



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

August 1, 2012

Mr. Joseph W. Shea  
Manager, Corporate Nuclear Licensing  
Tennessee Valley Authority  
3R Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000327/2012003, 05000328/2012003

Dear Mr. Shea:

On June 30, 2012, 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 July 5, 2012, with Mr. J. Carlin and other members of the Sequoyah 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.

Two NRC-identified findings of very low safety significance (Green) were identified during this inspection. Both of these findings were determined to involve violations of NRC requirements. Further, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with the NRC Enforcement Policy.

If you contest any of these non-cited violations, 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 a 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 05000327/2012003, 05000328/2012003  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

J. Shea

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J. Shea

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Letter to J. W. Shea from Scott Shaeffer dated August 1, 2012

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000327/2012003, 05000328/2012003

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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.: 05000327/2012003, 05000328/2012003

Licensee: Tennessee Valley Authority (TVA)

Facility: Sequoyah Nuclear Plant, Units 1 and 2

Location: Sequoyah Access Road  
Soddy-Daisy, TN 37379

Dates: April 1 – June 30, 2012

Inspectors: C. Young, Senior Resident Inspector  
W. Deschaine, Resident Inspector  
R. Carrion, Senior Reactor Inspector (4OA5)

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

Enclosure

## SUMMARY OF FINDINGS

IR 05000327/2012003, 05000328/2012003; 4/1/2012 – 6/30/2012; Sequoyah Nuclear Plant, Units 1 and 2; Fire Protection and Identification and Resolution of Problems

The report covered a three-month period of inspection by resident inspectors. Two Green findings were identified, of which both involved non-cited violations (NCVs) of NRC requirements. The safety significance of a finding is determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP) and indicated by the color (Green, White, Yellow, Red) or may be To Be Determined (TBD) pending completion of an SDP; the cross-cutting aspect was determined using IMC 0310, "Components Within the Cross-Cutting Areas." The severity level of a traditional enforcement violation is determined using the NRC's Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process." The documents reviewed during the inspection period are listed in either the Report Details or in the Attachment.

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

#### **Cornerstone: Mitigating Systems**

- Green. The inspectors identified a noncited violation of Units 1 & 2 Technical Specification 6.8.1.f for the licensee's failure to implement procedures required for fire protection program implementation. Specifically, the licensee failed to evaluate six minimum critical objectives on December 5, 2011, during a fire drill as required by TVA-SPP-17.16, Conduct and Evaluation of Fire Drills, revision 0. This issue was entered into the licensee's corrective action program as Problem Evaluation Reports (PERs) 538996, 568242, and 568248.

The performance deficiency was determined to be greater than minor because it was associated with the protection against external events 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 lack of adequate drill performance could negatively affect the fire brigade's capability to combat a fire. Findings associated with performance of the fire brigade are not evaluated using IMC 0609, Attachment F, "Fire Protection Significance Determination Process," and Appendix M, "Significance Determination Process Using Qualitative Criteria," as described in NRC Inspection Manual Chapter 0609.04, Table 3b, "Phase 1 - Initial Screening and Characterization of Findings." The NRC concluded that the finding was of very low safety significance (Green) because the defense-in-depth attribute of the fire brigade was minimally affected, in that, the evaluated crew was only one of four crews of the site fire brigade team, the other crews had adequately been evaluated, and that the overall condition of the fire detection and suppression systems has been satisfactory. The finding was determined to have a crosscutting aspect in the area of Problem Identification and Resolution because of inadequate oversight and self-assessment of fire operations department activities, specifically fire brigade training. [P.3(a)] (Section 1R05)

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- Green. The inspectors identified a Green NCV of Unit 1 TS 6.8, "Procedures & Programs," for the licensee's failure to provide adequate procedures for maintenance and surveillance activities involving the main turbine throttle valves and the associated solid state protection system (SSPS) function which provides a reactor trip on turbine trip signal. The failure to include applicable torque requirements for set screws associated with the limit switch lever arm assembly resulted in one of the four turbine throttle valve position limit switches being in an inoperable condition such that the SSPS function of reactor trip on turbine trip, which involves a four-out-of-four logic, was inoperable and could not have functioned if required. This issue was entered into the licensee's corrective action program as Problem Evaluation Reports (PERs) 419594 and 518647

The finding was determined to be greater than minor because it was associated with the procedure quality attribute of the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the finding resulted in the inability of the SSPS to provide the required reactor trip signal upon closure of all four turbine throttle valves above 50 percent RTP. Using Inspection IMC 0609, "Significance Determination Process," Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to be of very low safety significance (Green) since the trip is not credited in any Updated Final Safety Analysis (UFSAR) Chapter 15 accident analysis and the redundant reactor trip on turbine trip function that is based on low auto stop oil pressure was unaffected.

