



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

October 29, 2018

Mr. Joseph W. Shea  
Vice President, Nuclear Regulatory Affairs  
and Support Services  
Tennessee Valley Authority  
1101 Market Street, LP 4A  
Chattanooga, TN 37402-2801

**SUBJECT: SEQUOYAH NUCLEAR PLANT – NRC INTEGRATED INSPECTION REPORT  
05000327/2018003 AND 05000328/2018003**

Dear Mr. Shea:

On September 30, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Sequoyah Nuclear Plant, Units 1 and 2. On October 11, 2018, the NRC inspectors discussed the results of this inspection with Mr. Tony Williams and other members of your staff. The results of this inspection are documented in the enclosed report.

No NRC-identified or self-revealing findings were identified during this inspection. However, inspectors documented a licensee-identified violation which was determined to be of very low safety significance in this report. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC resident inspector at the Sequoyah Nuclear Plant.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

*/RA/*

Anthony D. Masters, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Docket Nos.: 05000327, 05000328  
License Nos.: DPR-77, DPR-79

Enclosure:  
IR 05000327/2018003 and 05000328/2018003

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SUBJECT: SEQUOYAH NUCLEAR PLANT – NRC INTEGRATED INSPECTION REPORT  
05000327/2018003, 05000328/2018003 dated October 29, 2018.

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**U.S. NUCLEAR REGULATORY COMMISSION  
Inspection Report**

Docket Number(s): 50-327, 50-328

License Number(s): DPR-77, DPR-79

Report Number(s): 05000327/2018003 and 05000328/2018003

Enterprise Identifier: I-2018-003-0034

Licensee: Tennessee Valley Authority (TVA)

Facility: Sequoyah Nuclear Plant

Location: Soddy-Daisy, TN 37379

Inspection Dates: July 1, 2018 to September 30, 2018

Inspectors: D. Hardage, Senior Resident Inspector  
N. Childs, Resident Inspector  
W. Deschaine, Resident Inspector  
B. Collins, Reactor Inspector (Triennial Heat Sink Inspection)

Approved By: A. Masters, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Enclosure

## **SUMMARY**

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring licensee's performance by conducting a quarterly integrated inspection at Sequoyah Nuclear Plant, Units 1 and 2 in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information. No NRC-identified or self-revealing findings were identified during this inspection. A licensee-identified non-cited violation is documented in report Section 71111.15.

### **List of Findings and Violations**

None

## PLANT STATUS

Unit 1 began the inspection period at rated thermal power and remained at or near rated thermal power for the remainder of the inspection period.

Unit 2 began the inspection period at rated thermal power. On July 27, 2018, the unit was down powered to 65 percent to replace the 2A generator terminal bushing fan motor. The unit was returned to rated thermal power on July 28, 2018. On September 11, 2018, the unit was down powered to 65 percent to replace the 2B and 2C generator terminal bushing fan motors. The unit was returned to rated thermal power on September 12, 2018. Unit 2 operated at or near rated thermal power for the rest of the inspection period.

## INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed plant status activities described in IMC 2515 Appendix D, "Plant Status" and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

## REACTOR SAFETY

### 71111.01 - Adverse Weather Protection

#### Impending Severe Weather (1 Sample)

The inspectors evaluated readiness for impending adverse weather conditions for a tornado watch on July 20 – 21, 2018.

#### External Flooding (1 Sample)

The inspectors evaluated readiness to cope with external flooding on September 14, 2018.

### 71111.04 - Equipment Alignment

#### Partial Walkdown (2 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) A train essential raw cooling water (ERCW) while J-A and K-A were out of service for maintenance on July 25, 2018
- (2) Unit 1 and 2 offsite power while A common station service transformer was out of service for corrective maintenance on September 7, 2018

### Complete Walkdown (1 Sample)

The inspectors evaluated system configurations during a complete walkdown of the Unit 2 safety injection (SI) system on September 14, 2018.

