



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

April 29, 2014

Mr. Joseph W. Shea  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
1101 Market Street, LP 3D-C  
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000327/2014002 AND 05000328/2014002

Dear Mr. Shea:

On March 31, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Sequoyah Nuclear Plant, Units 1 and 2. On April 8, the NRC inspectors discussed the results of this inspection with Mr. Carlin and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

The inspection examined 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 inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents one self-revealing finding of very low safety significance (Green). This finding was determined to involve a violation of NRC requirements. Additionally, two licensee-identified violations which were determined to be of very low safety significance are listed in this report. However, because of the very low safety significance and because they have been entered into your corrective action program, the NRC is treating these issues as non-cited violations (NCVs) consistent with the NRC Enforcement Policy. If you contest the violations of significance of the NCVs in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Sequoyah Nuclear Plant

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at the Sequoyah Nuclear Plant.

Additionally, as we informed you in the most recent NRC integrated inspection report, cross-cutting aspects identified in the last six months of 2013 using the previous terminology were being converted in accordance with the cross-reference in Inspection Manual Chapter 0310. Section 4OA5 of the enclosed report documents the conversion of these cross-cutting aspects which will be evaluated for cross-cutting themes and potential substantive cross-cutting issues in accordance with IMC 0305 starting with the 2014 mid-cycle assessment review. If you disagree with the cross cutting aspect assigned, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at the Sequoyah Nuclear Plant.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Jonathan H. Bartley, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000327/2014002, 05000328/2014002  
w/Attachment: Supplementary Information

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J. Shea

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Letter to Joseph W. Shea from Jonathan H. Bartley dated April 29, 2014

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-327, 50-328

License Nos.: DPR-77, DPR-79

Report Nos.: 05000327/2014002, 05000328/2014002

Licensee: Tennessee Valley Authority

Facility: Sequoyah Nuclear Plant, Units 1 and 2

Location: Sequoyah Access Road  
Soddy-Daisy, TN 37379

Dates: January 1 – March 31, 2014

Inspectors: G .Smith, Senior Resident Inspector  
W. Deschaine, Resident Inspector  
S. Walker, Senior Reactor Inspector (Section 4OA5.1)  
R. Patterson, Reactor Inspector (Section 4OA5.1)

Approved by: Jonathan H. Bartley, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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## SUMMARY OF FINDINGS

IR 05000327/2014-002, 05000328/2014-002; 1/1-3/31/2014; Sequoyah Nuclear Plant, Units 1 and 2; (Event Follow-up)

The report covered a three-month period of inspection by resident inspectors. Three findings/violations were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5, dated February 2014.

### A. NRC-Identified and Self-Revealing Findings

Cornerstone: Initiating Events

Green: A self-revealing non-cited violation of Units 1 and 2 Technical Specification 6.8.1.a, Administrative Controls (Procedures), was documented for the licensee's failure to establish an adequate clearance in preparation for maintenance activities on the B station air compressor. Implementation of this inadequate clearance on February 21, 2014, resulted in a reduction of control air pressure and a plant transient which challenged control room operators. Immediate corrective action was to revise the clearance to establish an adequate boundary. The licensee entered the issue into the corrective action program (CAP) for resolution as PER 850331.

The performance deficiency was more than minor because it was associated with the configuration control and human performance attributes of the initiating events cornerstone and adversely affected the cornerstone's objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the inadequate clearance caused a plant transient during power operations that without operator action would have resulted in a loss of air operated plant components and ultimately require the operators to trip both units. The finding was determined to be of very low (green) safety significance based on Exhibit 1, "Initiating Events Screening Questions," found in Inspection Manual Chapter 0609, "Significance Determination Process," Appendix A, "Significance Determination Process for Findings At-Power," because the finding did not result in a complete or partial loss of a support system that contributed to the likelihood of, or cause, an initiating event and affected mitigation equipment. The inspectors determined the cause of this finding was associated with a cross cutting aspect of Work Management in the Human Performance area. Specifically, the licensee failed to implement their clearance process such that nuclear safety was the overriding priority. (H.5) (Section 4OA3)

### B. Licensee-Identified Violations

Violations of very low safety significance, which were identified by the licensee, were reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and corrective action tracking numbers are listed in Section 4OA7 of this report.

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## REPORT DETAILS

### Summary of Plant Status:

Unit 1 operated at or near 100 percent rated thermal power (RTP) for the entire inspection period.

Unit 2 operated at or near 100 percent rated thermal power (RTP) for the entire inspection period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection

##### .1 Impending Adverse Weather Conditions (Extreme Cold Weather)

###### a. Inspection Scope

After the licensee completed preparations for seasonal low temperatures, the inspectors walked down the various structures, systems, and components (SSC) in the auxiliary building, turbine building, emergency raw cooling water (ERCW) building, and emergency diesel generator (EDG) building. These SSCs were selected because their safety related functions could be adversely affected by cold weather. The inspectors reviewed documents listed in the Attachment, observed plant conditions, and evaluated those conditions using criteria documented in Procedure 0-OPS-000-006.0, Rev. 55, "Freeze Protection." The inspectors paid particular attention to the operation of heat trace circuits, the use of space heaters, and the integrity of weatherized enclosures to ensure the operability of the affected SSC. During the weeks of January 6 and January 20 the site experienced periods of extreme cold which is defined as "less than 25 degrees Fahrenheit (F) or less than 32 degrees F for eight hours." These low temperatures required execution of Appendix I, "Extreme Cold Weather Performance," of procedure 0-OPS-000-006.0. This appendix provided additional guidance to ensure SSCs remained functional during extreme cold temperatures. This activity constituted one inspection sample.