The cause of this finding was determined to have a cross-cutting aspect in the area of Human Performance, Resources component, and the aspect of complete and accurate procedures and work packages. The procedures for performing maintenance and surveillance activities associated with the turbine throttle valves and associated SSPS function were not adequate to assure nuclear safety due to the failure to include applicable torque requirements for the components associated with the valve limit switch assembly. [H.2(c)]. (Section 4OA2.2)

#### B. Licensee-Identified Violations

A violation of very low safety significance, which was identified by the licensee, was reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and its respective corrective actions are listed in Section 4OA7 of this report.



## **REPORT DETAILS**

### **Summary of Plant Status:**

Unit 1 began the inspection period in a planned refueling outage. Following the outage, Unit 1 achieved criticality on March 31, 2012, and returned to 100 percent rated thermal power (RTP) on April 5, 2012. The unit remained at 100 percent RTP until May 22, when Unit 1 reduced power to 20 percent RTP to take the turbine offline for planned corrective maintenance to repair a seal oil heat exchanger leak and a hotwell pump motor. Unit 1 was returned to 100 percent RTP on May 29, where it operated for the remainder of the inspection period.

Unit 2 operated at or near 100 percent RTP until May 1, when power was reduced to approximately 90 percent RTP for planned corrective maintenance to repair a stator cooling water heat exchanger. The unit returned to 100 percent RTP on May 2 and remained there until May 30, when the unit reduced power to 89 percent RTP in response to a feedwater heater string isolation. Following repairs, the unit returned to 100 percent RTP on June 1, 2012, 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**

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

The inspectors performed the annual review of the licensee's readiness of offsite and alternate AC power systems prior to the onset of the high grid loading season. The inspectors reviewed procedures affecting these areas and the communications protocols between the transmission system operator and the licensee to verify that appropriate information is exchanged when issues arise that could impact the offsite power system. The inspectors walked down offsite power supply systems and emergency diesel generators, reviewed corrective action program documents, and interviewed appropriate plant personnel to assess deficiencies and plant readiness for summer high grid loading. Documents reviewed are listed in the Attachment. The inspectors completed one sample.

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

No findings were identified.

#### **1R04 Equipment Alignment**

##### **.1 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

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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.

- Unit 2 A Train Residual Heat Removal System
- 1A-A Emergency Diesel Generator while 1B Centrifugal Charging Pump was inoperable for a maintenance outage
- Unit 2 Motor-driven Auxiliary Feedwater Trains A and B during Turbine Driven Auxiliary Feedwater System Maintenance

b. Findings

No findings were identified.

.2 Complete System Walkdown

a. Inspection Scope

The inspectors performed a complete system walkdown of the Component Cooling Water System and support systems to verify proper equipment alignment, to identify any discrepancies that could impact the function of the system and increase risk, and to verify that the licensee properly identified and resolved equipment alignment problems that could cause events or impact the functional capability of the system.

The inspectors reviewed the UFSAR, system procedures, system drawings, and system design documents to determine the correct lineup and then examined system components and their configuration to identify any discrepancies between the existing system equipment lineup and the correct lineup. During the walkdown, the inspectors reviewed the following:

- Valves were correctly positioned and did not exhibit leakage that would impact the functions of any given valve.
- Electrical power was available as required.
- Major system components were correctly labeled, lubricated, cooled, ventilated, etc.
- Hangers and supports were correctly installed and functional.
- Essential support systems were operational.
- Ancillary equipment or debris did not interfere with system performance.
- Tagging clearances were appropriate.
- Valves were locked as required by the locked valve program.

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In addition, the inspectors reviewed outstanding maintenance work requests and design issues on the system to determine whether any condition described in those work requests could adversely impact current system operability. Documents reviewed are listed in the Attachment. The inspectors completed one sample.

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Fire Protection Tours

a. Inspection Scope

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

- 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)
- Control Building Elevation 732 (Mechanical Equipment Room and Relay Room)

b. Findings

No findings were identified.

.2 Annual Drill Observations

a. Inspection Scope

On June 13, 2012, the inspectors observed an announced fire drill in the 2-C CCW Excitation Transformer and CCW Pump. 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

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compared their findings with the licensee's observations and to the requirements specified in the licensee's Fire Protection report. The inspectors also reviewed the performance of an unannounced fire drill from December 5, 2011. This activity constituted one inspection sample.

b. Findings

Introduction: The inspectors identified a Green noncited violation of Units 1 & 2 Technical Specification 6.8.1.f for the licensee's failure to implement procedures required for fire protection program implementation. Specifically, the licensee failed to evaluate six minimum critical objectives on December 5, 2011 during a fire drill as required by TVA-SPP-17.16, Conduct and Evaluation of Fire Drills, revision 0.

