



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II**

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ATLANTA, GEORGIA 30303-1257

May 11, 2016

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  
05000327/2016001 AND 05000328/2016001

Dear Mr. Shea:

On March 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Sequoyah Nuclear Plant, Units 1 and 2. On April 21, the NRC inspectors discussed the results of this inspection with Mr. Schwarz and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented two findings which were determined to be of very low safety significance (Green) in this report. These findings involved violations of NRC requirements. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance of these NCVs, 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, D.C. 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the 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.

J. Shea

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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/**

Alan Blamey, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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

Enclosure:  
IR 05000327/2016001, 05000328/2016001  
w/Attachment: Supplementary Information

cc Distribution via Listserv

J. Shea

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Letter to Joseph W. Shea from Alan Blamey dated May 11, 2016.

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000327/2016001 AND 05000328/2016001

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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.: 05000327/2016001, 05000328/2016001

Licensee: Tennessee Valley Authority (TVA)

Facility: Sequoyah Nuclear Plant, Units 1 and 2

Location: Sequoyah Access Road  
Soddy-Daisy, TN 37379

Dates: January 1- March 31, 2016

Inspectors: G .Smith, Senior Resident Inspector  
S. Roberts, Resident Inspector (Acting)  
W. Deschaine, Resident Inspector  
C. Kontz, Senior Project Engineer

Approved by: Alan Blamey, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

## SUMMARY

IR 05000327/2016001, 05000328/2016001; 1/1-3/31/2016; Sequoyah Nuclear Plant, Units 1 and 2; Fire Protection, Follow-up of Events and Notices of Enforcement Discretion

The report covered a three-month period of inspection by resident inspectors and an announced inspection by region-based inspectors. Two 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) dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Components Within the Cross Cutting Areas" dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

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

#### Cornerstone: Initiating Events

- Green. The NRC identified a non-cited violation (NCV) of Unit 1 and 2 Technical Specification 5.4.1 for the licensee's failure to adequately implement fire protection procedures. Specifically, the inspectors identified several cables located within a cable tray that penetrated the floor of the cable spreading room that were not adequately coating with fire retardant material as required by plant procedures. The licensee placed the issue into the corrective action program (CAP) and implemented a fire watch for the degraded condition.

The inspectors determined that the failure to adequately implement all requirements of the licensee's fire protection program procedures was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the protection against external events (fire) attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors determined the finding was of very low safety significance (Green) because of the fire protection defense in depth concept provided other barriers to prevent the spread of fires. The cause of this finding was related to the procedural adherence component of the human performance area, because the licensee failed to properly install cable bundles through wall penetrations. [H.8] (Section 1R05)

- Green. A self-revealing NCV of Units 1 & 2 Technical Specification, 5.4.1 was documented for the licensee's failure to implement an adequate procedure associate with the startup of the main steam system. Specifically, the licensee caused an inadvertent safety injection which unnecessarily challenged the operators due to an inadequate draining of the main steam header during system start up. The licensee placed the issue into the CAP.

The failure of the licensee to adequately drain condensate from the main steam header resulted in an inadvertent safety injection (SI) and was a performance efficiency. The finding was determined to be greater than minor because it adversely effected the Procedure Quality attribute of the Initiating Events Cornerstone to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The significance of this finding was evaluated in accordance with the Manual Chapter 0609 Appendix A, "The Significance Determination Process for Findings At-Power." Although the unit was in Mode 3 at the time, this appendix was chosen because the plant did not meet the entry conditions for residual heat removal system operation. The inspectors concluded that the finding was of very low safety significance (Green) because no significant initiating event prompted this transient. The finding was determined to have a cross-cutting aspect in the operating experience component of the problem identification and resolution area, because the licensee failed to evaluate and implement relevant internal and external operating experience. [P.5] (Section 4OA3)

B. Licensee-Identified Violations

None.

## **REPORT DETAILS**

### Summary of Plant Status:

Unit 1 began the period shut down in Mode 3. A problem with the hydrogen cooling system was detected last year and the unit was taken off line on December 26, 2015. Following extensive trouble shooting and repairs to the main generator hydrogen cooling fans, the unit was returned to 100 percent rated thermal power (RTP) on February 20, 2016 where it operated for the remainder of the inspection period.

