



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

May 9, 2013

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  
05000327/2013002, 05000328/2013002

Dear Mr. Shea:

On March 31, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Sequoyah Nuclear Plant, Units 1 and 2. The enclosed inspection report documents the inspection results discussed on April 4, 2013, with Mr. J. T. Carlin and other members of his staff.

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.

One self-revealing and two NRC-identified findings of very low safety significance (Green) were identified during this inspection. All of these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with the NRC Enforcement Policy.

If you contest any 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 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. In addition, if you disagree with the cross-cutting aspect assigned to any finding 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, RII, and the NRC Senior Resident Inspector at Sequoyah Nuclear Plant.

J. Shea

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In accordance with 10 CFR 2.390 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 Public Document Room or from the Publicly Available Records (PARS) component of NRC's document 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/**

Scott M. Shaeffer, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000327/2013002, 05000328/2013002  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

J. Shea

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/RA/

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J. Shea

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Letter to J.W. Shea from Scott Shaeffer dated May 9, 2013

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000327/2013002, 05000328/2013002

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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.: 05000327/2013002, 05000328/2013002

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, 2013

Inspectors: G .Smith, Senior Resident Inspector  
W. Deschaine, Resident Inspector  
M. Coursey, Reactor Inspector (4OA5)

Approved by: Scott M. Shaeffer, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000327/2013-002, 05000328/2013-002; 01/01-03/31/2013; Sequoyah Nuclear Plant, Units 1 and 2; (i.e. Problem Identification and Resolution and Event Follow-up)

The report covered a three-month period of inspection by resident inspectors and announced inspections by regional inspectors. Three findings 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 June 2, 2011. Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. Cross-cutting aspects are determined using IMC 0310, "Components Within the Cross-Cutting Areas" dated October 28, 2011. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated June 7, 2012. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

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

#### Cornerstone: Initiating Events

- Green. A self-revealing Green NCV of Unit 2 Technical Specification (TS) 6.8.1, "Procedures & Programs," was noted for the licensee's failure to provide adequate procedures for maintenance and surveillance activities involving the RCP circuit breaker ground fault relay, GR-5. Specifically, the GR-5 relay continued to operate beyond its service life and ultimately failed causing a loss of a reactor coolant pump and a reactor trip on low system flow. No maintenance procedures were developed to periodically replace this relay. Failure to perform adequate preventative maintenance (e.g. periodic relay replacement) on the GR-5 relay at proper intervals was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the procedure quality attribute of the initiating event cornerstone and affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during power operations. This was self-evident as the relay failure ultimately led to a reactor trip which challenged the reactor protection system and led to a plant transient. The licensee has entered this issue into the corrective action program (CAP) as Problem Evaluation Report (PER) 596978.

The significance of this finding was evaluated in accordance with the IMC 0609 Appendix A, The SDP Process for Findings at Power. According to Exhibit 1 of this procedure, for transient indicators, since the reactor trip did NOT include a loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition, the finding screened to Green. Thus, the inspectors concluded that the finding was of very low safety significance (Green) based on the fact that the reactor trip was uncomplicated. This finding was determined to have a cross-cutting aspect in the area of human performance, the component of work control, and the aspect of work activity coordination, H.3(b), due to the failure to provide work planning activities that ensure long term equipment reliability. Specifically, the GR-5 relays were essentially treated as run-to-failure components which led to a reactor trip. (Section 40A3)

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### Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green NCV of Technical Specification (TS) 6.8.1, "Procedures and Programs," for the licensee's failure to establish an adequate procedure associated with Abnormal Operating Procedure (AOP) M.08, "Internal Flooding." Specifically, internal flooding due to a fire protection header pipe break into the shutdown board rooms did not prompt entry into AOP-M.08. Failure to properly establish an adequate abnormal operating procedure (AOP) to mitigate the impact of an internal flood in the shutdown board room was a performance deficiency. Specifically, the failure to properly establish an adequate AOP to mitigate the impact of an internal flood in the shutdown board rooms, could have potentially compromised the site's ability to safely shutdown the plant in the event of a pipe leak or rupture in that area. The licensee entered this issue into the CAP as PER 639295.

The performance deficiency was determined to be more than minor because it was associated with the procedure quality 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 performed the significance determination using NRC Inspection Manual Chapter 0609, "Significance Determination Process." Because the finding affected the Mitigating Systems Cornerstone while the plant was at power, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," evaluates the finding using Appendix A. Using Appendix A, Exhibit 2, Mitigating Systems Screening Questions, the finding was determined to be of very low safety significance because it was not a design or qualification issue and was confirmed not to result in a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; and did not result in the loss of one or more trains of non-technical specification equipment. The finding was determined to have a cross-cutting aspect in the CAP component of the Problem Identification and Resolution area [P.1(c)] since the licensee failed to thoroughly evaluate the issues identified in PER 344249 such that the resolution addressed the cause and extent of condition. (Section 4OA2.2)

- Green. The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with three examples of the licensee's failure to promptly identify and correct conditions adverse to quality. Specifically, the licensee failed to promptly correct (1) the conduit penetration seals entering the ERCW building, (2) two penetrations in the wall of the ERCW building below the probable maximum flood level that were not sealed, and (3) two diesel generator drain lines that could not be isolated. The licensee entered the finding into the CAP as PERs 594536, 594568, 610005, and 622421.

The failure to promptly identify and correct conditions adverse to quality was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected, the licensee's continued failure to promptly identify and correct conditions adverse to quality could result in more risk significant equipment being inoperable for longer periods of time without the licensee realizing,

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and is therefore a finding. The inspectors performed the significance determination using NRC Inspection Manual Chapter 0609, "Significance Determination Process." Because the finding affected the Mitigating Systems Cornerstone while the plant was at power, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," evaluates the finding using Appendix A. Using Appendix A, Exhibit 2, Mitigating Systems Screening Questions, the finding was determined to have very low safety significance because the finding: (1) was not a design or qualification issue confirmed not to result in a loss of operability or functionality; (2) did not represent an actual loss of safety function of the system or train; (3) did not result in the loss of one or more trains of nontechnical specification equipment; and (4) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding, or severe weather initiating event. In addition, this finding had a human performance cross-cutting aspect associated with decision making. Specifically, the licensee failed to use conservative assumptions in decision making regarding the timely opening of manhole 33 for physical inspection to be able to quantitatively determine the in leakage value for the degraded condition and put in place an adequate comp measure. Also, the licensee incurred excessive delay in plugging of two ERCW building holes as well as evaluation of the potential water intrusion into the EDG building during flooding events [H.1(b)]. (Section 4OA2.3)

B. Licensee-Identified Violations

None

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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 began the inspection period in a refueling outage. The unit was returned to full power operation on January 8, 2013. The unit continued to operate at or near 100 percent rated thermal power (RTP) until January 27 when it was ramped down to 25 percent power to take the turbine offline to perform turbine control maintenance. The unit was returned to full power operation on January 28. The unit continued to operate at or near 100 percent rated thermal power (RTP) until February 23 when it was ramped down to 25 percent power to take the turbine offline to perform turbine control maintenance. On February 24, the unit experienced a manual reactor trip (Section 4OA3) on low vacuum signal. Following repairs, the unit returned to 100 percent RTP on March 1 where it operated for the remainder of the inspection period.