Description: The inspectors reviewed the records for an unannounced fire drill that was conducted on December 5, 2011. The records included the TVA Fire Drill Evaluation Report which was used by the licensee's evaluation team to identify performance deficiencies during the fire drill. The inspectors reviewed procedure TVA-SPP-17.16, Conduct and Evaluation of Fire Drills, revision 0, which requires that the graded drill objectives listed in the Fire Drill Evaluation Report shall serve as the minimum drill objectives and expectations for each fire drill. The evaluation team for the fire drill conducted on December 5, 2011 marked six of these drill objectives "Not Applicable (N/A)" since the brigade did not physically respond to the scene of the simulated fire. The inspectors determined that this did not meet the requirements of the minimum drill objectives specified in TVA-SPP-17.16. The licensee entered this issue into their corrective action program as PERs 538996, 568242, and 568248.

Analysis: The failure to evaluate six minimum critical objectives on December 5, 2011 during a fire drill as required by TVA-SPP-17.16, Conduct and Evaluation of Fire Drills, revision 0 was a performance deficiency. The performance deficiency was determined to be greater than minor because it was associated with the protection against external events 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 lack of adequate drill performance could negatively affect the fire brigade's capability to combat a fire. Findings associated with performance of the fire brigade are not evaluated using IMC 0609, Attachment F, "Fire Protection Significance Determination Process," and require NRC management review using Appendix M, "Significance Determination Process Using Qualitative Criteria," as described in NRC Inspection Manual Chapter 0609.04, Table 3b, "Phase 1 - Initial Screening and Characterization of Findings." The NRC concluded that the finding was of very low safety significance (Green) because the defense-in-depth attribute of the fire brigade was minimally affected, in that, the evaluated crew was only one of four crews of the site fire brigade team, the other crews had adequately been evaluated, and that the overall condition of the fire detection and suppression systems has been satisfactory. The finding was determined to have a crosscutting aspect in the area of Problem Identification and Resolution because of inadequate oversight and self-assessment of fire operations activities, specifically fire brigade training. [P.3(a)]

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Enforcement: Units 1 and 2 TS 6.8.1.f required, in part, that written procedures be established, implemented, and maintained covering the activities involved with Fire Protection Program implementation. Procedure TVA-SPP-17.16, Conduct and Evaluation of Fire Drills, Revision 0, is one of the procedures that implement this requirement. Contrary to the above, on December 5, 2011, the licensee failed to evaluate six minimum critical objectives during a fire drill. Because the finding was of very low safety significance and has been entered into the licensee's CAP as PERs 538996, 568242, and 568248, this violation is being treated as an NCV, consistent with the Enforcement Policy: NCV 05000327,328/2012003-01, "Failure to Evaluate Fire Drill."

#### 1R07 Heat Sink Performance

##### a. Inspection Scope

The inspectors observed inspection of the Component Cooling Water (CCS) Heat Exchanger 0B2 and reviewed the results of inspection of the CCS Heat Exchanger 2A1 & 2A2 to determine whether there were any previously undetected adverse performance trends, whether the acceptance criteria and results appropriately considered differences between testing conditions and design conditions; whether test results were appropriately categorized against pre-established acceptance criteria; and whether the frequency of testing was sufficient to detect degradation prior to loss of heat removal capability below design basis values, and whether tube plugging guidance addressed the evaluation of remaining performance margin prior to plugging. The inspectors also reviewed work documents detailing observations and results of the last internal inspection of the heat exchangers. Documents reviewed are listed in the Attachment. The inspectors completed one 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 May 2, 2012. The training scenario involved PORV 68-334 Failing Open, Large Break LOCA, Safety Injection Pump 1B-B failing, and a AFW 1A-A discharge line break. The inspectors observed crew performance in terms of communications; ability to take timely and proper actions; prioritizing, interpreting and verifying alarms; correct use and implementation of procedures, including the alarm response procedures; timely control board operation and manipulation, including high risk operator actions; oversight and direction provided by shift manager, including the ability to identify and implement appropriate Technical Specification (TS) action; and, group dynamics involved in crew performance. The inspectors also observed the

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evaluators' critique and reviewed simulator fidelity to verify that it matched actual plant response. Documents reviewed are listed in the Attachment. This activity constituted one inspection sample.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance

a. Inspection Scope

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

- Operator compliance and use of procedures
- Control board manipulations
- Communication between crew members
- Use and interpretation of plant instruments, indications and alarms
- Use of human error prevention techniques
- Documentation of activities, including initials and sign-offs in procedures
- Supervision of activities, including risk and reactivity management
- Pre-job briefs

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

- Unit 1 power reduction to 20 percent RTP and turbine trip for planned corrective maintenance
- Unit 2 power reduction to 89 percent RTP and response to a feedwater heater string isolation

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

b. Findings

No findings were identified.