Unit 2 operated at or near 100 percent RTP until February 3, 2016, when the unit was taken off line to effect repairs to a leaking isophase bus cooler bushing in the main generator. Following repairs to the bushing, the unit was returned to 100 percent RTP on February 11 where it operated for the remainder of the inspection period.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R04 Equipment Alignment (71111.04)

##### Partial System Walkdown

##### a. Inspection Scope

The inspectors performed partial walkdowns of the following three 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 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 three samples, as defined in Inspection Procedure (IP) 71111.04.

- Unit 1 'A' Auxiliary Feedwater (AFW) train while 'B' AFW pump was out-of-service (OOS) for maintenance
- Unit 1 'A' Containment Spray (CS) train while 1B CS pump was OOS for maintenance
- Unit 2 'B' Emergency Diesel Generator (EDG) while 2A EDG OOS for maintenance

##### b. Findings

No findings were identified.



## 1R05 Fire Protection (71111.05)

### .1 Fire Protection Tours

#### a. Inspection Scope

The inspectors conducted a tour of six 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 OOS, 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 six samples, as defined in IP 71111.05.

- Vital Battery room V
- Flex Diesel Generator Building
- EDG Building
- Control Building 669 Elevation
- Control Building 685 Elevation
- Control Building 706 Elevation

#### b. Findings

Introduction. The NRC identified a Green non-cited violation (NCV) of Units 1 and 2, Technical Specifications (TS), 5.4 "Procedures" for the licensee's failure to ensure a cable tray bundle located within floor cable tray penetration (C02706F0030) had appropriate flame retardant (Flamemastic 77) applied.

Description. On March 10, 2016, during a fire walkdown in the cable spreading room area located on elevation 669 of the Control Building, the inspectors noted that some new cable runs entering a floor penetration did not have Flamemastic 77 correctly applied. The inspector determined that M&AI-13.1 "Installation of Electrical Cable Tray Penetration Seals, Pressure Seals, Flame Retardant Cable Coating, and Mechanical Seals," procedure was not correctly followed, in that Flamemastic 77 was not applied to the lower 5 feet of the affected cable bundles. M&AI-13.1, section 4.3.1 step 1, states "COAT surfaces of cables with Flamemastic 77 for a minimum of five feet on each side of the wall or floor penetration; or to an accessible distance when the five feet minimum distance cannot be met, due to cables being inaccessible, or the nearest electrical panel or enclosure after board is in place." The functional integrity of the fire barrier penetrations ensures that fires will be confined or adequately prevented from spreading to adjacent portions of the facility. With the fire retardant coating not applied to the cable penetration, installed in 2013, there was no assurance that the fire barrier would prevent the spread of fire through the cable penetration in a design basis fire. Thus, the penetration was determined to be nonfunctional. This issue was entered into the licensee's CAP as Condition Report (CR) 1150135.

Analysis. The licensee's failure to apply Flamemastic 77 to the lower five feet of the cable bundles in floor cable tray penetration (C02706F0030) as required by M&AI-13.1, was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the protection against external events (fire) attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to ensure a cable tray bundle going through a floor cable tray penetration C02706F0030 had appropriate flame retardant (Flamemastic 77) coating.

The inspectors performed the significance determination process (SDP) using NRC IMC 0609, "Significance Determination Process", Attachment 4, Phase 1 – "Initial Screening and Characterization of Findings", which required further evaluation in accordance with Manual Chapter 0609 Appendix F, Attachment 1, "Fire Protection SDP Phase 1 Worksheet." The finding was assigned to section 1.4.3 "Fire Confinement", where it was determined that due to the number cables in the cable spreading room, it was unknown whether the reactor would be able to reach and maintain safe shutdown. The issue was evaluated using Manual Chapter 0609 Appendix F, Attachment 2, and assigned a "High" degradation rating, giving no credit for Barrier Protection in accordance with the "Fire Barrier Degradation" section. The inspectors concluded, that the finding was of very low safety significance (Green) due to fully functional automatic suppression systems on either side of the fire barrier (Question 1.4.3-C). Using Manual Chapter 0310, "Aspects Within the Cross-Cutting Areas," the inspectors identified a cross-cutting aspect in the Procedural Adherence component of the Human Performance area, because the licensee failed to properly install cable bundles through wall penetrations. [H.8]