###### b. Findings

No findings were identified.

#### 1R04 Equipment Alignment

##### .1 Partial System Walkdown

###### a. Inspection Scope

The inspectors performed partial walk-downs of the following systems to verify the operability of redundant or diverse trains and components when safety equipment was inoperable. The inspectors focused on identification of discrepancies that could impact

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the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures; walked down control system components; and determined whether selected breakers, valves, and support equipment were in the correct position to support system operation. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program (CAP). Documents reviewed are listed in the Attachment. The inspectors completed four samples.

- 2B Component Cooling System (CCS) pump while the 2A CCS pump was out-of-service (OOS) for planned maintenance
- 1B EDG while the 1A EDG was OOS for planned maintenance
- 1B Containment Spray (CS) train while the 1A CS pump was OOS for planned maintenance
- 2B Residual Heat Removal (RHR) train while the 2A RHR pump was OOS for planned maintenance

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Fire Protection Tours

a. Inspection Scope

The inspectors conducted a tour of the areas important to safety listed below to assess the material condition and operational status of fire protection features. The inspectors evaluated whether: combustibles and ignition sources were controlled in accordance with the licensee's administrative procedures; fire detection and suppression equipment was available for use; passive fire barriers were maintained in good material condition; and compensatory measures for out-of-service, degraded, or inoperable fire protection equipment were implemented in accordance with the licensee's fire plan. Documents reviewed are listed in the Attachment. The inspectors completed four samples.

- Auxiliary Building elevation 653' (Unit 1 and Unit 2)
- ERCW building elevation 688'
- ERCW building elevation 704'
- ERCW building elevation 722'

b. Findings

No findings were identified.



## .2 Annual Drill Observations

### a. Inspection Scope

On February 18 and February 20 the inspectors observed an announced fire drill in the Unit 2 pressurizer transformer room, on the pressurizer heater transformer. The February 20 drill was a reevaluation due to a performance failure from the February 18 drill. The inspectors assessed fire alarm effectiveness; response time for notifying and assembling the fire brigade; the selection, placement, and use of firefighting equipment; use of personnel fire protective clothing and equipment (e.g., turnout gear, self-contained breathing apparatus); communications; incident command and control; teamwork; and fire fighting strategies. The inspectors also attended the post-drill critique to assess the licensee's ability to review fire brigade performance and identify areas for improvement. Following the critique, the inspectors compared their findings with the licensee's observations and to the requirements specified in the licensee's Fire Protection report. The inspectors completed one sample.

### b. Findings

No findings were identified.

## 1R06 Flood Protection Measures

### .1 Internal Flooding

#### a. Inspection Scope

The inspectors examined internal flood protection measures associated with the Unit 2 residual heat removal (RHR) and containment spray pump rooms internal flood design in order to verify that flood mitigation plans were consistent with the design requirements and risk analysis assumptions. The inspectors verified that equipment essential for reactor shutdown was properly protected from a flood caused by pipe breaks in the Unit 2 RHR and containment spray pump rooms. Specifically, the inspectors reviewed the licensee's moderate energy line break flooding study to fully understand the licensee's flood mitigation strategy, reviewed licensee drawings, and then verified that the assumptions and results remained valid. The inspectors walked down the Unit 2 RHR and containment spray pump rooms to verify the assumed flooding sources, adequacy of common area drainage, and flood detection instrumentation to ensure that a flooding event would not impact reactor shutdown capabilities. The inspectors completed one sample.

#### b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program

.1 Quarterly Review

a. Inspection Scope

The inspectors observed two simulator sessions, one on January 27 and the other on February 3, 2014. The first training scenario observed involved a loss of direct current caused by sabotage coupled with a loss of ERCW. The second scenario observed involved a steam generator level transmitter failing; a small reactor coolant system (RCS) leak on loop 3 hot leg which developed into a loss-of-coolant accident (LOCA) with loss of RHR recirculation. The inspectors observed crew performance in terms of: communications; ability to take timely and proper actions; prioritizing, interpreting and verifying alarms; correct use and implementation of procedures, including the alarm response procedures; timely control board operation and manipulation, including high risk operator actions; oversight and direction provided by shift manager, including the ability to identify and implement appropriate Technical Specification (TS) action; and, group dynamics involved in crew performance. The inspectors also observed the evaluators' critique and reviewed simulator fidelity to verify that it matched actual plant response. Documents reviewed are listed in the Attachment. This activity constituted one inspection sample.

b. Findings

No findings were identified

.2 Quarterly Review of Licensed Operator Performance

a. Inspection Scope

The inspectors observed and assessed licensed operator performance in the main control room during periods of heightened activity or risk. The inspectors reviewed various licensee policies and procedures such as OPDP-1, Conduct of Operations, NPG-SPP-10.0, Plant Operations, and 0-GO-5, Normal Power Operation. The inspectors utilized activities such as post-maintenance testing, surveillance testing, unplanned transients, infrequent plant evolutions, plant startups and shutdowns, reactor power and turbine load changes, and refueling and other outage activities to focus on the following conduct of operations as appropriate:

