. No findings of significance were identified.

Report Details

1. **REACTOR SAFETY**
Cornerstones: Mitigating Systems, Barrier Integrity

1R21 Safety System Design and Performance Capability

.1 Introduction

The emergency core cooling system (ECCS) was selected for inspection. The inspection focused on the design and performance of ECCS components required for swapover to recirculation following a small break loss of coolant accident (SBLOCA). The Sequoyah Individual Plant Evaluation identified "SBLOCAs followed by failure of swapover from RWST to sump" as the dominant accident sequences contributing the highest percent to the overall core damage frequency.

.2 System Needs

a. Inspection Scope

The team reviewed the ECCS design calculations and pump performance curves to verify that the refueling water storage tank (RWST) and sump volumes and their level setpoints ensured adequate net positive suction head to the ECCS pumps.

The team reviewed the design calculations, RWST test results, and containment sump test results (1/4-scale model) to verify that adequate measures were in place (by depth of water or by design features) to protect the pumps taking suction from the RWST and/or the sump from the effects of vortexing and air entrainment.

The team reviewed the residual heat removal (RHR) system modeling calculation to verify that the RHR pumps (RHRPs) provided adequate net positive suction head to the centrifugal charging pumps (CCPs) and safety injection pumps (SIPs) for recirculation following a design basis accident.

The team performed an electrical design review for probable common cause failures to start or run of risk significant equipment in the ECCS system for a SBLOCA with recirculation from the sump. The design review focused on evaluating the capabilities of Unit 1 risk significant equipment to mitigate the event. The team reviewed plant modification Design Change Notice (DCN) M09179-B, which revised the degraded voltage protection scheme for the 6.9 KV shutdown boards. The scope of the design change included removal of the existing loss of voltage relays and replacing them with solid state loss of voltage relays. Additionally, the voltage magnitude setpoints and time delay setpoints associated with the loss of voltage and degraded voltage relays were revised. The inspectors verified that a degraded voltage analysis had been performed and that the auxiliary power system (APS) analytical voltage limits had been determined for (1) minimum steady state 6.9 KV shutdown board voltage under most severe loading conditions; (2) minimum steady state 6.9 KV shutdown board voltage that will maintain all connected safety related motor loads above their stall voltage; (3) the APS voltage profile and recovery during transient (starting) conditions. The protective devices for the

460 volts safety related motors that could start immediately upon receipt of an accident signal with a concurrent degraded voltage were also evaluated by the licensee and were determined to be acceptable. Instrument loop accuracy calculations prepared to demonstrate the technical adequacy of the revised voltage magnitudes and time delays of the loss of voltage and degraded voltage relays were also reviewed by the team and determined to be acceptable. The electrical system needs of the CCP, SIP, and RHRP motors were verified to be acceptable for supporting equipment performance based on review of calculation SQN-EEB-MS-T106-0002.

The team reviewed design basis documents and design drawings to verify the design bases were correctly implemented for:

- RWST and containment sump water level requirements.
- power supplies to ECCS instrumentation.
- equipment controls and control interlocks for safety injection and RHR systems.

The team reviewed the methodologies and calculations that were used to establish the RWST and sump setpoint levels for swapover to recirculation. In addition, they compared these setpoint levels to values given in the Technical Specifications (TSs). These reviews were performed to verify that the setpoints were correctly determined in accordance with the ECCS design criteria and were correctly specified in the TSs.

The team reviewed the licensee's emergency procedure (ES 1.3) to verify that the actions specified for ECCS swapover from injection to sump recirculation were in accordance with accident analyses and design basis documents (Updated Final Safety Analysis Report and Safety Injection Design Criteria). The team also verified the actions were achievable within the times specified in the design basis documents and verified instrumentation was available to provide operators with required information.

The team reviewed selected design changes M12670-A, M12591-A, and M12661-A to verify no negative impact on ECCS function.

b. Issues and Findings

No findings of significance were identified.