### **1. REACTOR SAFETY**

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### **1R01 Adverse Weather Protection**

##### **External Flood Protection**

##### **a. Inspection Scope**

The inspectors reviewed the licensee's readiness to cope with external flooding. External flooding from a probable maximum flood (PMF) or design basis flood (DBF) has the potential for internal flooding of a portion of a number of the plant structures. During this type of external flooding event, the reactor core decay heat will be removed by the flood protection provisions designed to remain operational up to the DBF elevation in accordance with position 2 of Regulatory Guide 1.59. Provisions have also been made to cool the spent fuel pool. Abnormal Operating Procedure (AOP)-N.03, "External Flooding," documents the shutdown requirements for the plant during this event. The inspectors reviewed the feasibility of several of these provisions for coping with this type of event to determine if they would achieve the desired results. The inspectors also reviewed the licensee's related corrective action documents (problem evaluation reports) to ensure any nonconforming conditions related to potential flooding were properly addressed. Documents reviewed are listed in the Attachment. This inspection satisfied one inspection sample.

##### **b. Findings**

All findings related to this inspection sample have been documented in IR 2013-009.

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## 1R04 Equipment Alignment

### 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 CAP. Documents reviewed are listed in the Attachment. The inspectors completed three samples.

- 2B-B Emergency Diesel Generator while 2A-A Emergency Diesel Generator was inoperable for planned maintenance
- 1B-B Emergency Diesel Generator while 1A-A Emergency Diesel Generator was inoperable for planned maintenance
- 2A Residual Heat Removal System while 2B Residual Heat Removal System was inoperable 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 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 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 six samples.

- Control Building Elevation 706 (Cable Spreading Room)
- Control Building Elevation 669 (Mechanical Equipment Room, 250 VDC Battery and Battery Board Rooms)
- Control Building Elevation 685 (Auxiliary Instrument Rooms)
- Auxiliary Building Elevation 714 (Corridor)
- Auxiliary Building Elevation 690 (Corridor)
- Control Building Elevation 732 (Mechanical Equipment Room and Relay Room)

b. Findings

No findings were identified.

.2 Annual Drill Observations

a. Inspection Scope

On February 12 and February 19, 2013 the inspectors observed two unannounced fire drills in the essential raw cooling water (ERCW) building. 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. This activity constituted one inspection sample.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (Annual)

a. Inspection Scope

The inspectors evaluated the maintenance cleaning of the 2A2 Component Cooling System (CCS) heat exchanger (HX) on March 13, 2013, and the 1A2 CCS HX on March 26, 2013. The inspectors performed a visual inspection of the plate & frame heat exchangers and noted that the pressure cleaning activities were effective in removing debris from the individual plates. The inspectors also performed a post-walkdown of the CCS system and noted normal pressures, flows, and temperatures. The inspector reviewed and evaluated a recent HX performance test for the 1A (1A1 and 1A2 HX) CCS HX train as documented in 1PI-070-001.0, Rev. 18, "Performance Testing of Component Cooling Heat Exchangers 1A1, 1A2." This test indicated that the average fouling factor was 0.000819 h x ft x° F/BTU which was above the operability limit of 0.000606 h x ft x° F/BTU. Based on this higher fouling factor, the operability limit for

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river water was reduced from 87 °F to 85.5 °F. The inspectors verified the HX performance methodology was consistent with industry guidance. The inspectors also reviewed fouling factor coefficient test results for all six of the CCS HXs dating back to 2000. The inspectors determined that the current maintenance cleaning and performance testing frequency is sufficient to detect degradation prior to loss of heat removal capability below design basis values. This activity constituted one inspection sample.

b. Findings

No findings were identified

1R11 Licensed Operator Regualification Program

.1 Quarterly Review

a. Inspection Scope

The inspectors performed one licensed operator requalification program review. The inspectors observed a simulator session on February 11, 2013. The training scenario, S-82, involved an impulse pressure transmitter (PT-1-72) failure, a loss of condenser vacuum with a failure of an air removal pump to auto start, a steam line leak inside containment that developed into a steam line break, both reactor trip breakers failing to open (ATWS), both the 1A-A and the 1B-B motor-driven auxiliary feedwater (AFW) pumps failed to auto start, and a failure of the Hi-Hi containment pressure signal to initiate an automatic Phase B containment isolation. 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.

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

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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, 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 reactor startup
- Unit 2 turbine sync to grid and power escalation

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

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 five samples.

- Unit 2 Yellow PSA (Probabilistic Safety Assessment) Risk - 2B Residual Heat Removal pump maintenance
- Emergent work on 1A Emergency Diesel Generator breaker

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- Unit 2 Yellow PSA Risk - 2A2 Component Cooling Water Heat Exchanger Inspection/Cleaning Outage
- Unit 1 Yellow PSA Risk - 1A2 Component Cooling Water Heat Exchanger Inspection/Cleaning Outage
- Unit 2 Yellow PSA Risk – Turbine Driven Auxiliary Feedwater and 2A Residual Heat Removal pump maintenance

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments

a. Inspection Scope

For the five operability evaluations described in the problem evaluation 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 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 five samples.

- PER 610005 – ERCW leak path
- PER 594536 – Seal Conduit at ERCW to prevent Flood Water Entry
- PER 594568 – Install threaded plug at ERCW to prevent Flood Water Entry
- PER 682259 – Operability Determination for stuck open SI relief valve
- PER 686710 – Operability of Steam Generator No. 1 Level Transmitter (2-L-3-39) Post-Trip

b. Findings

All findings related to these inspection samples have been documented in IR 2013-010.