- operator compliance and use of procedures
- control board manipulations
- communication between crew members
- use and interpretation of plant instruments, indications and alarms
- use of human error prevention techniques
- documentation of activities, including initials and sign-offs in procedures
- supervision of activities, including risk and reactivity management
- pre-job briefs

Specifically, the inspectors observed licensed operator performance during the following activities:

- Unit 1 turbine load reduction as a result of minor power swings due to operation with two of three condensate demineralizer booster pumps running

Documents reviewed are listed in the Attachment. This activity constituted one inspection sample.

b. Findings

No findings were identified

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the maintenance activities, issues, and/or systems listed below to verify the effectiveness of the licensee's activities in terms of: appropriate work practices; identifying and addressing common cause failures; scoping in accordance with 10 CFR 50.65(b); characterizing reliability issues for performance; trending key parameters for condition monitoring; charging unavailability for performance; classification in accordance with 10 CFR 50.65(a)(1) or (a)(2); appropriateness of performance criteria for structure, system, or components (SSCs) and functions classified as (a)(2); and appropriateness of goals and corrective actions for SSCs and functions classified as (a)(1). Documents reviewed are listed in the Attachment. The inspectors completed three samples.

- Cause Determination Evaluation (CDE) #2718 – Maintenance Rule Functional Failure of Relay 86LOR
- CDE #2730 - 2B-B 480V Board Room Chiller Tripped (SR 835011)
- 1A Charging Pump breaker failure (SR 832878)

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the following activities to determine whether appropriate risk assessments were performed prior to removing equipment from service for maintenance. The inspectors evaluated whether risk assessments were performed as required by 10 CFR 50.65(a)(4), and were accurate and complete. When emergent work was performed, the inspectors reviewed whether plant risk was promptly reassessed and managed. The inspectors also assessed whether the licensee's risk

assessment tool use and risk categories were in accordance with Standard Programs and Processes Procedure NPG-SPP-07.1, "On-Line Work Management," Revision 3, and Instruction 0-TI-DSM-000-007.1, "Risk Assessment Guidelines," Revision 9. Documents reviewed are listed in the Attachment. The inspectors completed six samples.

- Elevated risk during 2A CCS Pump and 1A EDG Outages.
- Planned Yellow PSA risk for RHR pump room cooler outage.
- Unit 2 Emergent work due to Loop Control Processor set I rack I failure.
- Planned Yellow risk for Unit 2 'B' RHR pump.
- Emergent work due to failure of 2-FS-74-24 RHR B mini-flow switch.
- Emergent work due to 1B EDG air start motor failure.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments

a. Inspection Scope

For the operability evaluations described in the Problem Event Reports (PERs) listed below, the inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available, such that no unrecognized increase in risk occurred. The inspectors compared the operability evaluations to the Updated Final Safety Analysis Report (UFSAR) descriptions to determine if the system or component's intended function(s) were adversely impacted. In addition, the inspectors reviewed compensatory measures implemented to determine whether the compensatory measures worked as stated and the measures were adequately controlled. The inspectors also reviewed a sampling of PERs to assess whether the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment. The inspectors completed six samples.

- PER 841159 – Dissimilar detectors installed in 1-RM-90-130 (PDO/POE)
- SR 847233 – Functional Evaluation (FE) associated with the EDG governor voltage value
- PER 760336 – Past Determination of Operability (PDO) for Evaluation of Time Critical Actions associated with emergency core cooling suction realignment
- PER 824224 – Adverse impact of service air on ABSCE boundary (Event Notification #49690)
- PER 857326 – Potential non-conforming condition for AFW flow during a feed line break (FE)
- PER 857276 – Non-conservative value used in the 1A CS Heat Exchanger thermal performance evaluation (PDO)

b. Findings

No findings were identified.

1R18 Plant Modifications

.1 Temporary Modifications

a. Inspection Scope

The inspectors reviewed the temporary modification listed below and the associated 10 CFR 50.59 screening, and compared it against the UFSAR and TS to verify whether the modification affected operability or availability of the affected system.

- TACF – SQN-2-2013-007- Provide temporary Power to ICE AHU to support 2A Rx Vent Board Cleaning

Following installation and testing, the inspectors observed indications affected by the modification, discussed them with operators, and verified that the modification was installed properly and its operation did not adversely affect safety system functions. Documents reviewed are listed in the Attachment. The inspectors completed one sample.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

The inspectors reviewed the post-maintenance tests associated with the work orders (WOs) listed below to assess whether procedures and test activities ensured system operability and functional capability. The inspectors reviewed the licensee's test procedure to evaluate whether: the procedure adequately tested the safety function(s) that may have been affected by the maintenance activity; the acceptance criteria in the procedure were consistent with information in the applicable licensing basis and/or design basis documents; and the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed the test data to determine whether test results adequately demonstrated restoration of the affected safety function(s). Documents reviewed are listed in the Attachment. The inspectors completed seven samples.