Enforcement. Unit 1 TS 5.4.1.d required, in part, that written procedures be established, implemented, and maintained covering the activities in the Fire Protection Program implementation. Procedure M&AI-13.1, "Installation of Electrical Cable Tray Penetration Seals, Pressure Seals, Flame Retardant Cable Coating, and Mechanical Seals", section 4.3.1 step 1, states "COAT surfaces of cables with Flamemastic 77 for a minimum of five feet on each side of the wall or floor penetration; or to an accessible distance when the five feet minimum distance cannot be met, due to cables being inaccessible, or the nearest electrical panel or enclosure after board is in place."

Contrary to the above, between July 30 and July 31, 2013, a cable tray bundle going through a floor cable tray penetration (WM) was installed in the cable spreading room under WO 114496556, without any Flamemastic 77 applied. The functional integrity of the fire barrier penetrations ensures that fires will be confined or adequately retarded from spreading to adjacent portions of the facility. With the fire retardant coating not applied to the cable penetration, there was no assurance that the fire barrier would have prevented the spread of fire through the cable penetration in a design basis fire. Thus, the penetration was nonfunctional. The licensee immediately entered Fire Operating Requirement 14.6 measures A.3.1 and A.3.2, which required the functional verification of fire detectors as well as an hourly fire watch. Because the finding was of very low safety significance and has been entered into the licensee's CAP as CR1150135, this violation is being treated as an NCV, consistent with the NRC Enforcement Policy:

NCV 05000327, 328/2016-001 "Inadequate Application of Flame Retardant on Cable Room Penetrations."

.2 Annual Drill Observations

a. Inspection Scope

On January 15 and January 21, 2016, the inspectors observed an announced fire drill in the Unit 1, 706' elevation of the Turbine building, on the Main Turbine Oil Tank (MTOT). 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 firefighting strategies in the MTOT area. 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. This activity constituted one inspection sample, as defined in IP 71111.05A.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

Internal Flooding

a. Inspection Scope

The inspectors reviewed one internal flood protection measures sample for the EDG building internal flood design to verify that flood mitigation plans were consistent with the design requirements and risk analysis assumptions and that equipment essential for reactor shutdown was properly protected from a flood caused by pipe breaks in the EDG building. 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 EDG building 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, as defined in IP 71111.06.

b. Findings

No findings were identified.

## 1R11 Licensed Operator Requalification Program (71111.11)

### .1 Quarterly Review

#### a. Inspection Scope

The inspectors performed one licensed operator requalification program review. The inspectors observed a simulator session on February 4, 2016. Training scenario SEG: S-111 involved an impulse pressure transmitter failure, main feed water pump trip, spurious feed water isolation, and a feed line break inside containment. 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 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, as defined in IP 71111.11.

#### 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 2 rapid reduction in power (100 percent RTP to 15 percent RTP) on February 3, 2016
- Unit 1 synchronization to the grid on February 16

Documents reviewed are listed in the Attachment. This activity constituted one inspection sample, as defined in IP 71111.11.

b. Findings

No findings were identified

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed the cause determination evaluations (CDEs), 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 Title 10 *Code of Federal Regulations* (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 two samples, as defined in IP 71111.12.

- CDE 2865 - Unit 2 Steam driven AFW pump failure of swap over valves
- CDE 2866 - 6.9 KV Shutdown Board Room 'A' Chiller Tripped

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed the following four 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 16 and Instruction 0-TI-DSM-000-007.1, "Risk Assessment Guidelines," Revision 9. Documents reviewed are listed in the Attachment. The inspectors completed four samples, as defined in IP 71111.13.