1R12 Maintenance Effectivenessa. Inspection Scope

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

- Maintenance Rule Tenth Periodic Assessment Report (PE sample)
- Function 333, Auxiliary Feedwater

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Controla. 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 four samples.

- Unit 1 Yellow Risk – 1B RHR Pump Outage
- Unit 2 Yellow Risk – 2B RHR Pump Outage
- Unit 1 & 2 Yellow Risk – CCS and AFW pump room cooler B-B outage
- Unit 2 Yellow Risk – TDAFW Maintenance

b. Findings

No findings were identified.

## 1R15 Operability Evaluations

### a. Inspection Scope

For the six operability evaluations described in the 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 UFSAR descriptions to determine if the system or component's intended function(s) were adversely impacted. In addition, the inspectors reviewed compensatory measures implemented to determine whether the compensatory measures worked as stated and the measures were adequately controlled. The inspectors also reviewed a sampling of PERs to assess whether the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment. The inspectors completed six samples.

- PER 506338, 1-FCV-63-156 missing spring pack cartridge cap bolt
- PER 506338, 1-FCV-63-156 broken and incorrect spring pack cartridge cap bolts discovered
- PER 521157, Limit switches for Safety Injection check valves appear to be inconsistent with EQ Binder qualification
- PER 508222, auxiliary building secondary containment enclosure breach
- PER 508848, main control room pressure boundary breach
- PER 349196, 6.9kV and 480V switchgear post-LOCA operability

### b. Findings

No findings were identified.

## 1R19 Post-Maintenance Testing

### a. 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 111984162, Spent Fuel Cooling System Heat Exchanger B Outlet Isolation Valve Inspection
- WO 111984164, Spent Fuel Cooling System Heat Exchanger B Inlet Flow Control Valve Inspection
- WO 113462549, Vital Battery III Replacement

b. Findings

No findings were identified.

1R22 Surveillance Testing

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.

In-Service Tests:

- 1-SI-SXV-000-203.0, Full Stroking of Category 'A' and 'B' Valves During Cold Shutdown, Revision 5, and 0-SI-SXV-001-266.0, ASME Code Valve Testing, Revision 34
- 1-SI-SXV-000-201.0, Full Stroking of Category 'A' and 'B' Valves During Operation, Revision 16, Appendix F, Train B Containment Spray
- 1-SI-SXP-072-201.B, Containment Spray Pump 1B-B Performance Test, Revision 15

Routine Surveillance Tests:

- 2-SI-OPS-082-007.B, Electrical Power System Diesel Generator 2B-B, Revision 52
- 0-SI-SXI-003-300.5A, System Leakage Test ERCW Supply to A-Train MDAFW Pump, Revision 1

b. Findings

No findings were identified.

1EP6 Drill Evaluation

a. Inspection Scope

Resident inspectors evaluated the conduct of routine licensee emergency drills on April 17, 2012, and June 26, 2012, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation (PAR) development

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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 46. 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 two samples.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors sampled licensee submittals for the PIs listed below for the period from April 1, 2011 through March 31, 2012, for both Unit 1 and Unit 2. Definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Indicator Guideline, Revision 6, were used to determine the reporting basis for each data element in order to verify the accuracy of the PI data reported during that period.

Cornerstone: 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.

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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.

.2 Selected Issue Follow-up: Unit 1 Turbine Throttle Valve #2 SSPS Limit Switch Failure

a. Inspection Scope

On August 18, 2011, Unit 1 experienced a reactor trip due to a momentary undervoltage condition sensed on two reactor coolant pumps when the 1A start bus transferred to its alternate supply. When the main turbine tripped during this event, operators noted that the Channel II turbine stop valve bistable light failed to give the expected indication upon valve closure. This indication led to the discovery that the #2 turbine throttle valve position limit switch which provides the valve closure signal required for the solid state protection system (SSPS) reactor trip on turbine trip function was in an inoperable condition.