- WO 114788780, Adjust TCVs for "A" MCR chiller
- WO 114789031, Inspect and lubricate 6.9kV Shutdown board room AHU 2B-B
- WO 115593042, Replace RHR mini-flow switch
- WO 115226000, Replace/Rework Sense Lines on SQN-1-FT-001-0021B-E

- WO 114150971, 30 VDC power supply died on Eagle 21 card in 2-R-4, TF2
- WO 115616417, Reroute hoses on Air Start motor for the 1B EDG
- WO 115570058, Eagle 21 LCP card replacement

b. Findings

No findings were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the surveillance tests identified below, the inspectors assessed whether the SSCs involved in these tests satisfied the requirements described in the TS surveillance requirements, the UFSAR, applicable licensee procedures, and whether the tests demonstrated that the SSCs were capable of performing their intended safety functions. This was accomplished by witnessing testing and/or reviewing the test data. Documents reviewed are listed in the Attachment. The inspectors completed six samples.

In-Service Tests:

- 1-SI-SXP-072-201.A, Containment Spray Pump 1A-A Performance Test
- 1-SI-SXP-003-201.B MDAFW Pump 1B-B Performance Test

RCS leakage test:

- 0-SI-OPS-068-137.0, Reactor Coolant System Water Inventory (U-2) performed 2/27/14

Routine Surveillance Tests:

- 0-SI-OPS-030-024.0 'B' Train Control Room Air Clean-up Flow test
- 1-SI-SFT-030-001.B, Containment Air Return Fan 1B-B Quarterly Operability Test, Revision 6
- 1-SI-OPS-000-002.0, Shift Logs

b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, and Security

##### 4OA1 Performance Indicator (PI) Verification

###### a. Inspection Scope

The inspectors sampled licensee submittals for the PIs listed below for the period from January 2013 through December 2013, for both Unit 1 and Unit 2. Definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Indicator Guideline, Revision 6, were used to determine the reporting basis for each data element in order to verify the accuracy of the PI data reported during that period.

###### Cornerstone: Barrier Integrity

- Reactor Coolant System Activity
- Reactor Coolant System Leakage

The inspectors reviewed portions of the operations and chemistry logs to verify whether the licensee had accurately determined and reported the Reactor Coolant System (RCS) activity and leakage during the previous four quarters for both units. The inspectors also observed the performance of Procedure 0-SI-OPS-068-137.0, RCS Water Inventory, which determines the amount of RCS leakage. Documents reviewed are listed in the Attachment.

###### b. Findings

No findings were identified.

##### 4OA2 Problem Identification and Resolution

###### .1 Daily Review

###### a. Inspection Scope

As required by Inspection Procedure 71152, Identification and Resolution of Problems, and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This was accomplished by reviewing the description of each new PER and attending daily management review committee meetings.

###### b. Findings and Observations

No findings were identified.

4OA3 Follow-up of Events and Notices of Enforcement Discretion.1 (Closed) Licensee Event Report (LER) 05000327/2013-003-00, Limiting Conditions for Operation Exceeded for Emergency Core Cooling Systema. Inspection Scope

On August 8, 2013, an operator noted that the emergency core cooling system (ECCS) 'A' train residual heat removal (RHR) containment sump suction valve (FCV-63-72) was in the mid-position (both open and closed lights illuminated). At the time, operations declared the position indication for this valve inoperable and entered limiting condition for operation (LCO) 3.3.3.7, "Accident Monitoring." This LCO required repairs to be made within 30 days of discovery; or else the plant was to be shut down. On August 14, during planned ECCS valve testing, the 'A' train RHR suction valve to the refueling water storage tank, FCV-74-3, failed to stroke closed upon demand. The valve was immediately declared inoperable and the ECCS LCO 3.5.2 was entered.

Troubleshooting revealed multiple grounds on the FCV-74-3 circuitry. Based on the fact that FCV-74-3 and FCV-63-72 contain common interlocks, it was suspected that there could be a more significant issue with FCV-63-72 than just a position indication failure. On August 16 maintenance personnel removed the actuator cover on FCV 63-72 and noted a significant amount of water had accumulated in the motor actuator. Following several repairs, both FCV-74-3 and FCV-63-72 were both stroked satisfactorily and declared back in service. A past operability evaluation was performed by the licensee and concluded that, indeed, FCV-63-72 was most likely inoperable beginning on August 8 and ultimately not repaired until August 17 or approximately nine days later. Thus the LER was required pursuant to 10CFR50.73(a)(2)(i)(B) as an operation or condition prohibited by plant technical specifications since the ECCS LCO 3.5.2 time of 72 hours (3 days) was clearly exceeded. This issue has been previously discussed in the 2013 fourth quarter integrated resident report, 2013-005 (Section 4OA5).

b. Findings

Non-Cited violation (NCV) 05000327/2013005-01 was issued as a result of this issue and is documented in the NRC inspection report 05000327, 328/2013005 (ADAMS accession number ML14038A346) released on February 7, 2014.