.3 System Condition and Capability

a. Inspection Scope

The team reviewed the procedure for operator rounds to verify that it included the inspection of the RWST moat spillway pipe specified by DCN M08370A. In addition, they observed the RWST moat during a plant walkdown to verify that it was maintained in a manner consistent with design assumptions and that its configuration was consistent with procedural requirements for standby operation.

The team reviewed the results of completed ECCS pump surveillance test procedures to verify that the acceptance criteria specified were appropriate and that the test results

were acceptable. The acceptance criteria were evaluated against both TS requirements and the minimum performance values specified in the design analyses.

The team conducted a walkdown of the accessible portions of the ECCS in both units to verify that the system configuration would support system function under accident conditions and was consistent with the calculation design assumptions. The walkdown included examples of each pump, the RWSTs, and instrumentation, valves, and piping not located in the containment or contaminated areas. The team examined the pump rooms to verify that they contained fire detection equipment and sprinklers, if required. Valves were examined for correct alignment. All equipment was examined for evidence of deterioration or inadequate maintenance.

The team compared the RWST and sump level instrument elevations from the installation drawings and the Updated Final Safety Analysis Report (UFSAR) with the elevations assumed in the licensee's setpoint calculations. This comparison was made to verify that appropriate elevations were employed in establishing the settings.

The revised degraded voltage protection scheme for the 6.9 KV shutdown boards (DCN M09179-B) included a loss of voltage relay with a setpoint of 80% of nominal and a time delay of 1.25 seconds for starting the diesel generator; for opening both the normal and alternate shutdown board feeder breakers; and initiating load shed of the 6.9 KV bus. The scheme also included the degraded voltage relays with a setpoint of 93.5% of nominal. There were time delays of 9.5 seconds and 300 seconds associated with the degraded voltage relays. The 9.5 seconds is used to initiate load shed of the 6.9 KV shutdown bus coincident with an accident. The 300 seconds time delay is used for starting the diesel generator and initiating load shed of the 6.9 KV shutdown bus prior to a non-accident sequencing of electrical loads on to the emergency diesel generator. The team reviewed plant modification DCN M09179-B and instrument loop accuracy calculations 27DAT and DS1-2 and verified that the revised instrument setpoints were supported by approved calculations of record. The team verified that the guidance of IEEE 279-1971 concerning the use of two-out-of three logic for the arrangement of the loss of voltage and degraded voltage relays was incorporated, based on review of drawing 1, 2-45N765-18. Additionally, logic input to the sequencer from the loss of voltage and degraded voltage relays were verified by reviewing drawing 1, 2-45N765-3. The CCP, SIP, and RHRP motors were demonstrated to operate in accordance with design bases and licensing bases by review of drawing 1, 2-45N76, sheet 13, Revision 8; sheet 14, Revision 6; and sheet 16, Revision 15.

The team reviewed ECCS surveillance records, system health reports, and the current records of temporary alterations and operator work-arounds. These reviews were conducted to verify that system performance and condition remained in accordance with the UFSAR and Safety Injection System Design Criteria, and that TS requirements were met.

The team observed the venting of CCP suction piping to verify the duration of the venting was adequate to prevent gas binding of the centrifugal charging pumps in the event of a safety injection actuation.

b. Issues and Findings

No findings of significance were identified.

.4 Inspect Selected Components

a. Inspection Scope

The team reviewed trend records, a performance test, and an operability evaluation to verify that the licensee was appropriately monitoring and evaluating the condition of the component cooling heat exchangers.

The team reviewed the wiring diagrams for the RWST level transmitters to verify compliance with the licensee's separation criteria for electric circuits.

The team reviewed RWST level setpoint values from four completed surveillance tests to verify compliance with TS values.

The team reviewed motor/pump speed torque curves and motor acceleration time/ thermal damage curves for the CCP, SIP, and RHRP motors in order to verify that the motors were adequately sized based on mechanical load demand. The licensee had re-rated the CCP motors based on a letter from the pump motor vendor. A UFSAR change request was prepared by the licensee in order to incorporate this change in the licensing bases. The team reviewed the maximum load demands and the pump performance curves for the safety injection and residual heat removal pump motors to verify that they were within the service factor rating.