### 71111.05AQ - Fire Protection Annual/Quarterly

#### Quarterly Inspection (4 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) Unit 1 and 2, control building – elevation 732 on July 11, 2018
- (2) Unit 1 and 2, control building – elevation 669 on August 22, 2018
- (3) Unit 1 and 2, control building – elevation 685 on August 24, 2018
- (4) Unit 1 and 2, residual heat removal (RHR) pump rooms – elevation 653 on September 14, 2018

#### Annual Inspection (1 Sample)

The inspectors evaluated fire brigade performance during an unannounced fire drill in the control building 24V/48V battery board and charger room on September 19, 2018.

### 71111.06 - Flood Protection Measures

#### Internal Flooding (2 Samples)

The inspectors evaluated internal flooding mitigation protections in the Unit 1 RHR pump rooms and the Unit 2 SI pump rooms on September 14, 2018.

### 71111.07 - Heat Sink Performance

#### Heat Sink (Triennial) (4 Samples)

The inspectors evaluated heat exchanger/sink performance on the following components from August 6 – 10, 2018:

- (1) component cooling system (CCS) 1A1 heat exchanger (SQN-1-HEX-070-0008A)
- (2) emergency diesel generator 1A2 oil cooler (SQN-1-CLR-082-0280/2)
- (3) main control room B-B chiller (SQN-0-CLR-311-0141-B)
- (4) ERCW intake structure & Chickamauga Lake, specifically Sections 02.02d.4, 02.02d.5, 02.02d.6 and 02.02d.7 were completed.

### 71111.11 - Licensed Operator Requalification Program and Licensed Operator Performance

#### Operator Requalification (1 Sample)

The inspectors observed and evaluated main feedwater pump trip with turbine runback, rod control system failure, and LOOP with faulted steam generator on August 13, 2018.

### Operator Performance (1 Sample)

The inspectors observed and evaluated Unit 2 downpower to 67 percent on September 11, 2018.

### 71111.12 - Maintenance Effectiveness

#### Routine Maintenance Effectiveness (1 Sample)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

- (1) Review of Function 030-K, Shutdown Board Room Chillers on September 5, 2018

#### Quality Control (1 Sample)

The inspectors evaluated maintenance and quality control activities associated with the following equipment performance issues:

- (1) Work Order (WO) 119655843, Repair of through wall leak downstream of 2-FCV-67-65, ERCW header 2A supply to 2B diesel generator on August 3, 2018.

### 71111.13 - Maintenance Risk Assessments and Emergent Work Control (3 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) Unit 1 and Unit 2, week of July 7 – July 14, 2018, including protected equipment status reviews for scheduled maintenance on J-A ERCW pump diesel generator and emergent maintenance on R-A ERCW pump
- (2) Unit 1 and Unit 2, week of July 21 – July 28, 2018, including protected equipment status reviews for scheduled maintenance on J-A and K-A ERCW and emergent inoperability of A ERCW to support 1A1, 1A2, 2A1 and 2A2 CCS heat exchanger flushing
- (3) Unit 1 and Unit 2, week of August 4 – August 11, 2018, including protected equipment status reviews for scheduled replacement of 1A-A shutdown board transformer and scheduled maintenance on K-A ERCW pump

### 71111.15 - Operability Determinations and Functionality Assessments (4 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) Void identified in Unit 2 emergency boration line, Condition Report (CR) 1430796 on July 20, 2018
- (2) Fouling factor for 1A1/1A2 CCS heat exchanger exceeded acceptance criteria during testing, CR 1434213 on July 31, 2018
- (3) Unisolable through wall leak upstream of A1A-A ERCW strainer backwash isolation valve, CR 1436447 on August 6, 2018
- (4) Appendix R Control Building Issue for RHR Pumps, CR 1440822 on September 11, 2018



#### 71111.18 - Plant Modifications (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

- (1) DCN-22778, Installation of relief valve for the turbine driven auxiliary feedwater (TDAFW) mini-flow line on September 13.