1R18 Plant Modifications.1 Temporary Modificationsa. 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 0-12-011-067, Temporary sump pumps in ERCW building

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 Testinga. Inspection Scope

The inspectors reviewed the post-maintenance tests associated with the three 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 three samples.

- WO 113483759, 2B Emergency Diesel Generator (EDG) 7 day tank cleaning
- WO 114488424, Troubleshoot 1A EDG light socket
- WO 113993265, Calibrate Unit 2 steam-driven AFW pump time delay relay

b. Findings

Introduction. The inspectors noted that two consecutive 1A EDG monthly surveillance tests exhibited anomalies associated with the output breaker operation between February and March of 2013.

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Description. On February 10, 2013, during the 1A EDG monthly surveillance, the 1A EDG breaker failed to close on the first attempt. The operators noted the red light illuminated momentarily and the breaker then opened. Local observation of the breaker cubicle noted no trip flags. A second attempt was made and the breaker successfully stayed closed. The one hour EDG run was completed successfully. Based on discussions between operations and engineering, the breaker's reliability was questioned and the EDG was declared inoperable. The suspect 6.9 kilovolt (kV) breaker was removed from the cubicle for cause testing. Another breaker was installed in its place and the surveillance was successfully re-performed with the replacement breaker, and the EDG was declared operable. The removed breaker was moved to the electrical shop for further testing. The issue was entered into the CAP as PER 679474 which will include an apparent cause evaluation.

On March 10, 2013, during the next scheduled monthly surveillance of the 1A EDG, the output breaker again failed to close while attempting to parallel the EDG to the grid. Note that this breaker was a different breaker from the February 10, 2013 incident. Operators requested an electrician to observe subsequent breaker operations. Two more breaker closures were attempted and again, the breaker failed to close (total of 3 times). The electrician reported the breaker cycled, current on the ammeter increased, but the breaker did not latch and immediately tripped. The control room operators noted that during the three closure attempts, the red light never energized. No trip flags were noted at the breaker cubicle. Bench testing of the breaker was performed and the breaker was able to be closed seven times without incident. At that point, the troubleshooting process began to examine causes external to the breaker. Subsequent troubleshooting revealed the circuit breaker was exposed to a standing trip signal. The cause of the trip signal was an electrical short across the red indicating light that resulted in the energization of the trip coil. The short was caused by a crack in the red indicating lamp socket assembly which allowed the positive and negative contacts on the socket to touch and short the light. The light socket assembly was subsequently replaced and the 1A EDG was successfully tested and declared operable on March 10, 2013. As of the end of the inspection period, the licensee had not completed a causal analysis of both failures. Pending additional information from the licensee which identifies the root cause of both failures, this item is identified as unresolved item (URI) 050000327/2013002-01, 1A EDG Breaker Failures.

## 1R20 Refueling and Other Outage Activities

### .1 Unit 2 Refueling Outage Cycle 18

#### a. Inspection Scope

For the Unit 2 refueling outage that began on October 15, 2012, specifically January 1 – January 8, 2013, the inspectors performed inspections and reviews of the following outage activities. Documents reviewed are listed in the Attachment. This inspection satisfied one inspection sample for Refueling Activities.

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- Heatup and Startup Activities. The inspectors toured the containment prior to reactor startup to verify that debris which could affect the performance of the containment sump had not been left in the containment. The inspectors reviewed the licensee's mode-change checklists to verify that appropriate prerequisites were met prior to changing TS modes. To verify RCS integrity and containment integrity, the inspectors further reviewed the licensee's RCS leakage calculations and containment isolation valve lineups. In order to verify that core operating limit parameters were consistent with core design, the inspectors also observed portions of the low power physics testing, including reactor criticality.

b. Findings

No findings were identified.

.2 Unit 2 Forced Outage

a. Inspection Scope

Following the manual reactor trip of Unit 2 on February 24, 2013, the licensee maintained Unit 2 in Mode 3 until conditions to support restart were established on February 26, 2013. The inspectors reviewed the licensee's mode change checklists to verify that appropriate prerequisites were met prior to changing TS modes. The inspectors reviewed portions of the plant startup including reactor criticality and power ascension. This inspection satisfied one inspection sample for Outage Activities.

b. Findings

No findings were identified

1R22 Surveillance Testing

a. Inspection Scope

For the six surveillance tests identified below, the inspectors assessed whether the structure, system and components (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-074-201.A, Residual Heat Removal Pump 1A-A Performance Test, Rev. 17
- 1-SI-SXP-063-201.A, Safety Injection Pump 1A-A Performance Test, Rev. 13

RCS leakage test:

- 0-SI-OPS-068-137.0, Reactor Coolant System Water Inventory, Rev. 23

Routine Surveillance Tests:

- 2-SI-OPS-082-024.A, 2A-A D/G 24 Hour Run and Load Rejection Testing, Rev. 18
- 1-SI-OPS-082-024.B, 1B-B D/G 24 Hour Run and Load Rejection Testing, Rev. 23
- 1-SI-IFT-099-90.8B Reactor Trip Instrumentation Monthly Functional Test (SSPS) Train B, Rev 20

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness1EP6 Drill Evaluationa. Inspection Scope

Resident inspectors evaluated the conduct of routine licensee emergency drill on February 12, 2013, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation (PAR) 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 49. 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 1 sample.

b. Findings

No findings were identified.

## 4. OTHER ACTIVITIES

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

4OA1 Performance Indicator (PI) Verificationa. Inspection Scope

The inspectors sampled licensee submittals for the PIs listed below for the period from January 1, 2012 through December 31, 2012 for both Unit 1 and Unit 2. Definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment

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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: Initiating Events

- Unplanned Scrams per 7000 Critical Hours
- Unplanned Scrams with Complications
- Unplanned Power Changes per 7000 Critical Hours

The inspectors reviewed selected Licensee Event Reports (LERs) and portions of operator logs to verify whether the licensee had accurately identified the number of scrams and unplanned power changes that occurred during the previous four quarters for both units. The inspectors also reviewed the accuracy of the number of critical hours reported and the licensee's basis for addressing the criteria for complications for each of the reported scrams. Documents reviewed are listed in the Attachment.

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. The inspectors completed five samples per Unit.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems

.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.