The team reviewed calculation SQN-APS-018, and verified that a voltage analysis had been performed in order to demonstrate that Generic Letter 89-10 motor-operated valve (MOV) motors had adequate terminal voltages. The team verified that these design inputs were correctly incorporated in the mechanical calculations performed to assess the required thrust and valve actuator capability for selected MOVs. Essential service protection for the CCP, SIP, and RHRP motors and MOV motors were also reviewed for adequacy. The team reviewed test data from surveillance instruction 1-SI-SFT-062-001.0 for the CCP motor and MOVATS Signature Analysis System for selected MOVs and verified that values of motor inrush and running currents met acceptance criteria.

The team reviewed the licensee's oil sampling and monitoring instruction and selected oil analysis results for ECCS pump and motor bearings to verify that contamination and indications of excessive bearing wear were not present.

The team reviewed the testing and preventive maintenance procedures for MOVs to verify that the licensee provided requirements to ensure MOVs 1&2-FCV-63-8 and -11 would perform as specified in the design criteria.

b. Issues and Findings

No findings of significance were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

Motor data collected by the licensee during a surveillance test on CCP 1 B-B indicated that the power requirement exceeded that assumed in the design calculation. This condition was identified and evaluated by the licensee in problem evaluation report (PER) 00-002097-000. The team reviewed the PER and calculation to verify that the problem was adequately evaluated and resolved.

Significant Corrective Action Report SQSCA910001 documented a design deficiency where the 6.9 KV Shutdown Boards could have degraded voltage conditions when they were fed from the alternate feeder breakers. The corrective actions developed for recurrence control were provided in DCN M09179-B. This DCN modified the loss of voltage and degraded voltage relay schemes on the 6.9 KV shutdown boards. The inspection team reviewed this change to verify that the CCP, SIP, and RHRP motors would be capable of performing their design function under the most limiting 161 KV switch yard degraded grid voltage of 153 KV. Risk significant MOVs were also verified to be capable of performing their design function under degraded voltage conditions (Reference calculation SQN-APS-018).

PER SQ972506 reported that the results of a surveillance test indicated that CCP 2A-A brake horsepower was 699.8 in lieu of the value of 690 listed in the UFSAR and used in the diesel generator loading analysis. In a letter to the licensee, Westinghouse Electric Corporation provided the results of an evaluation which concluded that the CCP motors would operate satisfactorily at 720 horsepower. Based on this letter and design basis information in its EQ Binder, the licensee re-rated the CCP motors to 708 horsepower. Corrective actions developed and implemented for closure of the PER included revisions to the electrical auxiliary calculation and diesel generator loading analysis calculation. Revision of UFSAR Tables 8.3.1-1, and 8.3.1-2 were also part of the proposed corrective actions. The team verified that SAR Change Package 16-40 was approved to implement this change and that PER SQ972506PER was closed.

The team reviewed the following PERs and licensee event reports (LERs) to verify accurate root cause identification and adequate corrective action plan development:

- PERs: 00-007081-000, 00-003034-000, 99-001635-000, 99-003074-000, 99-003456-000, 99-002064-000, 93-0800, 96-2314, 95-0029.

- LERs: 32791023, 32795001, 32890012.

The team reviewed the MOV trending reports for the last Unit 1 and Unit 2 cycles (an ongoing Generic Letter 89-10 commitment). These reports were reviewed to verify that the licensee was examining MOV repairs, analyses, as-found deteriorated conditions, and test results for trends in MOV operability. The team also reviewed the records of the following conditions that were described in the trend reports to verify that they were identified in the licensee's corrective action program at an appropriate threshold and to verify effectiveness of the corrective actions:

- the minimum thrust requirement for MOV 1-FCV-074-035 could not be met without exceeding the maximum allowable thrust (resolved in PER SQ981321PER).
- the closing capability of MOV 2-FCV-072-022 was negative (-5%).

b. Issues and Findings

No findings of significance were identified.