#### 71111.19 - Post Maintenance Testing (5 Samples)

The inspectors evaluated the following post maintenance tests:

- (1) WO 119126956, Adjust impeller clearance to improve R-A ERCW pump performance on August 3
- (2) WO 119283073, Electric board room chiller temperature control valve maintenance on September 4
- (3) WO 119793667, Perform permanent repair of through wall leak on ERCW strainer A1A-A backflush valve on September 9
- (4) WO 119362989, 669' penetration room cooler 2B-B belt replacement on September 12
- (5) WO 119283426, Replace fuel oil flex hoses on diesel driven fire pump on September 12

#### 71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

##### Routine (1 Sample)

- (1) 2-SI-SXP-003-201.S, Turbine Driven Auxiliary Feedwater Pump 2A-S Performance Test on September 17, 2018

##### In-service (1 Sample)

- (1) 0-SI-SXP-067-201.J, Essential Raw Cooling Water Pump J-A Performance Test on August 3, 2018

#### 71114.06 - Drill Evaluation

##### Emergency Planning Drill (1 Sample)

The inspectors evaluated the emergency preparedness drill on August 8, 2018. The drill included:

- A fire in the 2A-A charging pump and a contaminated injury responder
- A turbine trip on generator differential and anticipated transient without scram (ATWS)
- A fuel failure, 500 gpm loss of coolant accident (LOCA) and loss of containment due to failure of containment ventilation isolation valves

#### **OTHER ACTIVITIES – BASELINE**

##### 71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below for the

period from July 2017 through June 2018. (12 Samples)

- (1) emergency AC power systems (Unit 1 and Unit 2)
- (2) heat removal systems (Unit 1 and Unit 2)
- (3) safety systems functional failures (Unit 1 and Unit 2)
- (4) high pressure injection systems (Unit 1 and Unit 2)
- (5) residual heat removal systems (Unit 1 and Unit 2)
- (6) cooling water support systems (Unit 1 and Unit 2)

**INSPECTION RESULTS**

Licensee Identified Non-Cited Violation	71111.15 - <u>Operability Determinations and Functionality Assessments</u>
<p>This violation of very low safety significance was identified by the licensee and has been entered into the licensee corrective action program and is being treated as a Non-Cited Violation, consistent with Section 2.3.2 of the Enforcement Policy.</p>	
<p>Violation: Sequoyah Unit 1 Operating License Condition 2.C(16) and Sequoyah Unit 2 Operating License Condition 2.C(13) require in part that TVA shall implement and maintain in effect all provisions of the approved fire protection program. The Sequoyah fire protection report describes how the licensee complies with applicable sections of 10 CFR 50, Appendix R, including Section III.L.1 which states in part that alternative or dedicated shutdown capability provided for a specific fire area shall be able to achieve cold shutdown conditions within 72 hours and maintain cold shutdown conditions thereafter.</p> <p>Contrary to the above, since implementation of the Sequoyah Fire Protection Program, the licensee failed to maintain all aspects of the approved program. Specifically, in August 2018, the licensee discovered that the site’s ability to achieve cold shutdown conditions within 72 hours would be challenged due to an inadequate evaluation of the RHR pumps functionality during certain Appendix R fire scenarios.</p> <p>Significance/Severity Level: Using Inspection Manual Chapter 0609, Appendix F, “Fire Protection Significance Determination Process,” dated May 2, 2018, the inspectors determined that this finding was of very low safety significance (Green) because the finding did not affect the ability to reach and maintain hot shutdown/hot standby or safe and stable conditions.</p> <p>Corrective Action Reference: CR 1440822</p>	

**EXIT MEETINGS AND DEBRIEFS**

The inspectors verified no proprietary information was retained or documented in this report.

- On October 11, 2018, the inspector presented the quarterly resident inspector inspection results to Mr. Tony Williams, and other members of the licensee staff.

## **DOCUMENTS REVIEWED**

### **Inspection Procedure 71111.01**

#### Procedures

AOP-N.02, Tornado Watch/Warning, Revision 38

### **Inspection Procedure 71111.04**

#### Procedures

0-SO-67-1, Essential Raw Cooling Water, Revision 110

0-SI-OPS-082-007.W, AC Electrical Power Source Operability Verification, Revision 45

### **Inspection Procedure 71111.05**

#### Procedures

Sequoyah Fire Protection Report, Part II – Fire Protection Plan, Revision 36

PFP NO: CON-0-669-00, Fire Protection Pre-Fire Plans Auxiliary Building El. 653, Revision 9