.2 Inadequate Clearance Causes Instrument Air System Transient.a. Inspection Scope

On February 21, 2014, the site experienced a transient in the control air system that involved a rapid reduction in system pressure. The transient affected both Unit 1 and Unit 2. The pressure transient was a result of an improper clearance order that was hung as a prerequisite for system maintenance. The inspectors performed a detailed analysis of this event.



b. Findings and Observations

Introduction: A Green self-revealing non-cited violation of Units 1 and 2 Technical Specification 6.8.1.a, Administrative Controls (Procedures), was identified for failure to establish an adequate clearance in preparation for maintenance activities on the B station air compressor.

Description: On February 21, 2014, Clearance 0-32-0036 (0-TO-2014) was issued for a clam inspection of B station control and service air compressor aftercooler. Mechanical personnel, after getting operations review/permission to start work, began work on WO 114973782 for the clam inspection. While performing the work, the plant control (instrument) air pressure dropped to 74 psig approximately 15 minutes after the end bell head was loosened on the water side of the cooler. Normally plant control air pressure is kept at around 105 psig. The main +control room immediately entered Abnormal Operating Procedure (AOP) M.02, Loss of Control Air, due to indications received. Auxiliary Unit Operators (AUOs) were dispatched to the field and discovered the air side of the aftercooler leaking air from the air-water seal at the B air compressor after cooler. The AUOs isolated the leak by closing 0-VLV-32-519. These operator actions restored control air pressure to approximately 105 psig preventing a significant plant transient.

The licensee determined that the cause for the reduction in control air pressure was due to an inadequate clearance that did not isolate both the air and water sources of the aftercooler as required by SPP-10.2, "Clearance Procedure To Safely Control Energy." The clearance preparer and reviewer independently reviewed the clearance request and work package and identified only the need to secure the compressor and isolate the water side of the cooler. After the endbell head bolting was removed, the gasket between the water and airside head failed, creating the control air header leak. Had this leak not been isolated, the loss of control air could have resulted in a loss of air operated plant components and ultimately required the operators to trip both units.

This issue was placed in the licensee's corrective action program (CAP) as PER 850331. The licensee's Root Cause Analysis (RCA) determined the Direct Cause (DC) for the entry into AOP-M.02 was the individuals involved with the clearance of the 'B' Station Service Air Compressor did not adhere to the procedural standards to establish a safe work boundary. The Root Cause (RC) was determined to be individuals did not fulfill their responsibilities when performing the phases (planning, preparation, review, and field verification) of the clearance process. Corrective actions planned to prevent reoccurrence included revising the clearance procedure to: 1) require the Primary Authorized Employee (PAE) to conduct a briefing with Senior Reactor Operator (SRO) prior to signing on a clearance for boundary and protection and 2) identify the responsibilities of the defined individuals listed in the roles and responsibilities section.

Analysis: The failure of the licensee to establish an adequate clearance in preparation for maintenance activities on the B station air compressor as required by SPP-10.2, "Clearance Procedure To Safely Control Energy," was a performance deficiency. The performance deficiency was determined to be more than minor and is considered a finding because it was associated with the configuration control and human performance attributes of the initiating events cornerstone and adversely affected the cornerstone's

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objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the inadequate clearance caused a plant transient during power operations that without operator action would have resulted in a loss of air operated plant components and ultimately require the operators to trip both units. The finding was determined to be of very low (green) safety significance based on Exhibit 1, "Initiating Events Screening Questions," found in Inspection Manual Chapter 0609, "Significance Determination Process," Appendix A, "Significance Determination Process for Findings At-Power," dated June 19, 2012, because the finding did not result in a complete or partial loss of a support system that contributed to the likelihood of, or cause, an initiating event and affected mitigation equipment. The inspectors determined the cause of this finding was associated with a cross cutting aspect of Work Management in the Human Performance area. Specifically, the licensee failed to implement their clearance process such that nuclear safety was the overriding priority. (H.5)

Enforcement: Units 1 and 2 Technical Specification 6.8.1.a requires, in part, that written procedures be established, implemented, and maintained covering the activities specified in Appendix A, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors," of Regulatory Guide (RG) 1.33, "Quality Assurance Program Requirements (Operations)," Revision 2, dated February 1978. RG 1.33 Appendix A, Section 1, "Administrative Procedures," requires written procedures for equipment control (e.g., locking and tagging) and is implemented by procedure NPG-SPP-10.2, which states, in part, "this procedure is used to ensure that before performing work on machines or equipment where the unexpected energizing, start up, or release of stored energy could occur and cause injury or property damage, the machine or equipment is isolated from its energy source and rendered non-operative." Clearance 0-32-0036 (0-TO-2014) was established in preparation for a clam inspection of B station control and service air compressor aftercooler. Contrary to the above, on February 21, 2014, clearance 0-32-0036 (0-TO-2014) was inadequately established in that the clearance did not isolate both the air and water sources which led to a cooler gasket failure and the subsequent release of system air pressure. This pressure release caused a reduction in control air and service air pressures resulting in a plant transient and had the potential to challenge safety related system operations. Immediate corrective action was to revise the clearance to establish an adequate boundary. Because this finding is of very low safety significance and been entered into the licensee's CAP as PER 850331, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000327,328/2014002-01, Inadequate Clearance Causes Control Air System Transient.