The inspectors reviewed the licensee's actions in response to this condition, including actions to determine and correct the cause of the failure. The inspectors reviewed PERs 419594 and 518647 dealing with this event, interviewed engineering and operations personnel, and reviewed the licensee's corrective actions.

b. Findings and Observations

One of the functions of the SSPS involves generating a reactor trip signal when four-out-of-four turbine throttle valves closure signals are received at power levels above 50 percent RTP. Upon discovery of the above condition, this function, required by TS LCO 3.3.1.1, Reactor Trip System Instrumentation, was declared inoperable due to the absence of a valve closure signal from one of the four valves. Although the unit was not in an applicable Mode of operation at the time of discovery of the condition, it was

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determined that the required function could not have been met if it had been required while in Mode 1 prior to the event. The licensee entered the discovery of this condition into the CAP as PER 419594 on August 19, 2011. This resulted in corrective maintenance being performed to repair the valve position limit switch lever arm, which was discovered to be loose.

In their review of the licensee event report (LER) associated with this event in March of 2012, the inspectors observed that no cause evaluation was performed in response to PER 419594. In response to this observation, the licensee initiated PER 518647, which included an apparent cause evaluation which was completed in April 2012. The inspectors reviewed this cause evaluation and associated corrective actions. The inspectors determined that the licensee's apparent cause evaluation associated with PER 518647 was thorough and that the corrective actions appeared to be adequate to address the identified causes. The licensee's investigation determined that the cause of the failure was a loose limit switch lever arm set screw, and that appropriate procedural guidance for torquing this component to its required torque value has not been incorporated into applicable maintenance and surveillance procedures which had been performed on the equipment during outages prior to this event, including maintenance procedure IMI-47-TV-GV, Main Turbine Throttle Valve Governor Valve Calibration, Revision 15, which had been performed during the prior refueling outage on November 4, 2010, and surveillance procedure 0-SI-IFT-099-093.1, Functional Tests of Turbine Auto Stop Oil Dump and Throttle Valves Reactor Trips, Revision 29, which had been performed during a prior forced outage on June 27, 2011. The licensee's corrective actions included revision to these procedures to incorporate the applicable torque requirements.

One finding was identified, as detailed below.

Introduction: The inspectors identified a Green NCV of Unit 1 TS 6.8, "Procedures & Programs," for the licensee's failure to provide adequate procedures for maintenance and surveillance activities involving the main turbine throttle valves and the associated solid state protection system (SSPS) function which provides a reactor trip on turbine trip signal. This resulted in one of the four turbine throttle valve position limit switches being in an inoperable condition such that the SSPS function of reactor trip on turbine trip, which involves a four-out-of-four logic, was inoperable and could not have functioned if required.

Description: On August 18, 2011, the SSPS function involving a reactor trip on turbine trip when four-out-of-four turbine throttle valve closure signals are generated above 50 percent RTP was discovered to be in an inoperable condition due to the failure of the #2 turbine throttle valve limit switch to provide the required signal. This affected function did generate the expected valve closure signal during a plant trip which occurred on July 20, 2011, but failed to function as required during the plant trip that occurred on August 18, 2011. The cause of this failure was determined to be that the limit switch lever arm set screw was loose, and that appropriate procedural guidance for torquing this component to its required torque value has not been incorporated into applicable maintenance and surveillance procedures which had been performed on the equipment during outages prior to this event, including maintenance procedure IMI-47-TV-GV, Main Turbine

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Throttle Valve Governor Valve Calibration, Revision 15, which had been performed during the prior refueling outage on November 4, 2010, and surveillance procedure 0-SI-IFT-099-093.1, Functional Tests of Turbine Auto Stop Oil Dump and Throttle Valves Reactor Trips, Revision 28, which had been performed during a prior forced outage on June 27, 2011.

Analysis: The licensee's failure to perform adequate maintenance and surveillance activities involving the main turbine throttle valves and associated SSPS reactor trip function such that the activities adversely impacted the ability of the equipment to function as required was a performance deficiency. The finding was determined to be greater than minor because it was associated with the procedure quality attribute of the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the finding resulted in the inability of the SSPS to provide the required reactor trip signal upon closure of all four turbine throttle valves above 50 percent RTP. Using Inspection IMC 0609, "Significance Determination Process," Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to be of very low safety significance (Green) since the trip is not credited in any Updated Final Safety Analysis (UFSAR) Chapter 15 accident analysis and the redundant reactor trip on turbine trip function that is based on low auto stop oil pressure was unaffected.

The cause of this finding was determined to have a cross-cutting aspect in the area of Human Performance, Resources component, and the aspect of complete and accurate procedures and work packages. The procedures for performing maintenance and surveillance activities associated with the turbine throttle valves and associated SSPS function were not adequate to assure nuclear safety due to the failure to include applicable torque requirements for the components associated with the valve limit switch assembly. [H.2(c)].