- '1A' start bus de-energized for planned maintenance
- Emergent failure of Unit 1 and common annunciators
- Emergent failure of the Unit 2 Rod Control System (Urgent Failure Alarm)
- Unit 2 'B' Containment Spray Pump outage

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

For the six operability evaluations described in the CRs 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 CRs 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, as defined in IP 71111.15.

- CR 1119008 – Unable to stroke tornado dampers
- CR 1098144 – Unit 1 containment annulus vacuum
- CR 1103478 – Plugged tube in Main Control Room 'A' Chiller evaluation
- CR 1129990 – Unit 1 Turbine-driven AFW (TDAFW) piping pressurized
- CR 1033303 - U2 Refueling Water Storage Tank (RWST) Loop Seal Auxiliary Building Secondary Containment Envelope (ABSCE) evaluation
- CR 1145835 – Water Leak in A 480 Volt FLEX Diesel Generator

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)Permanent Modificationsa. Inspection Scope

The inspectors reviewed the permanent 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.

- DCN 23527 – Vital Battery Charger II replacement

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, as defined in IP 71111.18.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)a. Inspection Scope

The inspectors reviewed the post-maintenance tests associated with the five 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 five samples, as defined in IP 71111.19.

- WO 116432629, MCR A/C oil cooler cleaning
- WO 117606151, Urgent Failure Alarm Unit 2
- WO 117656162, Unit I Hydrogen (H2) Mitigation System (H2 Igniters)
- WO 117013894, CCP 1B planned maintenance
- WO 117035886, RHR Discharge Piping Vent

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)a. Inspection Scope

For the five 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 five samples, as defined in IP 71111.22.

In-Service Tests:

- 1-SI-SXP-072-201.N Containment Spray Pump 1B XI Test, Revision 16

Reactor Coolant System (RCS) leakage test:

- 0-SI-OPS-068-137.0, Reactor Coolant System Water Inventory, Rev. 35)

Routine Surveillance Tests:

- 1-PI-SFT-084-001.0, Functional Test of Flood Mode Boration Makeup System, Revision 13
- 0-RT-NUC-000-003.0, Low Power Physics Testing, Revision 25
- 2-SI-IFT-099-90.8 U2 Rx Trip Inst (SSPS) Train B, Revision 31

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness1EP6 Drill Evaluation (71114.06)a. Inspection Scope

Resident inspectors evaluated the conduct of a licensee emergency drill on March 23, 2016, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulated control room to verify that event classification and notifications were done in accordance with EPIP-1, Emergency Plan Classification Matrix, Revision 52. The inspectors also attended the licensee critique of the drill to compare any inspector observed weakness with those identified by the licensee in order to verify whether the licensee was properly identifying deficiencies. The inspectors completed one sample, as defined in IP 71114.06.



b. Findings

No findings were identified.

4. OTHER ACTIVITIES (OA)

4OA1 Performance Indicator (PI) Verification (71151)

a. Inspection Scope

The inspectors sampled licensee submittals for the two PIs listed below for the period from January, 2015 through December, 2015 for both Unit 1 and Unit 2. Definitions and guidance contained in Nuclear Energy Institute 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 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 (71152)

Daily Review

a. Inspection Scope

As required by IP 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 CR 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

##### Unit 1 Safety Injection

###### a. Inspection Scope

On February 9, 2016, the inspectors responded to an automatic safety injection on Unit 1 due to low steam generator pressure on loop 2. The unit was in Mode 3 at the time and remained in Mode 3 during the event. The inspectors evaluated plant status, mitigating actions, and the licensee's classification of the event, to enable the NRC to determine an appropriate NRC response. The inspectors discussed the actuation with operations, engineering, and licensee management personnel to gain an understanding of the event and assess follow-up actions. The inspectors reviewed operator actions taken to determine whether they were in accordance with licensee procedures and TS, and reviewed unit and system indications to verify whether actions and system responses were as expected and designed. The inspectors also reviewed the initial licensee notifications to verify whether they met the requirements specified in NUREG-1022, "Event Reporting Guidelines." The event was reported to the NRC as event notification #51720 and documented in the licensee's CAP as CR 1135308.