.3 (Closed) LER 05000327/2013-004-00 and 05000327/2013-004-01, Failure to Comply with Technical Specification

a. Inspection Scope

From October 21-27, 2013, the licensee noted that several breeches occurred in the Unit 1 containment penetration, X-108. This penetration consisted of several smaller penetrations used to provide air or water to the containment for various uses during the Unit 1 outage. The breeches occurred while Unit 1 was in Mode 6 during the movement

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of irradiated fuel. TS 3.9.4, "Containment Building Penetrations," required that each penetration from the containment atmosphere to the outside atmosphere be closed by an isolation valve. In the case where the penetration flow path is from the containment atmosphere to the auxiliary building security containment envelope (ABSCE) boundary, the TS allow for the penetration to be unisolated provided that it remained under administrative control. Revision 00 of this LER noted that the non-compliance with TS was due to the fact that the penetration was essentially unmanned or in essence there were no administrative controls in place to immediately isolate the penetration if required. Revision 00 of this LER was submitted in accordance with 10 CFR 50.73(a)(2)(i)(B) as any operation or condition prohibited by technical specifications. Revision 00 of this LER also noted that the unmanned penetration called into question the operability of the Unit 2 Auxiliary Building Gaseous Treatment System (ABGTS) system such that the ABGTS fans would not be able to maintain the required 0.25" H<sub>2</sub>O vacuum on the Auxiliary Building which included the Unit 1 containment building as the equipment hatch was open at the time of the event. Hence, Revision 00 of this LER was also submitted in accordance with 10 CFR 50.73(a)(2)(v)(C) and 10 CFR 50.73(a)(2)(v)(D) where an event or condition caused a single or multiple trains of a system to become inoperable where the system in question is necessary to control the release of radioactive material or mitigate the consequences of an accident.

Revision 01 of this LER made some corrections to the original LER including a revision of the failure mode to remove the ABGTS concern. Specifically, the licensee calculated that, even with the X-108 penetration open, the ABGTS would still be able to perform its design function. This was due to the fact the ABGTS system could still remove and filter enough air from the auxiliary building even given the breach in the X-108 penetration. Thus, the applicable requirements of 10 CFR 50.73(a)(2)(v)(C) and (a)(2)(v)(D) were removed from the LER in Revision 01 and Unit 2 was not affected. Revision 01 also concluded that the X-108 penetration traversed from the containment air space to the outside air atmosphere. The supplied equipment from the X-108 penetration was located in the additional equipment building and this building is not located within the ABSCE boundary. Thus, in accordance with TS 3.9.4, the penetration shall be closed during movement of irradiated fuel and the "under administrative control" aspect would not apply. Nevertheless, the performance deficiency remained a condition prohibited by technical specifications regardless of whether the unisolated penetration was manned or unmanned.

The inspectors discussed the event with operations, maintenance, engineering, and licensee management personnel to gain an understanding of the conditions leading to the event and assess licensee actions taken following the event. Additionally, the inspectors reviewed the apparent cause evaluation report to assess the detail and thoroughness of the evaluation and the adequacy of the proposed corrective actions.

The inspectors reviewed the LER and PER 800432 to verify that the cause of the breached penetration was identified and whether corrective actions were appropriate. The licensee's apparent cause evaluation identified that the procedures which controlled penetration breaches during modes 5 and 6 were not effective. The inspectors concluded that the licensee's corrective actions to this event were appropriate, including

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a revision to the site-wide procedures that control breeches to the containment and ABSCE boundary. This LER included a licensee identified violation which is described in Section 4OA7.

b. Findings

No findings were identified.

.4 Event Notification (EN) 49690 and 49738

a. Inspection Scope

On January 3, 2014, the licensee made a 10 CFR 50.72 notification, EN #49690 (see section 1R15), due to a concern that the service air system could overwhelm the ABGTS system given an Auxiliary Building Isolation (ABI) signal. The licensee determined this to be an unanalyzed condition such that the ABGTS may not be able to maintain the 0.25" H<sub>2</sub>O vacuum in the auxiliary building. Subsequently, the licensee performed a more detailed evaluation under PER 800432 and 824224 and determined that, given an ABI, the ABGTS would still be able to perform its design function despite operation of the service air system in supplying various outage loads. The licensee performed a follow-up EN #49738 and retracted the previous EN for an unanalyzed condition.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 (Closed) Unresolved Item (URI) 05000327, 328/2013007-09: Insufficient Diesel Starting Air Pressure Following SBO Coping Period (ML13267A460)

During the 2013 Sequoyah triennial component design bases inspection (ML13267A460), the team identified an unresolved item associated with licensee's capability to meet their station blackout (SBO) mitigation strategy. Specifically, the team questioned the licensee's ability to restore the standby (Class 1E) ac power sources. The team noted that the leak rate acceptance criterion outlined in procedure 0-PI-SXV-082-203, "Diesel Starting Air Valve Test," was 5 psig/minute for the EDG air start check valves. At this allowable leak rate, the EDG air start pressure could fall below the minimum required starting pressure potentially preventing the EDG from starting at the end of the four SBO coping period.

NUMARC 87-00, section 4.3.1, subsection (1), "Station Blackout Response Guidelines," states in part, that "plant procedures should identify site-specific actions necessary to restore offsite or standby (Class 1E) ac power sources."