Enforcement: Unit 1 TS 6.8.1.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 9.a, "Procedures for Performing Maintenance," required, in part, that 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. Section 8.b.(1)(I) required procedures for reactor protection system surveillance tests and calibrations. Contrary to the above, on November 4, 2010, and June 27, 2011, the licensee failed to establish adequate written procedures appropriate to the circumstances for maintenance that could affect the performance of safety-related equipment and for reactor protection system surveillance testing. Specifically, the maintenance procedure IMI-47-TV-GV, Main Turbine Throttle Valve Governor Valve Calibration, Revision 15, and surveillance procedure 0-SI-IFT-099-093.1, Functional Tests of Turbine Auto Stop Oil Dump and Throttle Valves Reactor Trips, Revision 28, failed to contain applicable torque requirements for set screws associated with the valve limit switch lever arm, which resulted in subsequent discovery of the SSPS function in an

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inoperable condition. Because the finding was of very low safety significance and has been entered into the licensee's CAP as PERs 419594 and 518647, this violation is being treated as an NCV, consistent with the NRC Enforcement Policy: NCV 05000327/2012003-02, "Turbine Throttle Valve Reactor Trip Function Degraded."

### .3 Semi-Annual Trend Review

#### a. Inspection Scope

As required by Inspection Procedure 71152, the inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors review was focused on repetitive equipment issues, but also included licensee trending efforts and licensee human performance results. The inspectors review nominally considered the twelve-month period of June 2011 through June 2012, although some examples expanded beyond those dates when the scope of the trend warranted. Specifically, the inspectors considered the results of daily inspector screening discussed in Section 4OA2.1 and reviewed licensee trend reports for the period in order to determine the existence of any adverse trends that the licensee may not have previously identified. This inspection satisfied one inspection sample for Semi-annual Trend Review.

#### b. Findings and Observations

No findings were identified. In general, the licensee had identified trends and appropriately addressed them in their CAP. The inspectors evaluated the licensee trending methodology and observed that the licensee had performed a detailed review. The licensee routinely reviewed cause codes, involved organizations, key words, and system links to identify potential trends in their data. The inspectors compared the licensee process results with the results of the inspectors' daily screening. No previously unidentified trends of significance 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 Operation of an Independent Spent Fuel Storage Installation at Operating Plants (60855.1)

a. Inspection Scope

The inspectors reviewed a licensee-identified violation of NRC requirements with respect to its Independent Spent Fuel Storage Facility Installation (ISFSI) operations. 10 CFR 72.212(b)(3) states, "The general licensee must: Ensure that each cask used by the general licensee conforms to the terms, conditions, and specifications of a CoC or an amended CoC listed in 72.214." Condition 2 of Certificate of Compliance (CoC) 1014, Amendment 5, states, "Written operating procedures shall be prepared for cask handling, loading, movement, surveillance, and maintenance. The user's site-specific written operating procedures shall be consistent with the technical basis described in Chapter 8 of the Final Safety Analysis Report (FSAR)."

Contrary to the above, TVA's site-specific written operating procedures were not consistent with the technical basis described in Chapter 8 of the FSAR, Revision 7. Specifically, Section 8.1.5, Multi-Purpose Canister (MPC) Closure, Step 6.n. states..."backfill the MPC in accordance with the technical specifications." TVA's procedure NFTP-100, Fuel Selection for Dry MPC Storage, Revision 0006, was not consistent with the technical basis because it did not contain the correct methodology to calculate the cask heat load,  $Q_{(CoC)}$ . As a result, the  $Q_{(CoC)}$ , was incorrectly calculated for two casks previously loaded at Sequoyah (MPC SN-103 and MPC SN-107); which caused the casks to be backfilled with less helium than specified in Technical Specification (TS) Section 3.1.1, Multi-Purpose Canister (MPC). The  $Q_{(CoC)}$ , of MPC SN-0107 was reanalyzed and it was determined that, when actually loaded (approximately a year later than originally planned, which allowed the heat load additional time to decay away), the acceptance criterion for the helium backfill TS limit had actually been met and had not been in violation of the TS. However, when the MPC SN-0103 heat load was reanalyzed, its helium backfill TS limit was not met.

b. Findings

Because the TS limit was not met, this issue is more than minor and is a Severity Level IV violation.