PFP NO: CON-0-669-00, Fire Protection Pre-Fire Plans Control Building El. 669, Revision 5

PFP NO: CON-0-685-00, Fire Protection Pre-Fire Plans Control Building El. 685, Revision 7

#### Condition Reports

903960, 653' Fire Door A9 Weather Strip Needs Repaired

#### Work Orders

111466277, Replace the door seal around the 2B RHR pump room door

#### Other

Fire Drill Evaluation Report #76630, Electrical short in the 48V DC Plant Battery Board

### **Inspection Procedure 71111.06**

#### Procedures

PFP NO: CON-0-669-00, Fire Protection Pre-Fire Plans Auxiliary Building El. 653, Revision 9

#### Calculations

MDN-000-000-2010-0203, SQN Probabilistic Risk Assessment – Internal Flooding Analysis, Revision 4

### **Inspection Procedure 71111.07**

#### Procedures

0-TI-SXX-000-146.0, Program for Implementing NRC Generic Letter 89-13, Rev. 0004

CHEM-004, Sequoyah Nuclear – Raw Water Chemistry Strategic Plan, Rev. 0002

NPG-SPP-09.14, Generic Letter (GL) 89-13 Implementation, Rev. 0004

SQN-0-MNWX-317-HH3, PM #052053000 Attachment A (Check Standing Water in “A” Train Manholes/Handholes), Rev. 40

### Completed Tests

WO118709012, Main Control Room A/C TCV Oil Cooler B-B Inspection, dated December 25, 2017  
WO116794000, Main Control Room A/C Oil Cooler B-B TCV Inspection, dated December 28, 2015  
WO118612358, Inspect, Lube and Test Shear Pin on ERCW Traveling Water Screens C-B, dated October 30, 2017  
WO117719469, Inspect, Lube and Test Shear Pin on ERCW Traveling Water Screens C-B, dated January 30, 2017  
WO118567200, Inspect, Lube and Test Shear Pin on ERCW Traveling Water Screen B-B, dated October 16, 2017  
WO118004823, Inspect and Lube ERCW Traveling Water Screen A-A, dated May 8, 2017  
WO118818031, Inspect and Lube ERCW Traveling Water Screen A-A, dated February 2, 2018  
WO118047422, Inspect, Lube and Test Shear Pin on ERCW Traveling Water Screens D-A, dated May 22, 2017  
WO118840573, Inspect, Lube and Test Shear Pin on ERCW Traveling Water Screens D-A, dated February 19, 2018  
WO117690785, Inspect, Lube and Test Shear Pin on ERCW Traveling Water Screen B-B, dated January 16, 2017  
WO118977651, S-PI-SFT-070-001-0 CCS Heat Exchangers Performance Test – 2A1 & 2A2, dated August 8, 2018  
WO118977655, S-PI-SFT-070-001-0 CCS Heat Exchangers Performance Test – 1A1 & 1A2, dated August 7, 2018  
WO115948317, Inspect D/G 1A-2 Heat Exchanger, dated January 26, 2015  
WO117618925, Inspect D/G 1A-2 Heat Exchanger, dated January 23, 2017

### Calculations

EWR-13-ENG-317-152, Engineering Work Request: Water Level at Which Safety-Related Cable Conduits Would Be in Contact for Specific Manholes/Handholes, Revision 4  
SQN-DC-V-7.4, Design Criteria Document: Essential Raw Cooling Water System (67), Revision 33

### Drawings

1,2-47W845-1, Mechanical Flow Diagram – Essential Raw Cooling Water System (Flow Markup), Revision 32  
LRA-1,2-47W845-2, Mechanical Flow Diagram – Essential Raw Cooling Water System (Flow Markup), Revision 0  
FSAR Figure 9.2.1-1, Component Cooling System, Amendment 17

### Corrective Action Documents

CR1437443, Housekeeping Patch Used on A1A Backwash Line – Non-compliant with N-513-3, dated August 7, 2018  
CR1437446, White Stalactites Protruding from Ceiling in ERCW Intake Pumping Station, dated August 7, 2018  
CR1437452, Reach Rod in ERCW Intake Pumping Station, dated August 7, 2018  
CR1437455, Internal Flooding Analysis/Temporary Sump Pump Usage for ERCW Intake Pumping Station, dated August 7, 2018  
PMCR1310958, Revise Section 5.1.3(c) to Require Manhole/Handhole Cover Removal, dated August 9, 2018