This issue was unresolved pending the team's consultation with the Office of Nuclear Reactor Regulation (NRR) technical staff for clarification of the licensee's current license basis design requirements (with respect to 10 CFR 50.63 compliance), to determine if a performance deficiency existed. The licensee contended that either offsite power or the EDGs could be available after the SBO four hour coping. Following consultation with NRR, the team determined that the licensee did meet their licensing basis as approved. The site's procedures allow for attempting to restore either source, but the approved licensing basis includes no discussion on having the capability to start an EDG after the four hour coping period. However, the licensee revised the procedural leak rate acceptance criteria from 5 psig/minute to 0.625 psig/minute which will provide additional assurance that the EDGs, if available, would have adequate starting air pressure following the SBO coping period. The licensee captured this revision to the acceptance procedure in their corrective action program under PER 763335.

Therefore, since the inspectors verified the licensee was within their design and licensing basis; the issue was entered into the corrective action program, and prompt corrective actions were taken to change the acceptance criteria to provide additional assurance of EDG availability following the SBO coping period, this URI is now considered closed.

- .2 The table below provides a cross-reference from the 2013 and earlier findings and associated cross-cutting aspects to the new cross-cutting aspects resulting from the common language initiative. These aspects and any others identified since January 2014, will be evaluated for cross-cutting themes and potential substantive cross-cutting issues in accordance with IMC 0305 starting with the 2014 mid-cycle assessment review.

Finding	Old Cross-Cutting Aspect	New Cross-Cutting Aspect
05000327,328/2013007-01	H.1.(b)	H.14
05000327,328/2013007-02	H.2.(c)	H.7
05000327,328/2013007-05	H.4.(b)	H.8
05000327,328/2013007-07	H.4.(b)	H.8
05000327,328/2013007-08	P.1(c)	P.2
05000328/2013004-02	P.1(d)	P.3
05000327/2013005-01	P.1(c)	P.2

#### 4OA6 Meetings

##### Exit Meeting Summary

On April 8, 2014, the resident inspectors presented the inspection results to Mr. Carlin and other members of his staff, who acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

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#### 4OA7 Licensee-identified Violations

The following violations of very low significance (green) were identified by the licensee and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy, for being dispositioned as NCV(s). Documents reviewed are listed in the Attachment.

##### .1 Failure to comply with technical specifications during refueling operations

Unit 1 technical specification (TS) 3.3.9.4.c requires that during refueling operations, each penetration providing direct access from the containment atmosphere to the outside atmosphere be closed by a manual valve (if so equipped). Contrary to the above, between October 19 and 22, 2013, there were several instances where a Unit 1 containment penetration, X-108, to the additional equipment building was open (including its associated manual valve) during movement of irradiated fuel. This problem was entered into the licensee's corrective action program as PER 800432, 806293, and 824224. Using Inspection Manual Chapter 0609, Appendix G, "Shut-down Operations Significance Determination Process" dated February 28, 2005 the inspectors determined that, the finding was Green because it did not: 1) involve a loss of reactor coolant system (RCS) inventory; 2) degrade ability to terminate a leak path or add RCS inventory as needed; or 3) degrade the ability to recover RHR once it was lost. This issue is also discussed under Section 4OA3 of this report.

##### .2 Failure to perform adequate post maintenance testing of the 1B EDG

10 CFR 50, Criterion XI, "Test Control" requires in part that an established testing program shall require that all testing of SSCs ensure that the SSC can perform its intended function. Contrary to the above, on February 23, 2014, adequate testing to ensure the EDG air start motors could fulfill their required functions was not performed. An adequate test was not performed until March 16 which was part of an annual testing program. This problem was entered into the licensee's corrective action program as PER 859633. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," the finding was determined to be of very low safety significance (Green) because the 1B EDG retained the capability to automatically start despite the improper air hose configuration of the air start motors.

ATTACHMENT: SUPPLEMENTARY INFORMATION

## **SUPPLEMENTARY INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee personnel

J. Carlin, Site Vice President  
A. Day, Chemistry Manager  
R. Rice, Radiation Protection Manager  
D. Erb, Work Control Manager  
J. Johnson, Program Manager Licensing  
A. Little, Site Security Manager  
T. Marshall, Operations Manager  
M. McBrearty, Licensing Manager  
M. Prucell, Quality Assurance Manager  
P. Noe, Director Safety and Licensing  
W. Pierce, Site Engineering Director  
P. Pratt, Manager, Maintenance  
P. Simmons, Plant Manager  
K. Smith, Director of Training

#### NRC personnel

L. Regner, Project Manager, Office of Nuclear Reactor Regulation

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened and Closed

05000327,328/2014002-01	NCV	Inadequate Clearance Causes Control Air System Transient. (Section 4OA3.2)
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#### Closed

05000327/2013-003-00	LER	Limiting Conditions for Operation Exceeded for Emergency Core Cooling System (Section 4OA3.1)
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05000328/2013-001-00, and -01	LER	Failure to Comply with Technical Specification (Section 4OA3.3)
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05000327,328/2013007-09	URI	Insufficient EDG Starting Air Pressure Following SBO Coping Period (Section 4OA5.1)
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## LIST OF DOCUMENTS REVIEWED