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.2 Selected Issue Follow-up:

a. Inspection Scope

The inspectors reviewed the issue listed below in detail to evaluate the effectiveness of the licensee's corrective actions for important safety issues.

- PER 344249, Internal flooding

The inspectors assessed whether the issues were properly identified; documented accurately and completely; properly classified and prioritized; adequately considered extent of condition, generic implications, common cause, and previous occurrences; adequately identified root causes/apparent causes; and identified appropriate and timely corrective actions. The inspectors evaluated the licensee documents against the requirements of the licensee's CAP and implementing procedures, and 10 CFR 50, Appendix B. Documents reviewed are listed in the Attachment. The inspectors completed 1 sample.

b. Findings and Observations

Introduction: The inspectors identified a Green non-cited violation of Technical Specification (TS) 6.8.1, "Procedures and Programs," for the licensee's failure to establish an adequate procedure associated with (AOP) M.08, "Internal Flooding." Specifically, internal flooding due to a fire protection header pipe break into the shutdown board rooms did not prompt entry into AOP-M.08.

Description. While reviewing the corrective actions for PER 344249, the inspectors noted that a new AOP for internal flooding was created. The inspectors reviewed AOP-M.08, "Internal Flooding," which was issued and effective on June 30, 2012. During their review the inspectors had some questions about entry into the AOP with regards to internal flooding scenarios in the shutdown board rooms. The licensee recently issued a new PRA model and internal flooding of the shutdown board rooms was identified as a more significant contributor to core damage frequency than previously recognized. The inspectors interviewed senior reactor operators and other members of the licensee staff to better understand how an internal flood in the shutdown board rooms would be identified. The licensee does not have flood level switches in these rooms that would help the control room identify that internal flooding was occurring.

On November 8, 2012, the inspectors determined that a break of the high pressure fire protection (HPFP) pipe in the shutdown board room area would not cause them to enter AOP-M.08, "Internal Flooding" which caused the AOP to be inadequate. The licensee entered this condition into their corrective action program (CAP) as PER 639295 and corrective actions have been implemented which revised Annunciator response 0-AR-M-29, "Fire Detection System," to prompt entry into AOP-M.08 if internal flooding is discovered.

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Analysis. Failure to properly establish an adequate abnormal operating procedure (AOP) to mitigate the impact of an internal flood in the shutdown board room was a performance deficiency. Specifically, AOP-M.08, "Internal Flooding," was inadequate to mitigate the effects of a leak or pipe rupture in the shutdown board rooms. The performance deficiency was determined to be more than minor because it was associated with the procedure quality 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 failure to properly establish an adequate AOP to mitigate the impact of an internal flood in the shutdown board rooms, could have potentially compromised the site's ability to safely shutdown the plant in the event of a pipe leak or rupture in that area. The inspectors performed the significance determination using NRC Inspection Manual Chapter 0609, "Significance Determination Process." Because the finding affected the Mitigating Systems Cornerstone while the plant was at power, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," evaluates the finding using Appendix A. Using Appendix A, Exhibit 2, Mitigating Systems Screening Questions, the finding was determined to be of very low safety significance because it was not a design or qualification issue confirmed not to result in a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; and did not result in the loss of one or more trains of non-technical specification equipment. The inspectors identified a cross-cutting aspect in the Corrective Action Program component of the Problem Identification and Resolution area, because the licensee failed to thoroughly evaluate the issues identified in PER 344249 such that the resolution addressed the cause and extent of condition. [P.1(c)]

Enforcement. Units 1 and 2 TS 6.8.1, "Procedures and Programs," requires, in part, that written procedures shall be established, implemented, and maintained covering the following activities: The applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978; Appendix A, Section 5, requires procedures for Abnormal Conditions. Abnormal operating procedure AOP-M.08, "Internal Flooding," provides detailed instructions for implementing internal flood mitigation strategies necessary to cope with leaks or pipe ruptures, not associated with the RCS or small leaks which do not threaten equipment or personnel. Contrary to the above, from June 30, 2012, through November 11, 2012, the licensee failed to establish an adequate abnormal condition procedure to implement a successful internal flood mitigation strategy. Specifically, AOP-M.08, "Internal Flooding," was inadequate to mitigate the effects of a leak or pipe rupture in the shutdown board rooms for both units. Because the finding was of very low safety significance and has been entered into the licensee's CAP as PER 639295, this violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy: NCV 05000327,328/2013002-02, "Inadequate Abnormal Operating Procedure for Internal Flood Mitigation Strategy."

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### .3 Selected Issue Follow-up:

#### a. Inspection Scope

The inspectors reviewed the issues listed below in detail to evaluate the effectiveness of the licensee's corrective actions for important safety issues.

- PER 610005, ERCW leak path
- PERs 594536, Seal Conduit at ERCW to prevent Flood Water Entry & 594568, Install threaded plug at ERCW to prevent Flood Water Entry
- PER 549443, Equipment deficiency related to flooding mitigation not addressed

The inspectors assessed whether the issues were properly identified; documented accurately and completely; properly classified and prioritized; adequately considered extent of condition, generic implications, common cause, and previous occurrences; adequately identified root causes/apparent causes; and identified appropriate and timely corrective actions. The inspectors evaluated the licensee documents against the requirements of the licensee's CAP and implementing procedures, and 10 CFR 50, Appendix B. Documents reviewed are listed in the Attachment. The inspectors completed 3 samples.

#### b. Findings and Observations

Introduction. The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with three examples of the licensee's failure to promptly identify and correct conditions adverse to quality. Specifically, the licensee failed to promptly correct (1) the conduit penetration seals entering the ERCW building, (2) two penetrations in the wall of the ERCW building below the probable maximum flood level that were not sealed, and (3) two diesel generator drain lines that could not be isolated.

Description. The following are examples of the licensee's failure to promptly identify and correct conditions adverse to quality:

- During the NTTF-2.3 Fukushima reviews, the licensee discovered that the ERCW pumping station had two open penetrations in the North side wall of the ERCW pumping station near the East corner around elevation 713 feet and 719 feet, which is below the PMF level for the site. The licensee entered these two open penetrations into their CAP on August 13, 2012, as "D" level PERs 594536 & 594568. Both of these penetrations were missing a threaded plug and would let flood water enter the 2A ERCW Bay. On September 19, 2012, the inspectors questioned the licensee if these open penetrations would affect the current operability of the ERCW Pump Station. The licensee reevaluated the PERs and increased the priority of WOs 113783351 & 113786322 to plug the two penetrations. These Work orders were completed and the penetrations plugged on October 31, 2012. The inspectors determined that the licensee did not promptly correct these conditions adverse to quality.