4OA6 Meetings.1 Exit Meeting Summary

On July 5, 2012, the resident inspectors presented the inspection results to Mr. J. Carlin and other members of his staff, who acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

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**4OA7 Licensee-identified Violations**

The violation referenced in Section 4OA5.2 was identified by the licensee and meets the criteria of Section 2.3.2.b of the NRC Enforcement Policy for characterization as a Non-Cited Violation.

This issue is in the licensee's CAP as PER 452027, "MPC Forced Helium Dehydration Calculation Methodology." This is a Severity Level IV violation and is being treated as a non-cited violation (NCV), consistent with Section 2.3.2.b of the NRC Enforcement Policy; specifically, the violation was identified by the licensee, the issue was placed into the licensee's CAP, the violation was not repetitive as a result of inadequate corrective action, and the violation was not willful. Documents reviewed are listed in the Attachment.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee personnel**

J. Carlin, Site Vice President  
S. Connors, Operations Manager  
G. Cook, Site Licensing Manager  
J. Cross, Chemistry Manager  
A. Day, Radiation Protection Manager  
C. Dieckmann, Manager, Maintenance  
Z. Kitts, Licensing Engineer  
A. Little, Site Security Manager  
T. Marshall, Director, Safety and Licensing  
S. McCamy, Quality Assurance Manager  
P. Noe, Site Engineering Director  
P. Pratt, Work Control Manager  
J. Reidy, Operations Superintendent  
P. Simmons, Plant Manager  
D. Sutton, Licensing Engineer  
C. Ware, Training Director  
K. Wilkes, Operations Support Superintendent

#### **NRC personnel**

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

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

#### **Opened and Closed**

|                         |     |                                                                           |
|-------------------------|-----|---------------------------------------------------------------------------|
| 05000327,328/2011003-01 | NCV | Failure to Evaluate Fire Drill (Section 1R05)                             |
| 05000327/2011003-02     | NCV | Turbine Throttle Valve Reactor Trip<br>Function Degraded (Section 4OA2.2) |

## **LIST OF DOCUMENTS REVIEWED**

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

#### Procedures

TRO-TO-SOP-30.129, Sequoyah Nuclear Plant (SQN) Grid Operating Guide Revision 13  
COO-IGA-10.001, Nuclear Power Group and Power System Operations Intergroup Agreement (IGA), Revision 00  
0-PI-OPS-000-006.1, Summer Operations, Completed 5/4/2012

#### Other documents

2012 Plant Grid Interface (PGI) Meeting Minutes, February 1, 2012

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

#### Partial System Walkdowns

##### Procedures

0-SO-82-1, Diesel Generator 1A-A, Revision 0037  
0-SO-82-5, Diesel Generator 1A-A Support Systems, Revision 0020  
0-GO-14-7, AUO Operator Rounds – Outside, Revision 38  
0-SO-74-1, Residual Heat Removal System, Revision 84  
2-SO-3-2, Auxiliary Feedwater System, Revision 38

#### Complete System Walkdown

##### Procedures

0-SO-70-1, Component Cooling Water System B Train, Revision 41  
1-SO-70-1, Component Cooling Water System Unit 1 A Train, Revision 50  
2-SO-70-1, Component Cooling Water System Unit 2 A Train, Revision 41

#### Other documents

FSAR Section 9.2.1, Component Cooling System

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

#### Procedures

FPDP-1, Conduct of Fire Protection, Revision 2  
0-PI-FPU-317-299.W, Att. 8, Shift Check List, Revision 32  
NPG-SPP-18.4.7, Control of Transient Combustibles, Rev. 0  
EITP-100, Environmental Compliance, Rev. 6  
0-SI-FPU-410-703.0, Inspection of FPR Required Fire Doors, Rev. 5  
SQN-FPR-Part-II, SQN Fire Protection Report Part II – Fire Protection Plan, Revision 28

#### Other documents

CON-0-669-00, Fire Protection Pre-Fire Plans Control Building - El. 669, Revision 3  
CON-0-685-00, Fire Protection Pre-Fire Plans Control Building - El. 685, Revision 5  
CON-0-706-00, Fire Protection Pre-Fire Plans Control Building - El. 706, Revision 5  
CON-0-732-00, Fire Protection Pre-Fire Plans Control Building - El. 732, Revision 6

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## **Section R07: Heat Sink Performance**

### Procedures

0-SO-70-1, Component Cooling Water System B Train, Revision 41

### Work Orders

112063876, CCS Heat Exchanger 0B2 clam inspection

## **Section R11: Licensed Operator Regualification**

S-77, Simulator Exam Guide - RCS Leak, RCP Trip LB LOCA, Revision 0

## **Section R12: Maintenance Effectiveness**

### Procedures

TI-4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting – 10CFR50.65, Revision 23