###### b. Findings

Introduction. A Green self-revealing NCV of TS, 5.4 "Procedures" was identified for the licensee's failure to ensure adequate drainage of the main steam header upstream of the main steam isolation valves (MSIV) prior to admitting steam downstream of the MSIVs. Specifically, failure to slowly remove a buildup of condensate upstream of the MSIVs resulted in an inadvertent safety injection (SI) signal following opening of the MSIV bypass valves.

Description. On February 9, 2016, Unit 1 was in Mode 3 with the MSIVs closed at normal operating pressure and temperature. Following completion of extensive maintenance to the main generator, the licensee began efforts to pressurize the piping downstream of the MSIVs up to the main turbine governor and throttle valves. This evolution is accomplished by opening the MSIV bypass valves. After approximately three minutes with the bypass valves open, an SI was received based on low loop 2 steam generator pressure at 1415 psig. The plant was quickly re-stabilized in Mode 3 at normal operating pressure and temperature. The SI also automatically closed the MSIV bypass valves and the pressurization of the main steam header was secured. The plant was quickly restored to its pre-event condition.

This event was entered into the licensee's CAP as CR 1135308. A root cause team was formed in order to determine the cause of the inadvertent SI. The licensee determined that the loop 2 piping was essentially full of water at the time of the event. The unit had been down in excess of 30 days with the MSIVs closed and the licensee postulated that this excessive amount of time in this condition allowed steam to condense in this "dead-leg" of piping allowing a significant amount of water to accumulate in the main steam piping. Due to the significant amount of water accumulation upstream of the MSIV, as the water was drained in the vertical section of pipe, a low pressure spike occurred in the

steam section and was sensed by the three SI steam pressure transmitters and initiated the SI on low steam generator pressure.

The inspectors determined that there was sufficient operating experience available to identify the need for steam line draining following long periods of operation in Mode 3 with the MSIVs closed which should have been incorporated into TVA procedure, 1-SO-1-1, "Main Steam System," which provided instructions for startup, draining, and pressurizing the main steam header.

Analysis. The licensee's failure to adequately maintain 1-SO-1-1, "Main Steam System," was a performance deficiency. Specifically the licensee failed to incorporate operating experience to address the need to drain the residual condensate from the main steam header prior to starting up the secondary plant resulted in an inadvertent SI. The finding was determined to be greater than minor because it adversely effected the Procedure Quality attribute of the Initiating Events Cornerstone to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the procedure inadequacy caused an unnecessary initiation of safety systems and required prompt action by the operators to restore the plant to a stable condition.

The inspectors performed the significance determination process using NRC Inspection Manual Chapter 0609, "Significance Determination Process." The inspectors used, IMC 0609, Appendix A, Exhibit 1, "Initiating Events Screening Questions," and determined the finding was of very low safety significance because the deficiency did not, 1) exceed the leak rate for a small LOCA, 2) result in a interfacing system LOCA, 3) cause a reactor trip 4) involve a loss of support systems, 5) involve a degraded steam generator tube, 6) involve steam generator tube leakage, and 7) impact the frequency of a fire of internal flood event. Using Manual Chapter 0310, "Aspects Within the Cross-Cutting Areas," the inspectors assigned a cross-cutting aspect in the Operating Experience component of the Problem Identification and Resolution area, because the licensee failed to evaluate and implement relevant internal and external operating experience. [P.5]

Enforcement. Unit 1 TS 5.4.1.a required, 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 3.i, "Procedures for startup, Operation, and Shutdown of Safety-Related PWR Systems," required, in part, that instructions for startup of the main steam system be prepared. TVA procedure, 1-SO-1-1, "Main Steam System," Revision 32 provided instructions for startup, draining, and pressurizing the main steam header. Contrary to the above, on February 9, 2016, the licensee did not have written procedures adequately established and maintained for startup of the main steam system. 1-SO-1-1, "Main Steam System," which resulted in an inadvertent SI actuation. Specifically, 1-SO-1-1, failed to address the effects on the main steam system due to extended operation in Mode 3 with the MSIVs closed.