## 4. OTHER ACTIVITIES

### 4OA6 Management Meeting

The lead inspector presented the inspection results to Mr. D. Koehl, Plant Manager, and other members of the licensee's staff at an exit meeting on September 15, 2000. The licensee acknowledged the findings presented. Proprietary information is not included in the inspection report.

## PARTIAL LIST OF PERSONS CONTACTED

Licensee

G. Bell, Principal Instruments and Controls Design Engineer
G. Buchanan, Component Engineering Supervisor
H. Butterworth, Operations Manager
J. Campbell, Principal Electrical Design Engineer
T. Carson, Maintenance Manager
E. Freeman, Maintenance and Modifications Manager
W. Justice, Lead Mechanical Design Engineer
D. Koehl, Plant Manager
M. Lorek, Assistant Plant Manager
D. Lundy, Site Engineering Manager
R. Poole, Senior Mechanical Design Engineer
J. Proffitt, Licensing Specialist
J. Rinne, Electrical Design Manager
R. Rogers, Systems Engineering Manager
D. Romine, Senior Electrical Engineer
J. Thomas, Principal Mechanical Design Engineer
T. Trask, NSSS System Engineering Supervisor
J. Valente, Engineering & Support Services Manager
J. Wilkes, Operations Superintendent

NRC:

C. Casto, Director, Division of Reactor Safety, Region II

## APPENDIX

## LIST OF DOCUMENTS REVIEWED

### Technical Specifications

TS Table 3.3-3, Engineered Safety Features Actuation System Instrumentation .
TS Table 3.3-4, Engineered Safety Features Actuation System Instrumentation Trip Set points.
TS 3/4.5, Emergency Core Cooling Systems.
TS Table 4.3-2, Engineered Safety Feature ... Instrumentation Surveillance Requirements.

### UFSAR

Unit 1 UFSAR Section 8.3, Onsite Power System.
UFSAR Section 15.3.1, Loss of Coolant from ... Actuate the Emergency Core Cooling System.
UFSAR Chapter 6, Engineered Safety Features.
UFSAR Chapter 7, Instrumentation and Controls.
SAR Change Request 16-34, Installation of pressure reducing orifices ... ECCS throttle valves.

### Modifications

DCN M08370-A, Refueling Water Storage Tank ... Locate and Size Drain to Prevent Flooding.
DCN M09179-B, Alternate Feeders on 6.9 KV Shutdown Boards ... 80% Under Voltage Trip.
DCN S-154336-A, Documentation Relative to Optional Switch Settings for MOVs.
DCN M12661-A, RHR Water Hammer Mitigation Vents.
DCN M12670-A, Provide a New High-point Vent on Each Train of the SIS Header...
DCN M12591-A, Install High Point Vent - Train A RHR Injection Header.

### Safety Evaluation Report

Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 182 to facility operating license No. DPR-77 and Amendment No. 174 to facility Operating License No. DPR-79, TVA, Sequoyah Nuclear Plant, Units 1 and 2, Docket No. 50-327 and 50-328.

### Procedures

AOP-M.03, Abnormal Operating Procedure - Loss of Component Cooling Water, Revision 1.
EPM-3-E-0, Bases Document for E-O Reactor Trip on Safety Injection, Revision 5.
EPM-3-ES-1.3, EOP Development Document, Revision 2.
ES-1.3, Emergency Subprocedure for Transfer to RHR Containment Sump, Revision 7.
0-PI-IFT-040-001.0, Functional Test of Auxiliary and Reactor Building Flood Alarms, Revision 1.
2-PI-OPS-062-040.0, Charging Pump Suction Piping Vent, Revision 5.
0-TI-SXX-070-001.0, Analysis of Component Cooling Heat Exchanger Test Data, Revision 1.
1-SI-SXP-074-201.A, Residual Heat Removal Pump 1A-A Performance Test, Revision 4.
1-SI-SFT-062-001.0, Charging Pump Injection Flow Test, dated 3/5/00.
0-SI-SXV-063-266.0, ASME Section XI Valve Testing, Revision 10.
1-SI-OPS-062-040.A, Charging Pump 1A casing and discharge piping venting, Revision 9.
1-SI-OPS-063-012.0, ECCS valve alignment verification, Revision 5.
1-SI-ICC-063-176.1, Surveillance Instructions and Test values, dated 9-9-98.