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- Also, during the NTT-2.3 Fukushima reviews, which included reviews of applicable drawings, the licensee discovered that the conduit duct banks at the ERCW pumping station did not potentially have water stops installed to keep water from entering the building. The licensee entered this issue in their CAP as PER 610005 on September 16, 2012, as a "C" level. This was based on review of applicable drawings and not actual inspection of the penetrations. Based on questions from the NRC on September 19, 2012, regarding unsealed penetrations would affect the current operability of the ERCW Pump Station, the licensee was unable to locate a detailed drawing indicating the flood seal design detail. The licensee issued their functional evaluation for PER 610005, on November 7, 2012, and concluded that the potential lack of adequate water stops in the conduit duct banks at the ERCW pumping station result in a non-conformance with Sequoyah's CLB. The FE stated that this condition was non-conforming due to failure to meet FSAR Section 2.4.A.2.1 and this was also a degraded condition requiring a compensatory measure in order for the design basis flood event to be successfully mitigated. As a compensatory measure, the licensee installed four temporary sump pumps, one associated with each ERCW non-safety related building sump, on November 10, 2012. These pumps were rated at 600 gallon per minute (gpm). The inspectors reviewed the FE for PER 610005 and noted that no specific flow rate for water entering the ERCW Pumping Station through the conduit duct banks had been calculated. After multiple questions from the inspectors on the adequacy of the compensatory measures installed, the licensee on December 12, 2012, opened one of the four bays for manhole 33 to help plan the work orders to fix the potentially inadequate water stops as documented in PER 610005. Based on their observations, the licensee determined that the ERCW Station Building was at risk of flooding during a design basis flood due to numerous conduit penetrations not being protected with adequate (or missing) flooding seals. The lack of flood seals would allow flood waters to enter the ERCW building at a rate greater than the existing or additional temporary sump pumps could remove. Subsequently, the licensee revised their original FE for PER 610005. Specifically, revision 1 of this FE determined that the temporary sump pumps that they had installed on November 10, 2012, under Temporary Alteration Control Form (TACF) 0-12-011-067, did not have adequate capacity to keep up with the amount of water that potentially could enter through the conduit duct banks. This determination was made after the licensee performed a hydraulic calculation of the potential flow rate into the ERCW pumping station through the conduit banks and the flow rate that the sump pumps could remove. The licensee revised Temporary Alteration Control Form (TACF) 0-12-011-067 to add larger capacity sump pumps (rated at 1866 gpm) that would ensure water could be removed from the ERCW bays if the design basis flood occurred until adequate seals could be installed. These larger capacity sump pumps were installed on December 15, 2012. The inspectors reviewed the updated FE and determined that these compensatory measures were adequate to mitigate the potential in leakage of flood water into the ERCW structure during a postulated flooding event. The inspectors determined that the licensee did not promptly correct these conditions adverse to quality. Other regulatory issues associated with this subject are discussed in NRC Inspection Report 327,328/2013010.

- On August 15, 2011, two valves (0-40-840 - D/G Sump Drain Isolation Valve and 0-40-585 - D/G 1B-B Floor Drain Isolation) were discovered to be inoperable (incapable of being operated) which are required to be closed during a Probable Maximum Flood (PMF). The licensee entered this issue in their CAP as PER 416845 on August 15, 2011, as a "C" level. Work Orders (WOs) 112575484 and 112575486 were written to repair the valves. On May 10, 2012, the licensee wrote another PER 549443, which stated the two valves found to be inoperable had not been adequately evaluated with respect to potential significance and the WOs were not prioritized appropriately. The PER also stated that the valves had still not been corrected and with these valves incapable of being operated the potential existed for backflow of water into the D/G Building via drain lines during an external flooding event. The licensee conducted a functional evaluation and concluded that no degraded or nonconforming condition existed, but did suggest that pipe plugs would be useful in dealing with flood waters even though none existed onsite. PER 591849 was written on August 8, 2012, which identified the need to implement a method to plug the two drain lines at the D/G Building during an external flooding event. The intent of PER 591849 was to stage pipe plugs (or other appropriate plugging materials) so that the required action could be performed without delay during a flood. However, PER 591849 was closed to an enhancement action without procuring and staging the required materials and without updating procedures. On September 19, 2012, the inspectors questioned the adequacy of the functional evaluation done in response to PER 549443. This issue was entered into the CAP as PER 622421 and a new functional evaluation was conducted. The licensee concluded that the condition was a nonconforming condition, but that there was still about a foot of margin between where the water would rise to inside the D/G building and the lowest safety-related component. The licensee also procured pipe plugs for all of the drain valves in the D/G building and proceduralized the installation of these plugs. The inspectors determined that the licensee did not promptly identify and correct these conditions adverse to quality.

Analysis. The failure to promptly identify and correct conditions adverse to quality was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected, the licensee's continued failure to promptly identify and correct conditions adverse to quality could result in more risk significant equipment being inoperable for longer periods of time without the licensee realizing, and is therefore a finding. The inspectors performed the significance determination using NRC Inspection Manual Chapter 0609, "Significance Determination Process." Because the finding affected the Mitigating Systems Cornerstone while the plant was at power, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," evaluates the finding using Appendix A. Using Appendix A, Exhibit 2, Mitigating Systems Screening Questions, the finding was determined to have very low safety significance because the finding: (1) was not a design or qualification issue confirmed not to result in a loss of operability or functionality; (2) did not represent an actual loss of safety function of the system or train; (3) did not result in the loss of one or more trains of nontechnical specification equipment; and (4) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding, or severe weather initiating event. Specifically, these three examples are of the licensee's corrective action process/program failing to promptly identify and correct conditions adverse to quality.

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Additional regulatory issues related to flooding reviews were dispositioned as separate issues in Inspection Report 2013-010.

In addition, this finding had a human performance cross-cutting aspect associated with decision making, because the licensee failed to use conservative assumptions in decision making regarding the timely opening of manhole 33 for physical inspection to be able to quantitatively determine the in leakage value for the degraded condition and put in place an adequate comp measure; the delayed plugging of two ERCW building holes and evaluation of the potential water intrusion into the EDG building during flooding events [H.1(b)].