Because the finding was of very low safety significance and has been entered into the licensee's CAP as CR 1135308, this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000327/2016001-02, "Inadvertent Safety Injection Due to Inadequate Main Steam Procedure."

#### 4OA5 Other Activities

##### .1 (Closed) Violations (VIO) 05000327, 328/2015008-01, Failure to Perform Required Fire Watches and to Maintain Complete and Accurate Records of Fire Watches

###### a. Inspection Scope

The inspector performed a follow-up inspection for the SL III Traditional Enforcement violations (EA-14-003) discussed in letter dated March 9, 2015 (ADAMS Accession Number ML15068A132) associated with willful failure to implement procedures covering the activities involved with Fire Protection Program implementation and failure to maintain complete and accurate records of hourly fire watch patrols. The NRC staff performed this follow up inspection in accordance with Inspection Procedure 92702, "Follow-up on Traditional Enforcement Actions Including Violations, Deviations, Confirmatory Action Letters, Confirmatory Orders, and Alternate Dispute Resolution Confirmatory Orders."

The inspection objectives were to verify the licensee's actions to provide assurance that (as appropriate):

- adequate corrective actions have been implemented for the traditional enforcement violations;
- the root causes of these enforcement actions have been identified;
- generic implications have been addressed; and
- the licensee's programs and practices have been appropriately enhanced to prevent recurrence.

The inspector reviewed the licensee's RCAs associated with the violations in addition to other evaluations conducted in support of and as a result of the RCA. The inspectors reviewed corrective actions that were taken and implemented to address the identified causes. The inspectors verified that corrective actions planned and implemented were appropriate to address the causes and prevent recurrence. Documents reviewed are listed in the Attachment.

This violation is closed.

###### b. Findings

No findings were identified.

.2 Review of the Operation of an Independent Spent Fuel Storage Installation (ISFSI) (60855.1)

a. Inspection Scope

The inspectors reviewed the spring 2016 dry-cask-loading campaign of the ISFSI to verify that operations were conducted in a safe manner in accordance with approved procedures and without undue risk to the health and safety of the public. The campaign was conducted from approximately March 14 to April 15. The inspectors observed fuel loading operations and other processes on several multi-purpose canisters (MPCs) to verify that the specified fuel assemblies were placed in the correct locations and that other MPC processes were implemented in accordance with approved procedures. In all, five MPCs were loaded with spent fuel and placed within their respective Hi-Storm containers for ultimate storage on the ISFSI pad. The inspectors reviewed condition reports discovered during the campaign to ensure that issues were placed in the corrective action program. The inspectors also reviewed ISFSI document control practices to verify that changes to the required ISFSI procedures and equipment were performed in accordance with guidelines established in local procedures and 10CFR72.48. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On April 21, 2016, the resident inspectors presented the inspection results to Mr. Schwarz 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.

ATTACHMENT: SUPPLEMENTARY INFORMATION

## **SUPPLEMENTARY INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee personnel**

J. Alfultis, Senior Manager Site Projects  
G. Garner, Director Work Management  
M. Giacini, Director Plant Support  
M. Halter, Senior Manager Radiation Protection  
A. Little, Senior Manager Nuclear Site Security  
T. Marshall, Director Operations  
W. Pierce, Director Engineering  
P. Pratt, Plant Manager  
M. Rasmussen, Director Maintenance  
K. Smith, Director Training  
J. Johnson, Program Manager Licensing  
K. Loomis, Boric Acid Program Engineer  
M. Lovitt, Chemistry Manager  
M. McBrearty, Licensing Manager  
C Schwarz, Site Vice President

#### **NRC personnel**

A. Hon, Project Manager, Office of Nuclear Reactor Regulation

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

### Opened and Closed

05000327,328/2016001-01	NCV	Inadequate Application of Flame Retardant on Cable Room Penetrations (Section 1R05)
05000327/2016001-02	NCV	Inadvertent Safety Injection Due to Inadequate Main Steam Procedure (Section 4OA3)