2-SI-ICC-063-050.1, Channel Calibration of RWST Level Channel I..., dated 4-2-99.
1-SI-ICC-063-051.2, Channel Calibration of RWST Level Channel II ..., dated 6-12-98.
1-SI-ICC-063-052.3, Channel Calibration of RWST Level Channel III ..., dated 5-19-98.
1-SI-ICC-063-050.1, Channel Calibration of RWST Level Channel IV ..., dated 5-25-98.
OWA # SQ96026, Sequoyah-2 - Venting CCPs frequently due to gas buildup, dated 05/31/96.
MMDP-5, MOV Program, Revision 6.
0-GO-14, Operator Round and Tour Performance, Revision 45.

**Drawings**

1,2-44N350, Manways RHR Sump Valve Room, Revision 1.
1-41N363-3, Concrete Pipe Tunnels and Tank Foundations Outline, Revision 0.
1-47W331-2, Mechanical Containment Penetration, Revision 2.
1-47W432-1, Mechanical Residual Heat Removal System Piping, Revision 3.
2-47W309-3. Mechanical Large Reservoirs, Revision 4.
47W331-1, Mechanical Containment Penetrations, Revision 13.
48N924, Miscellaneous Steel RHR Sump Valve Room Liner-Sheet 1, Revision 8.
48N925, Miscellaneous Steel RHR Sump Valve Room Liner-Sheet 2, Revision 8.
1, 2-15E500-1, Key Diagram Station Auxiliary Power System, Revision 9.
Wiring Diagrams:
- 1,2-45N746-1, 480V Chem & Vol Cont BD A Single Line, Revision 5.
- 1,2-45N776, 480V Chem & Vol Cont Aux PWR Schematic Diagrams, Revision 3.
- 1,2-45N779-26, 480V Shutdown Aux. Power Schematic Diagrams, Revision 18.
- 1,2-45N779-15, 480V Shutdown Aux. Power Schematic Diagrams, Revision 13.
- 1,2-45N779-40, 480V Shutdown Aux. Power Schematic Diagrams, Revision 30.
- 1,2-45N779-11, 480V Shutdown Aux. Power Schematic Diagrams, Revision 23.
- 1,2-45N779-25, 480V Shutdown Aux. Power Schematic Diagrams, Revision 33.
- 1,2-45N779-8, 480V Shutdown Aux. Power Schematic Diagrams, Revision 25.
- 1,2-45N779-10, 480V Shutdown Aux. Power Schematic Diagrams, Revision 26.
- 1,2-45W1635-92, Local Instrument Panels Connection Diagrams Sheet 92, Revision 5.
- 1,2-45N1635-61, Local Instrument Panels Connection Diagrams Sheet 61, Revision 1.
- 1,2-45W1635-92, RWST Level Instrumentation Wiring Diagram, Revision 5.
- 1-45N724-1, 6900V Shutdown Board 1A-A Single Line, Revision 11.
- 1-45N724-2, 6900V Shutdown Board 1B-B Single Line, Revision 13.
- 6900V Aux. Power Schematic Diagrams:
  - 1, 2-45N765-1, Sheet 1, Revision 13.
  - 1, 2-45N765-2, Sheet 2, Revision 13.
  - 1, 2-45N765-3, Sheet 3, Revision 18.
  - 1, 2-45N765-8, Sheet 8, Revision 6.
  - 1, 2-45N765-13, Sheet 13, Revision 8.
  - 1, 2-45N765-14, Sheet 14, Revision 6.
  - 1, 2-45N765-16, Sheet 16, Revision 15.
  - 1, 2-45N765-18, Sheet 18, Revision 16.