### **Section R01: Adverse Weather Protection**

#### Procedures

0-PI-OPS-000-006.0, Freeze Protection, Revision 55

### **Section R04: Equipment Alignment**

#### Other documents

Sequoyah Final Safety Analysis Report

### **Section R05: Fire Protection**

#### Procedures

SQN-FPR-Part-II, SQN Fire Protection Report Part II – Fire Protection Plan, Revision 28

#### Drawings

#### PERs

#### Other documents

AUX-0-653-00, Fire Protection Pre-Fire Plans Auxiliary Building - El. 653, Revision 8  
ERCW-0-688-00, Fire Protection Pre-Fire Plans ERWC Building - El. 688, Revision 2  
ERCW-0-704-00, Fire Protection Pre-Fire Plans ERWC Building - El. 704, Revision 2  
ERCW-0-720-00, Fire Protection Pre-Fire Plans ERWC Building - El. 720, Revision 3

### **Section R06: Flood Protection Measures**

#### Other documents

TVA letter to NRC dated May 4, 2007. TVA response to GL 2007-01  
48N1225  
47W852-1, Floor & Equipment Drains  
SQN-SQS4-0056, Moderate Energy Line Break Flooding Study, Revision 2  
Safety Analysis Report Section 9.3 – Floor Drains  
MDN-000-000-2010-0203, SQN Probabilistic Risk Assessment – Internal Flooding Analysis, Revision 1

### **Section R11: Licensed Operator Requalification**

#### Other documents

OPL273S1401 - AOP-T.01, Sabotage, Loss of DC, Loss or ERCW  
SEG: S-71 – SG Level fail, RCS Leak and LOCA with Loss of RHR Recirculation

### **Section R12: Maintenance Effectiveness**

#### Procedures

TI-4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting –  
10CFR50.65, Revision 25

#### SRs

832878, 1A Charging Pump breaker failure  
835011, 2B-B 480V Board Room Chiller Tripped



Other documents

Cause Determination Evaluation #2718 – MRFF of 86LOR Relay

Cause Determination Evaluation #2730 - 2B-B 480V Board Room Chiller Tripped

**Section R13: Maintenance Risk Assessments and Emergent Work Evaluation**Procedures

NPG-SPP-07.0, Work Management, Revision 0

NPG-SPP-07.1, On Line Work Management, Revision 9

NPG-SPP-07.3, Work Activity Risk Management Process, Revision 13

NPG-SPP-07.11.1, Equipment Out of Service Management, Revision 9

**Section R15: Operability Evaluations**Work Orders

115593042, Process side in-leakage causing switch failure

SRs/PERs

PER 841159 – Dissimilar detectors installed in 1-RM-90-130

SR 847233 – FE for EDG governor voltage

PER 760336 – PDO for Evaluation of Time Critical Actions associated with ECCS suction realignment

PER 824224 – Adverse impact of service air on ABSCE boundary (EN#49690)

PER 857326 – Potential non-conforming condition for AFW flow during a feedline break

PER 857276 – Non-conservative value used in 1A Containment Spray Heat Exchanger thermal performance evaluation

PER 855850 – 2B RHR 2-FS-74-24A replacement

**Section R18: Plant Modifications**Other documents

SNQ-2-2013-007- Provide temporary Power to ICE AHU to support 2A Rx Vent Board Cleaning

**Section R19: Post Maintenance Testing**Work Orders

114788780, Adjust TCVs for “A’ MCR chiller

114789031, Inspect and lubricate 6.9kV Shutdown board room AHU 2B-B

115593042, Replace RHR mini-flow switch

115226000, Replace/Rework Sense Lines on SQN-1-FT-001-0021B-E

114150971, 30 VDC power supply died on Eagle 21 card in 2-R-4, TF2

115616417, Reroute hoses on Air Start motor for the 1B EDG

115570058, Eagle 21 LCP card replacement

**Section R22: Surveillance Testing**Procedures

1-SI-SFT-030-001.B, Containment Air Return Fan 1B-B Quarterly Operability Test, Revision 6

1-SI-SXP-072-201.A, Containment Spray Pump 1A-A Performance Test, Revision 1

1-SI-SXP-003-201.B MDAFW Pump 1B-B Performance Test, Revision 15

0-SI-OPS-068-137.0, Reactor Coolant System Water Inventory, Revision 33  
0-SI-OPS-030-024.0 'B' Train Control Room Air Clean-up Flow test, Revision 5  
1-SI-OPS-000-002.0, Shift Logs, Revision 17

**Section 40A1: Performance Indicator Verification**

Procedures

NPG-SPP-02.2, Performance Indicator Program, Revision 2  
NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 6

**Section 40A3: Event Followup**

PERs

850331, Loss of Control Air

**Section 40A5: Other Activities**

Basis Documents

Technical Specifications, Current  
Updated Final Safety Analysis, Current

Procedures

0-PI-SXV-082-203, Diesel Starting Air Valve Test

Miscellaneous

Regulatory Guide 1.155

Corrective Action Documents Written due to this Inspection

PER 763335, EDG Air Start Check Valve Leakage Acceptance Criteria

**Section 40A7: Licensee-Identified Violations**

PERs

800432, Inadequate ABSCE Boundary required NRC Notification  
806293, Request Engineering evaluation of water line on penetration X108