### Other documents

Maintenance Rule Tenth Periodic Assessment Report Units 1, 2, & Common, Revision 0

## **Section R15: Operability Evaluations**

### PERs

506338 – 1-FCV-63-156 missing spring pack cartridge cap bolt

506338 – 1-FCV-63-156 broken and incorrect spring pack cartridge cap bolts discovered

521157 – Limit switches for Safety Injection check valves appear to be inconsistent with EQ Binder qualification

### Other documents

SNQ-DC-V-21.0, Environmental Design, Revision 21

Calculation MDQ00003120020121, 6.9kV and 480V Board Room Transient Temperature Analysis

Calculation GENSTP3-001, Upper Boundary Temperature for Mild Environments Related to Environmental Qualification of Electrical Equipment

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

### Procedures

MMDP-1, Maintenance Management System, Revision 20

0-MI-EMV-317-146.0, Inspection, Preventive and Corrective Maintenance of Limitorque Motor Operators Maintenance Instruction, Revision 30

0-SI-SXV-000-206.0, Testing of Category A and B Valves after Work Activities, Revision 6

0-SI-EBT-250-100.2, 125Vdc Battery Quarterly Operability, Revision 18

0-PI-EBM-000-001.2, Battery Bank High Level Equalize Charge, Revision 24

0-SI-EBT-250-100.4, Modified Performance Testing of 125Vdc Vital Batteries and 125Vdc Vital Battery Charger Test, Revision 26

Work Orders

111984162, Spent Fuel Cooling System Heat Exchanger B Outlet Isolation Valve Inspection  
 111984164, Spent Fuel Cooling System Heat Exchanger B Inlet Flow Control Valve Inspection  
 113462549  
 113483180  
 113188276  
 113483157

**Section R22: Surveillance Testing**Procedures

NPG-SPP-06.9.1, Conduct of Testing, Revision 5  
 0-SI-SXV-072-266.0, ASME Code Valve Testing, Revision 11  
 0-SI-OPS-068-137.0, Reactor Coolant System Water Inventory, Revision 29  
 0-SI-SXI-003-300.5A, System Leakage Test ERCW Supply to A-Train MDAFW Pump, Revision 1  
 2-SI-OPS-082-007.B, Electrical Power System Diesel Generator 2B-B, Revision 52  
 1-SI-SXV-000-203.0, Full Stroking of Category "A" and "B" Valves During Cold Shutdown, Revision 5  
 0-SI-SXV-001-266.0, ASME Code Valve Testing, Revision 34  
 0-PI-SXV-001-001.0, Stroke Testing of MSIVs At Operating Temperature, Revision 5  
 1-SI-SXV-000-201.0, Full Stroking of Category 'A' and 'B' Valves During Operation, Revision 16, Appendix F, Train B Containment Spray  
 1-SI-SXP-072-201.B, Containment Spray Pump 1B-B Performance Test, Revision 15

Work Orders

111995485  
 111995448

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

NPG-SPP-02.2, Performance Indicator Program, Revision 2  
 NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 6  
 0-TI-CEM-000-001.3, Primary Chemistry Specifications, Revision 62

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

NPG-SPP-03.1, Corrective Action Program, Revision 1  
 IMI-47-TV-GV, Main Turbine Throttle Valve Governor Valve Calibration, Revision 15  
 0-SI-IFT-099-093.1, Functional Tests of Turbine Auto Stop Oil Dump and Throttle Valves Reactor Trips, Revision 28

Work Orders

112396955

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

PER 452027, MPC Forced Helium Dehydration Calculation Methodology  
Functional Evaluation for PER 452027, MPC Forced Helium Dehydration Calculation  
Methodology  
Apparent Cause Evaluation Report  
Engineering Evaluation for Loaded MPC-107 to Address LCO 3.1.1

**Procedures**

NFTP-100, Fuel Selection for Dry MPC Storage, Rev. 0007  
SQN-DCS-300.10, Forced Helium Dehydration System Operation, Revision 15

**Other Documents**

Holtec Certificate of Compliance 1014, Amendment 5, Technical Specifications  
FSAR for the HI-STORM 100 Cask System, Revision 7  
Response to Request for Technical Information (RRTI) 1058-004, Revision 0  
Engineering Change Order 196, Revision 0  
Holtec Information Bulletin (HIB) 51, Total MPC Heat Loads as They Apply to Specific Loading,  
Unloading, and Surveillance Operations. Revision 1

**Work Orders**

WO2009-770421-011 SQN-DCS-300.10 for MPC 107