Mechanical Control Diagrams:
- 1-47W610-63-3, Safety Injection System, Revision 4.
- 1-47W610-63-1, Safety Injection System, Revision16.
- 1-47W600-1146, Mechanical Instruments and Controls, Revision 3.
- 1-47W600-78, Mechanical Instruments and Controls, Revision1

2-47W600-241, Mechanical Instruments and Controls, Revision 2.
1-47W600-241, Mechanical Instruments and Controls, Revision 3.
2-47W600-143, Mechanical Instruments and Controls, Revision 2.
1-47W600-143, Mechanical Instruments and Controls, Revision 2.
47W309-4, Mechanical Large Reservoirs, Revision 5.
2-47W811-1, Flow Diagram - Safety Injection System, Revision 46.

Flow Diagrams:

1-47W811-1, Safety Injection System, Revision 53.
1,2-45W810-1, Residual Heat Removal System, Revision 36.
1,2-47W813-1, Reactor Cooling System, Revision 48.
1,2-47W812-1, Containment Spray System, Revision 38.

Mechanical Control Diagrams:

1-47W610-63-1, Safety Injection System, Revision 16.
1-47W610-63-3, Safety Injection System, Revision 4.
2-47W610-63-1, Safety Injection System, Revision 15.
1-47W610-63-3, Safety Injection System, Revision 4.
1,2-47W610-63-2, Safety Injection System, Revision 4.
1-47W610-74-1, RHR System, Revision 11.
2-47W611-63-1, Safety Injection System, Revision 3.
2-47W611-63-2, Safety Injection System, Revision 5.
2-47W611-63-3, Safety Injection System, Revision 7.
2-47W611-63-4, Safety Injection System, Revision 5.
2-47W611-63-5, Safety Injection System, Revision 5.
2-47W611-63-6, Safety Injection System, Revision 2.
2-47W611-63-7, Safety Injection System, Revision 2.

Mechanical Logic Diagrams:

2-47W611-63-8, Safety Injection System, Revision 3.
1-47W611-63-2, Safety Injection System, Revision 3.
1-47W611-63-3, Safety Injection System, Revision 8.
1-47W611-63-5, Safety Injection System, Revision 5.
1-47W611-63-6, Safety Injection System, Revision 2.
1-47W611-63-7, Safety Injection System, Revision 2.
1-47W611-63-8, Safety Injection System, Revision 3.
1-47W611-74-1, Residual Heat Removal System, Revision 5.
1-47W611-74-2, Residual Heat Removal System, Revision 4.
2-47W611-74-1, Residual Heat Removal System, Revision 4.
2-47W611-74-2, Residual Heat Removal System, Revision 4.

**Calculations and Reports of Calculation Results**

SQN-EEB-MS-T106-0008, Degraded Voltage Analysis, Revision 4.
SQN-EEB-MS-T106-0002, AC Electrical Load ..., Attachments 10.3.4 and 10.4.4, Revision 51.
SQN-APS-018, Generic Letter 89-10 Voltage Drop Calculation ( Unit 1), Revision 20.
SQN-APS-025, Generic Letter 89-10 Voltage Drop Calculation ( Unit 2), Revision 16.
1-FCV-63-006, ... Design Basis Review, Thrust Calculation and Valve Actuator Capability ...
1-FCV-63-008, ... Design Basis Review, Thrust Calculation and Valve Actuator Capability ...
1-FCV-63-003, ... Design Basis Review, Thrust Calculation and Valve Actuator Capability ...
SQN-63-D053/EPM-RJP-030691, ... Design Basis Review, Thrust Calculation and Valve ...