Enforcement. Title 10 of the Code of Federal Regulations Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected." Contrary to the above, between August 15, 2011, and December 12, 2012, the licensee failed to promptly identify and correct conditions adverse to quality. Specifically, the licensee failed to promptly correct: (1) the conduit penetration seals entering the ERCW building; (2) two penetrations in the wall of the ERCW building below the probable maximum flood level that were not sealed; and (3) two diesel generator drain lines that could not be isolated. Because the finding was of very low safety significance and has been entered into the licensee's CAP as PER 697609, this violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy: NCV 05000327,328/2013002-03, "Failure to Promptly Identify and Correct Conditions Adverse to Quality."

#### 4OA3 Event Follow-up

##### .1 (Closed) Licensee Event Report (LER) 05000328/2012-001-00: Automatic Reactor Trip on Loss of Flow due to a Reactor Coolant Pump (RCP) Trip

###### a. Inspection Scope

On August 16, 2012, Unit 2 reactor was automatically tripped due to low reactor coolant system flow due to a loss of the loop No 4 RCP. The pump motor was de-energized due to a tripped open 6.9 kV circuit breaker. The cause of the tripped circuit breaker was due to the inadvertent operation of the ground fault relay, GR-5. Following the reactor trip from 100 percent power, the main control room operators initiated the emergency operating procedures and stabilized the plant in Mode 3. The inspectors evaluated plant status, mitigating actions, and the licensee's classification of the event. The event was reported to the NRC as EN 48198 and documented in the licensee CAP as PER 596978, which included a formal root cause evaluation. One NCV was identified and is discussed below. This LER is closed.

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b. Findings

Introduction. A Self-revealing Green NCV of Unit 2 TS 6.8.1, "Procedures & Programs," was noted for the licensee's failure to provide adequate procedures for maintenance and surveillance activities involving the RCP circuit breaker ground fault relay, GR-5. This resulted in the energization of the trip coil and subsequent opening of the No. 4 RCP circuit breaker. This resulted in an automatic reactor trip due to low reactor coolant system flow as the No. 4 RCP motor was de-energized.

Description. On August 16, 2012, Unit 2 automatically tripped from 100 percent power due to a low reactor coolant system flow condition. The low flow condition was caused by a loss of the Loop No. 4 RCP due to a spurious trip of the pump's circuit breaker. Subsequent troubleshooting revealed that a 250 volt relay, GR-5, was providing a standing trip signal to the RCP circuit breaker. The GR-5 relay is used on the 6.9 kV Unit and Shutdown boards for ground fault protection. The licensee conducted a formal root cause analysis and entered this issue into their CAP as PER 596978. The root cause team discovered that the failure mechanism of the relay was due to a faulted Metal Oxide Varistor (MOV) which is internal to the relay itself. The MOV was noted to be shorted and did not appear to catastrophically fail which would have been indicative of a large spike in voltage. Rather, the component appeared to reach the end of its service life. According to the EPRI templates, the service life is listed as 8 to 10 years for solid state protective relays. The licensee's root cause team noted that preventative maintenance procedure did not provide guidance to replace the relay once the service life of the component had been reached. Additionally, the established preventative maintenance procedure was only performed once per 15 years which also was beyond the service life of the relay.

Analysis. The licensee's failure to perform adequate preventative maintenance (i.e. replacement) on the subject relays at proper intervals was a performance deficiency. The finding was determined to be greater than minor because it was associated with the procedure quality attribute of the initiating event cornerstone and affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during power operations. This was self-evident as the relay failure ultimately led to a reactor trip which challenged the reactor protection system and led to a plant transient.

The significance of this finding was evaluated in accordance with the IMC 0609 Appendix A, "The SDP Process for Findings at Power." According to Exhibit 1 of this procedure, for transient indicators, since the reactor trip did NOT include a loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition, the finding screened to Green. Thus, the inspectors concluded that the finding was of very low safety significance (Green) based on the fact that the reactor trip was uncomplicated.

This finding was determined to have a cross-cutting aspect in the area of human performance, the component of work control, and the aspect of work activity coordination, H.3(b), due to the failure to provide work planning activities that ensured long term equipment reliability. Specifically, the GR-5 relays were essentially treated as run-to-failure components which led to a reactor trip.

Enforcement. Unit 2 TS 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 9.a, "Procedures for Performing Maintenance," required, in part, maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Contrary to the above, prior to August 16, 2012, the licensee failed to establish adequate written procedures appropriate to the circumstances for maintenance that could affect the performance of safety-related equipment (e.g. reactor protection system components). Specifically, the lack of preventative maintenance procedures for the GR-5 relays affected the safety-related reactor protection system by unnecessarily challenging the system under a loss of reactor coolant flow condition. Because the finding was of very low safety significance and has been entered into the licensee's CAP as PER 596978, this violation is being treated as an NCV, consistent with the NRC Enforcement Policy: NCV 05000328/2013002-04, "Failure of ground fault Relay Leads to Loss of RCP and Reactor Trip."

## .2 Unit 2 Manual Reactor Trip

### a. Inspection Scope

On February 24, 2013, the inspectors responded to a manual reactor trip from 25 percent RTP on Unit 2 due to a failed "B" condenser vacuum sensing line. A portion of this line was found on the turbine deck and allowed atmospheric pressure to be sensed on the vacuum switch. This resulted in a low vacuum signal and caused the main condenser steam dumps to close on what was perceived as a loss of vacuum when, in fact, vacuum was unaffected. The transition to atmospheric steam dumps caused a plant transient and a lowering hotwell level. As an anticipatory action, the operators manually tripped the reactor prior to any loss of the hotwell pumps. Note that the turbine had been previously tripped for maintenance. The operators entered E-0 immediately after the reactor trip and stabilized the plant in Mode 3. 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 trip 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 Technical Specifications. The inspectors reviewed unit and system indications to verify whether actions and system responses were as expected and designed. The inspectors reviewed the reactor trip report as described in PER 686710. The inspectors also reviewed the initial licensee notifications to verify whether they met the requirements

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specified in NUREG-1022, "Event Reporting Guidelines." The event was reported to the NRC as event notification (EN) 48778 and documented in the licensee's corrective action program as PER 686710.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 Quarterly Resident Inspector Observations of Security Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors conducted observations of security force personnel and activities to ensure that the activities were consistent with licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings were identified.