### Closed

05000327, 328/2015008-01	NOV	Failure to Perform Required Fire Watches and to Maintain Complete and Accurate Records of Fire Watches (Section 4OA5)
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## **LIST OF DOCUMENTS REVIEWED**

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

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

#### **Partial System Walkdowns**

##### **Procedures**

1-SO-3-2, Auxiliary Feedwater System, Rev. 57  
0-SO-72-1, Containment Spray Systems, Rev. 47  
0-SO-82-4, Diesel Generators 2B-B, Rev. 58

##### **Drawings**

0-47W803-2, Flow Diagram Auxiliary Feedwater, Rev. 75  
0-47W812-1, Flow Diagram Containment Spray, Rev. 48  
0-47W610-82-1, Mechanical Control Diagram Diesel Generator Starting Air, Rev. 23

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

#### **Procedures**

FPDP-1, Conduct of Fire Protection, Revision 7  
NPG-SPP-18.4.7, Control of Transient Combustibles, Rev. 7  
0-SI-FPU-410-703.0, Inspection of FPR Required Fire Doors, Rev. 6  
SQN-FPR-Part-II, SQN Fire Protection Report Part II – Fire Protection Plan, Revision 35

#### **Other documents**

CON-0-669-00, Fire Protection Pre-Fire Plans Control Building - El. 669, Revision 4  
CON-0-669-00, Fire Protection Pre-Fire Plans Control Building - El. 685, Revision 6  
CON-0-706-00, Fire Protection Pre-Fire Plans Control Building - El. 706, Revision 6  
AUX-0-749-00, Fire Protection Pre-Fire Plans Auxiliary Building - El. 706, Revision 4  
DGB-0-722-00, Fire Protection Pre-Fire Plans Diesel Generator Building - El. 722, Revision 6  
WO114496556  
Raceway Standard Report – Cables in Raceway 2-WM-00234/00271 dated March 18, 2016

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

#### **Procedures**

AOP-M.08, Internal Flooding, Rev. 3

#### **Calculation**

SQS40056, Moderate Energy Line Break Flooding Study, Rev. 16  
TVA letter to NRC dated May 4, 2007. TVA response to GL 2007-01  
SQN Probabilistic Risk Assessment – Internal Flooding Analysis, Revision 3

#### **Other documents**



## **Section R12: Maintenance Effectiveness**

### **Procedures**

TI-4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting – 10CFR50.65, Revision 28

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

### **Procedures**

NPG-SPP-07.3, Work Activity Risk Management Process, Revision 19

NPG-SPP-07.2.4, Forced Outage or Short Duration Planned Outage Management, Revision 6

NPG-SPP-07.2, Outage Management, Revision 5

GOI-6, Apparatus Operations, Revision 172

## **Section R15: Operability Evaluations**

### **Procedures**

NEDP-22, Operability Determinations and Functional Evaluations, Rev. 17

OPDP-8, Operability Determination Process/Limiting Conditions for Operation Tracking, Rev. 21

NPG-SPP-03.5, Regulatory Reporting Requirements, Revision 12

## **Section R18: Plant Modifications**

### **Procedures**

NPG-SPP-09.3, Plant Modifications and Engineering Change Control, Revision 21

NPG-SPP-09.4, 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments, Revision 10

NPG-SPP-09.5, Modifications Temporary Configuration Changes, Revision 9

## **Section R19: Post Maintenance Testing**

### **Procedures**

MMDP-1, Maintenance Management System, Revision 31

NPG-SPP-06.1, Work Order Process Initiation, Revision 5

NPG-SPP-06.3, Pre-/Post-Maintenance Testing, Revision 1

NPG-SPP-06.5, Foreign Material Control, Revision 9

NPG-SPP-06.9, Testing Programs, Revision 1

NPG-SPP-06.9.1, Conduct of Testing, Revision 10

NPG-SPP-06.9.3, Post-Modification Testing, Revision 6

NPG-SPP-06.14, Guidelines for Planning and Execution of Troubleshooting Activities, Revision 1