1-FCV-63-072, ... Design Basis Review, Thrust Calculation and Valve Actuator Capability ...
SQN-63-053/EPM-RJP-022891, ... Design Basis Review, Thrust Calculation and Valve ...
1-FCV -70-153, ... Design Basis Review, Thrust Calculation and Valve Actuator Capability ...
DS1-2, Demonstrated Accuracy Calculation DS1-2, Revision 6.
27DAT, Demonstrated Accuracy Calculation 27DAT, Revision 4.
PSO Plant Section RS Calculation , 6.9 KV Shutdown Board 1A-A, CCP, Revision 0.
PSO Plant Section RS Calculation, 6.9 KV Shutdown Board 1A-A, SIP, Revision 0.
PSO Plant Section RS Calculation, 6.9 KV Shutdown Board, RHRP, Revision 0.
SQN-GRID-STUDY-012, Sequoyah Nuclear Plant - Transmission System Study ..., Revision 0.
ND-Q0063-980038, RWST and Containment RHR Safety and Operational Limits, RWST Setpoint Required Accuracy, and LBLOCA and SBLOCA Sump Minimum Levels, Rev. 1.
EEB-TI-0028, Setpoint Calculation Methodology, Rev. 5.
WCAP-11239, Westinghouse Setpoint Methodology for Protection Systems ..., Revision 6.
SQN-EEB-MS-TI28-0015, Instrument Accuracy Calculation 1-LT-63-50 through -53, Rev. 5.
SQN-EEB-MS-TI28-0056, Demonstrated Accuracy Calculation 2-LT-63-50 through -53, Rev. 4.
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SQN-30-D053 EPM-ASD01-031287, HVAC Cooling Load Calculation ..., Revision 3.
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SQN-67-D053 0-HCG-MWL-072087, SQN, ERCW- ... Heat Load ..., Revision 10
TOE 0-99-067-10436, Technical Operability Evaluation, Revision 0.
WCAP-12455, Containment Pressure... (Design Basis Analyses) November, 1989.
WCAP 12455, Revision 1, ... Containment Integrity Analyses for Ice Weight Optimization ...
Westinghouse Letter B25881223006, Residual Heat Removal System Modeling, 12/14/88.
Westinghouse Letter TVA-90-909, ... RWST Volume Requirement for Steamline Break, 7/16/90.
Report WM28-1-45-102, Model Study of the Sequoyah RHR Sump, October, 1978.
Report WR28-2-45-130, Hydraulic Performance of the Sequoyah RHR Sump ..., April 1987.
Report WR28-3-45-127, Vortexing Propensity of the RHR Sump at Sequoyah ..., March 1987.
Calculation Report V-EC-1109 (Valve 1-FCV-074-035), Weak Link ..., January 1992.

**Design Bases Documents**

SQN-DC-V-27.3, Safety Injection System Design Criteria Document, Revision 13.

SQN-DC-V-11.2 , 125 Volt Vital Battery System, Revision 8.
SQN-DC-V-11.4.1, Normal and Emergency AC Auxiliary Power Systems, Revision 10.
SQN-DC-V-12.2, Separation of Electric Equipment and Wiring, Revision 14.
System Description Manual 063 Emergency Core Cooling System, Revision 1.

**Vendor Documents**

Framatome Technologies Letter ..., SNP SBLOCA Accident Analysis Profile, 2/11/00.
Babcock and Wilcox ..., Document SQ-RPT25.66, Revision 00, 10/12/94.
Westinghouse Electric Corporation Letter TVA-90-583 ... Pump Motor Horsepower, 03/08/90.
Westinghouse Electric Corporation Letter TVA-90-1036, ... Pump Motor Horsepower, 09/20/90.
Induction Motor Starting Characteristics:

SQN-EEB-MS-T106-0002, Sheet D9, CCP Motor Speed/Torque Current Curve.
SQN-EEB-MS-T106-0002, Sheet D14, SIP Motor Speed Torque Current Curve 663805.
SQN-EEB-MS-T106-0002, RHRP Motor Speed Torque Current Curve.
CCP Motor Acceleration Time Current and Thermal Limit Curve 664534.
SIP Motor Acceleration Time Current and Thermal Limit Curve 665533.
RHRP Motor Acceleration Time and Thermal Limit Curve 665898.