.2 (Closed) NRC Temporary Instruction (TI) 2515/187, "Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns"

a. Inspection Scope

Inspector(s) verified that licensee's walkdown packages, related to walkdowns in the intake pumping station and the auxiliary building flood mode spool pieces, contained the elements as specified in NEI 12-07, Walkdown Guidance document:

The week of July 23, 2012, the inspectors accompanied the licensee on their walkdown of those activities related to accomplishing the plant's flood mode strategy and verified that the licensee confirmed the following flood protection features

- Visual inspection of the flood protection feature was performed if the flood protection feature was relevant. External visual inspection for indications of degradation that would prevent its credited function from being performed was performed.
- Reasonable simulation, if applicable to the site
- Critical SSC dimensions were measured

- Available physical margin, where applicable, was determined.
- Flood protection features which included spool piece simulated installations were observed to verify licensee capability to meet installation time requirements.

The inspectors independently performed their walkdown and verified that the following flood protection features were in place.

- Installed HESCO barriers were reviewed for material condition
- Review of installation of HESCO barriers including demonstrations
- Flood protection features in the intake pumping station were reviewed, including seals, sump pumps, check valves and equipment failure histories.
- Available physical margin, where applicable, was determined.

The inspectors verified that non-compliances with current licensing requirements, and issues identified in accordance with the 10 CFR 50.54(f) letter, Item 2.g of Enclosure 4, were entered into the licensee's corrective action program. In addition, issues identified in response to Item 2.g that could challenge risk significant equipment and the licensee's ability to mitigate the consequences will be subject to additional NRC evaluation.

b. Findings

All findings related to this inspection sample have been documented in IR 2013-010 and in Section 4OA2.3 of this report

.3 (Discussed) Temporary Instruction (TI) -2515/182 - Review of the Implementation of the Industry Initiative to Control Degradation of Underground Piping and Tanks, Phase 1

a. Inspection Scope

Leakage from buried and underground pipes has resulted in ground water contamination incidents with associated heightened NRC and public interest. The industry issued a guidance document, Nuclear Energy Institute (NEI) 09-14, "Guideline for the Management of Buried Piping Integrity," (ADAMS Accession No. ML1030901420), to describe the goals and required actions (commitments made by the licensee) resulting from this underground piping and tank initiative. On December 31, 2010, NEI issued Revision 1 to NEI 09-14, "Guidance for the Management of Underground Piping and Tank Integrity," (ADAMS Accession No. ML110700122), with an expanded scope of components which included underground piping that was not in direct contact with the soil and underground tanks. On November 17, 2011, the NRC issued TI-2515/182 "Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks," to gather information related to the industry's implementation of this initiative.

The inspectors reviewed the licensee's programs for buried pipe and underground piping and tanks in accordance with TI-2515/182 to determine if the program attributes and completion dates identified in Sections 3.3 A and 3.3 B of NEI 09-14, Revision 1 were contained in the licensee's program and implementing procedures. For the buried pipe and underground piping program attributes, with completion dates that had passed, the

inspectors reviewed records to determine if the attribute was in fact complete and to determine if the attribute was accomplished in a manner which reflected good or poor practices in program management.

b. Observations

The licensee's buried piping and underground piping and tanks program was inspected in accordance with paragraphs 03.01.a through 03.01.c of TI-2515/182 and was found to meet all applicable aspects of NEI 09-14 Revision 1, as set forth in Table 1 of the TI.

Based upon the scope of the review described above, Phase I of TI-2515/182 was completed.

c. Findings

No findings were identified.

4OA6 Meetings, Including Exit

.1 Exit Meeting Summary

On April 4, 2013, the resident inspectors presented the inspection results to Mr. J. T. 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.

On February 22, 2013, regional inspectors discussed results of the TI-2515/182 - Review of the Implementation of the Industry Initiative to Control Degradation of Underground Piping and Tanks, Phase 1 inspections with Mr. J. Johnson, Licensing Engineer, and other responsible staff. The inspectors verified that all proprietary information was returned to the licensee.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee personnel**

J. Carlin, Site Vice President  
S. Connors, Operations Manager  
J. Cross, Chemistry Manager  
A. Day, Radiation Protection Manager  
C. Dieckmann, Manager, Maintenance  
J. Johnson, Program Manager Licensing  
A. Little, Site Security Manager  
K. Loomis – Underground Piping Program Owner  
T. Marshall, Director Safety and Licensing  
M. Meade, Flooding Manager  
S. McCamy, Quality Assurance Manager  
P. Noe, Site Engineering Director  
P. Pratt, Work Control Manager  
R. M. McBrearty, Licensing Manager  
P. Simmons, Plant Manager  
K. Smith, Director of Training

#### **NRC personnel**

S. Lingam, Project Manager, Office of Nuclear Reactor Regulation

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

#### **Opened and Closed**

05000327,328/2013002-02	NCV	Inadequate Abnormal Operating Procedure for Internal Flood Mitigation Strategy (Section 4OA2.2)
05000327,328/2013002-03	NCV	Failure to Promptly Identify and Correct Conditions Adverse to Quality (Section 4OA2.3)
05000328/2013002-04	NCV	Failure of Ground Fault Relay Leads to Loss of RCP and Reactor Trip (Section 4OA3.1)

#### **Closed**

05000327, 328/2515/187	TI	Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns (Section 4OA5.2)
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Opened

05000327/2013002-01	URI	1A EDG Breaker Failures (Section 1R19)
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Discussed

05000327, 328/2515/182	TI	Review of the Implementation of the Industry Initiative to Control Degradation of Underground Piping and Tanks, Phase 1 (Section 4OA5.3)
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**LIST OF DOCUMENTS REVIEWED****Section R01: Adverse Weather Protection**Procedures

AOP-N.03, External Flooding, Revision 42

PERs

138749

138749, attachment TVA Hydrology Model Issue Identification and Assessment, dated 5/14/2010, pages 12 and 13

177492

177501 and associated functional evaluation Rev. 1

177669

177822

178649

179001

179338

179244

202572

202693

202777

202723

202622

499217

519131

Other documents

UFSAR Section 2.4.A.2.1

TRM 3.7.6, "Flood Protection"

Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants"

Design Criteria Document: SQN-DC-V-12.1, "Sequoyah Nuclear Plant – Flood Protection Provisions"

Calculations

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 CDQ000020080009, Rev. 2, Initial Dam Rating Curve Fort Loudoun  
 CDQ000020080080, Rev. 2, Flood Levels at WBN and SQN from Seismic Dam Failures