### **Work Orders**

WO 116432629, MCR A/C oil cooler cleaning

WO 117606151, Urgent Failure Alarm Unit 2

WO 117656162, Unit I Hydrogen (H2) Mitigation System (H2 Igniters)

WO 117013894, CCP 1B planned maintenance

WO 117035886, RHR Discharge Piping Vent

## **Section R22: Surveillance Testing**

### **Procedures**

NPG-SPP-06.9.1, Conduct of Testing, Revision 10

1-SI-SXP-072-201.N Containment Spray Pump 1B XI Test, Revision 16

0-SI-OPS-068-137.0, Reactor Coolant System Water Inventory, Rev. 35)

1-PI-SFT-084-001.0, Functional Test of Flood Mode Boration Makeup System, Revision 13

0-RT-NUC-000-003.0, Low Power Physics Testing, Revision 25  
2-SI-IFT-099-90.8 U2 Rx Trip Inst (SSPS) Train B, Revision 31

#### **Section 40A1: Performance Indicator Verification**

##### Procedures

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

#### **Section 40A2: Identification and Resolution of Problems**

##### Procedures

NPG-SPP-22.300, Corrective Action Program, Revision 5  
NPG-SPP-22.301, Condition Report Initiation, Revision 6  
NPG-SPP-22.302, Corrective Action Program Screening, Revision 8

#### **Section 40A3: Event Followup**

##### Procedures

1-SO-1-1, Main Steam System, Revision 32

#### **Section 40A5: Other Activities**

0-GO-17, Spent Fuel/Dry Cask Operations, Revision 6  
NPG-SPP-01.2, Administration of Site Technical Procedures, Revision 13  
NFTP-100, Fuel Selection for Dry MPC Storage, Revision 9  
NPG-SPP-09.9, 10CFR72.48 Evaluation of Changes, Test, and Experiments for ISFSI  
Installation, Revision 4  
SQN-DCS-300.11, Supplemental Cooling System Operation, Revision 11  
CTP-DCS-100.0, Dry Cask Storage Campaign Guidelines, Revision 19  
SQN-DCS-200.0, Dry Cask Campaign Review Program, Revision 4  
SQN-DCS-200.2, SQN-MPC-Loading and Transport Operations, Revision 39  
CR 1113719 - SQN Fire Watch Apparent Violation NRC Supplemental Inspection Package  
NPG-SPP-18.4.6 Rev. 0007 Control of Fire Protection Impairments  
SQN-OPS-SSA-15-003  
SQN PER 637101 Revision 00 Missed Fire Watches  
NPG-SPP-07.7 Rev. 0002 NPG CTS Role and Oversight of Supplemental Personnel  
SQN PER 687981 Revision 0 Fire Watches not Conducted  
CR Number: 1062049 Common Factor Analysis  
0-PI-FPU-317-299.W, ATT. 4 OPERATIONS FIRE PROTECTION WEEKLY INSPECTION  
Effective Date: 10-29-2015  
SQN PER 652672, 682505, 635934  
Inspection Readiness Package

## ACRONYMS

ADAMS	Agency Documents Access and Management System
AFW	auxiliary feedwater
ARV	atmospheric relief valves
CAP	corrective action program
CDE	cause determination evaluation
CFR	Code of Federal Regulations
CR	condition report
CS	containment spray
EDG	emergency diesel generator
EN	event notification
F	Fahrenheit
IMC	Inspection Manual Chapter
IP	Inspection Procedure
ISFSI	independent spent fuel storage installation
LOCA	loss of coolant accident
MPC	multi-purpose canisters
MSIV	main steam isolation valves
MTOT	main turbine oil tank
NCV	non-cited violation
NRC	U.S. Nuclear Regulatory Commission
OA	other activities
OOS	out-of-service
PAR	protective action recommendation
PARS	Publicly Available Records
PI	performance indicator
RCA	root cause analysis
RCS	reactor coolant system
RG	Regulatory Guide
RTP	rated thermal power
SDP	significance determination process
SI	safety injection
SSC	structure, system, or component
TS	technical specification
TVA	Tennessee Valley Authority
UFSAR	updated final safety analysis report
VIO	violation
WOs	work orders