**Licensee Event Reports (LERs)**

32792027, Automatic reactor trips.
32890002, Incorrect setpoint - Inadequate calculation for HHI.
32891008, Failure of RWST level wide range transmitter.
32892010, Inoperable RHR B-Train due to miswired flow switch.
32893003, ESF actuation due to equipment failure.
32894002, Shutdown required due to failure of a charging pump.
32894006, ESF actuation due to failure of nonessential air supply.
32894007, Charging pump inoperable due to flow exceeding TS limits.
32895005, LCO due to safety injection pump suction valve closure.
32800002, Safety injection pumps inoperable due to error during maintenance activity.
32791023, Potential loss of containment sump inventory outside containment during SBLOCA.
32795001, Gas accumulation in the RHR system following starting of the RHR pump.
32890012, Gas accumulation in CCP suction piping due to gas stripping in miniflow line orifices.

**Bulletins/Information Notices (IN)**

IN 2000-08, Inadequate Assessment of the Effect of Differential Temperatures on Safety Related Pumps, dated May 15, 2000.

**Problem Evaluation Reports**

SQ972506PER, CCP brake horse power 699.8 in lieu of 690 used in diesel generator analysis.
00-002097-000, CCP test indicates required wattage exceeds that assumed in the design.
99-007902-000, Pump program basis document has errors regarding relief request references.
00-007081-000, Issues requiring revision to design criteria, design calculations and the FSAR.
00-003034-000, Questions regarding replacement of CCP and SIP room coolers.
99-001635-000, Arcing occurred in panel 2-L-11A during a cable pulling for a modification.

99-003074-000, The safety injection flow to loop 3 during a surveillance test was unacceptable .
99-003456-000, ECCS pump room leak detection system may not work.
99-002064-000, RHR pump motors have elevated vibration levels.
93-0800, Potential for ECCS pumps to exceed allowable runout flow.
SQ962314PER, Excessive gas in RHR discharge piping.
SQ95-0029PER, RHR pipe support damage that may be due to severe water hammer.

**Significant Corrective Action Report**

SQSCA910001, 6.9 KV Shutdown boards alternate feeder breakers degraded voltage design deficiency.

**PERs Initiated as a Result of this Inspection**

00-008197, Valve interlock testing.
00-002097, Minor drawing discrepancies.
00-007081, Required revision of design criteria, calculations, and the FSAR.
00-008137, Standby diesel generator operation.
00-008107, Editorial discrepancies identified in calculations.

**Completed Surveillance Procedures**

0-SI-SIN-063-009.0, Containment Sump Inspection, Revision 1, completed 03/13/00 (Unit 1).
0-SI-SIN-063-009.0, Containment Sump Inspection, Revision 1, completed 05/05/99 (Unit 2).
1-PI-SFT-070-001.0, Performance Testing of CCW Hxs, Revision 3, completed 08/24/00.
1-SI-SFT-062-001.0, Charging Pump Injection Flow Test, Revision 10, completed 03/05/00.
1-SI-SFT-063-001.0, Safety Injection ... Flow Test, Revision 8, completed 03/08/00**.**
2-SI-SFT-062-001.0, Charging Pump Injection Flow Test, Revision 6, completed 05/02/99
1-SI-SFT-074-001.0, RHR Injection Flow Rate..., Revision 5, completed 10/17/95.
1-SI-SFT-074-001.0, RHR Injection Flow Rate ..., Revision 6, completed 04/02/97.
2-SI-SFT-074-001.0, RHR Injection Flow Rate ..., Revision 3, completed 05/15/96.
2-SI-SFT-074-001.0, RHR Injection Flow Rate ..., Revision 3, completed 10/20/97**.**

**System Health Reports**

System Health Reports for ECCS and Support Systems, 2nd and 3rd Quarters, FY 2000.

**Miscellaneous Documents**

Motor Operated Valve Trending Report (U1C10), 7/18/00.
Motor Operated Valve Trending Report (U2C9), 1/24/00.
Diagnostic Test Data Sheet for MOV 2-FCV-072-0022, completed 1/26/99.
Maintenance Instruction 0-MI-EMV-317-146.0; ... Limitorque Motor Operators; Revision 12.