**Section R04: Equipment Alignment**Partial System WalkdownsProcedures

0-SO-74-1, Residual Heat Removal System, Revision 86  
 AOP-R.03, RHR System Malfunction, Revision 30

Other documents

UFSAR Section 5.5.7, Residual Heat Removal System  
 0-47W810-1, Flow Diagram Residual Heat Removal System  
 0-45N674, RHR Schematic Diagram  
 1,2-47W611-74-1, Mechanical Logic Diagram Residual Heat Removal  
 0-45N779-9, 480V Shutdown Power Schematic  
 0-45N779-11, 480V Shutdown Power Schematic  
 0-45N779-12, 480V Shutdown Power Schematic  
 1,2-47W611-63-5, Mechanical Logic Diagram Residual Heat Removal

**Section R05: Fire Protection**Other documents

AUX-0-690-01, Auxiliary Building – El. 690 (Unit 1 Side), Revision 7  
 AUX-0-690-2, Auxiliary Building – El. 690 (Unit 2 Side), Revision 7  
 CON-0-706-00, Control Building – El. 706, Revision 5  
 CON-0-685-00, Control Building – El. 685, Revision 5

**Section R07: Heat Sink Performance**Procedures

1PI-070-001.0, Performance Testing of Component Cooling Heat Exchangers 1A1, 1A2  
 Revision 18

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

0-TI-DSM-000-007.1, Risk Assessment Guidelines, Revision 9  
 NPG-SPP-07.3, Work Activity Risk Management Process, Revision 11  
 NPG-SPP-07.2.4, Forced Outage or Short Duration Planned Outage Management, Revision 3  
 NPG-SPP-07.2, Outage Management, Revision 3  
 GOI-6, Apparatus Operations, Revision 154  
 NPG-SPP-07.1, On-Line Work Management, Revision 9

**Section R15: Operability Evaluations**Procedures

NEDP-22, Functional Evaluations, Rev. 14  
 OPDP-8, Limiting Conditions for Operation Tracking, Rev. 14  
 NPG-SPP-03.5, Regulatory Reporting Requirements, Revision 6

PERs

610005, ERCW leak path

594536, Seal Conduit at ERCW to prevent Flood Water Entry

594568, Install threaded plug at ERCW to prevent Flood Water Entry

682259, Operability Determination for stuck open SI relief valve

686710, Operability of Steam Generator No. 1 Level Transmitter (2-L-3-39) Post-Trip

**Section R18: Plant Modifications**Other documents

TACF 0-12-011-067, Temporary sump pumps in ERCW

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

WO 113483759, 2B Emergency Diesel Generator (EDG) 7 day tank cleaning

WO 114488424, Troubleshoot 1A EDG light socket

WO 113993265, Calibrate Unit 2 steam-driven Auxiliary Feed Water (AFW) pump time delay relay

**Section R20: Refueling and Outage Activities**Procedures

0-PI-OPS-000-011.0, "Containment Access Control During Modes 1-4, Revision 6

NPG-SPP-07.2.3, Plant Startup Review/Checklists, Revision 3

**Section R22: Surveillance Testing**Procedures

1-SI-SXP-074-201.A, Residual Heat Removal Pump 1A-A Performance Test, Revision 17

1-SI-SXP-063-201.A, Safety Injection Pump 1A-A Performance Test, Revision 13

0-SI-OPS-068-137.0, Reactor Coolant System Water Inventory, Revision 23

2-SI-OPS-082-024.A, 2A-A D/G 24 Hour Run and Load Rejection Testing, Revision 18

1-SI-OPS-082-024.B, 1B-B D/G 24 Hour Run and Load Rejection Testing, Revision 23

1-SI-IFT-099-90.8B Reactor Trip Instrumentation Monthly Functional Test (SSPS) Train B, Revision 20

**Section 40A1: Performance Indicator Verification**Other documents

Scram data

Dose Equivalent Iodine data

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

NPG-SPP-03.1, Corrective Action Program, Revision 6

1-AR-M15-B, Annunciator Response for Miscellaneous 1-XA-55-15B, Revision 29

0-AR-M-29, Annunciator Response for Fire Detection System, Revision 9

AOP-N.05, Earthquake, Revision 16

1-AR-M15-B, Annunciator Response for Miscellaneous 1-XA-55-15B, Revision 32

AOP-M.08, Internal Flooding, Revision 0 (Effective 7/6/2012)

PERs

345431, Potential internal flooding vulnerability  
 165889, inadequate procedure for fire header ruptures  
 542835, FE required revision  
 539250, Internal flooding vulnerability  
 344249, Internal flooding (Japan IER L1 11-1)  
 639295, NRC-identified internal flooding issue

**Section 40A5: Other Activities**Procedures

0-TI-DXX-000-915.0, Underground Piping and Tanks Integrity Program (UPTI), Revision 4  
 NPG-SPP-09.15, Underground Piping and Tanks Integrity Program (UPTI), Revision 3  
 Sequoyah Nuclear Plant Underground Piping and Tanks Integrity Program Inspection Plan, Revision 2  
 0-PI-DXX-000-750, Piping Inspection in Tunnels and Infrequently Accessed Areas, Rev. 0

PERs

347970, NEI 09-14; NSIAC Buried Piping Completion Dates to be assigned as long term corrective actions (LTCA's)  
 494566, 24 inch piping corrosion  
 175149, Fuel Oil Piping Failed PM

Other documents

EPRI TR 1016456, Recommendations for an Effective Program to Control the Degradation of Buried Pipe  
 Nuclear Energy Institute (NEI) 09-14, Guideline for the Management of Buried Piping Integrity, Rev. 1  
 CRP-ENG-F-12-002, TVA Fleet-wide Underground Piping and Tanks Integrity Program (UPTI) Focused Self-Assessment Report, dated 3/30/2012  
 SQN-ENG-F-10-05, Sequoyah Nuclear Plant (SQN) Buried Piping Integrity Program Implementation, dated 6/11/10  
 Buried Piping Program Health Report date range 7/1/2012 – 12/31/2012 dated February 10, 2013  
 Condition Assessment for Underground Piping and Tanks Integrity Program dated 12/30/12  
 SIA Project No. 0901186.00, Baseline Risk Implementation Analysis: Sequoyah Nuclear Power Plant, Rev. 00  
 Underground Piping and Tank Integrity Inspection checklist from inspection dated 02/04/2009