Other Documents

TVA065-REPT-067, Service Water Integrity Aging Management Program – Identification of Stagnant/Dead Legs for Fulfillment of Commitment 38(G) Tennessee Valley Authority Sequoyah Nuclear Plant, Revision 1

**Inspection Procedure 71111.11**

Other

Simulator Exercise Guide (SEG) S-2A, Revision 2

**Inspection Procedure 71111.12**

Procedures

N-MT-6, Magnetic Particle Examination for ASME and ANSI Code Components and Welds, Revision 6

N-VT-3, Visual Examination of Weld Ends, Fit-ups, and Dimensional Examination of Weld Joints, Revision 31

TI-4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting – 10CFR50.65, Revision 30

Other

MMDP-10, Category I/II weld data sheet for weld number 0-ER-1453A, work order 119655843 SQN-0-18-046, PRA risk significance for the A-A and B-B 6.9kV Shutdown Board Room Chillers

**Inspection Procedure 71111.13**

Procedures

NPG-SPP-07.3, Work Activity Risk Management Process, Revision 25

**Inspection Procedure 71111.15**

Procedures

NEDP-22, Operability Determinations and Functional Evaluations, Revision 18

2-PI-SFT-070-001.0, Performance Testing of Component Cooling Heat Exchangers 2A1, 2A2, Revision 22

Calculations

MDQ00006320100240, Calculation of Effects of Gas Accumulation in ECCS Piping

Condition Reports

1434213, 1A1/1A2 CCS Hx Fouling Factor Exceeded

1433922, 2A CCS Hx Pair Indicate Increase in Fouling

1440822, Appendix R Control Building Issue for RHR Pumps

Other

Design Criteria SQN-DC-V-13.9.9, Component Cooling Water System (70), Revision 28

SQN Fire Protection Report, Revision 36

### **Inspection Procedure 71111.18**

#### Procedures

NPG-SPP-09.3, Plant Modifications and Engineering Change Control, Revision 30  
NPG-SPP-09.4, 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments, Revision 12  
NPG-SPP-09.5, Temporary Modifications Temporary Configuration Changes, Revision 14

### **Inspection Procedure 71111.19**

#### Procedures

0-SI-SXP-067-201.R, Essential Raw Cooling Water Pump R-A Performance Test, Revision 21  
0-SI-SXI-000-201.0, ASME Section XI Inservice Pressure Test, Revision 25

#### Condition Reports

1443773, Diesel Fire Pump B Engine Speed is greater than limits per 0-SI-FPU-026-193.M

#### Work Orders

WO 119126956, Adjust Impeller Clearance to improve ERCW pump performance  
WO 119283073, Electric Board Room A/C Condenser "B" Temperature Control Valve  
WO 119283165, Electric Board Room Chiller Package B-B  
WO 119283426, Replace fuel oil flex hoses  
WO 119793667, Perform permanent repair of through wall leak

### **Inspection Procedure 71111.22**

#### Work Orders

119127825, 2-SI-SXP-003-201.S, TDAFW Pump 2A-S XI Test, September 17, 2018 performance

### **Inspection Procedure 71151**

#### Procedures

NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 7  
NPG-SPP-02.2, Performance Indicator Program, Revision 10

#### Other

Sequoyah Mitigating System Performance Index Basis Document, Revision 10  
Unit 1 and 2 MSPI Derivation Reports Emergency AC Power Systems July 2017-Jun 2018  
Unit 1 and 2 MSPI Derivation Reports Heat Removal Systems July 2017-Jun 2018  
Unit 1 and 2 MSPI Derivation Reports Cooling Water Systems July 2017-Jun 2018  
Unit 1 and 2 MSPI Derivation Reports High Pressure Injection Systems July 2017-Jun 2018  
Unit 1 and 2 MSPI Derivation Reports Residual Heat Removal Systems July 2017-Jun 2018