



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

April 29, 2010

Mr. R. M. Krich  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
3R Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

**SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000327/2010002, 05000328/2010002**

Dear Mr. Krich:

On March 31, 2010, 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 6, 2010 with Mr. K. Langdon and other members of your 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.

This report documents one self-revealing finding of very low safety significance (Green). This finding did not involve a violation of NRC requirements. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. However, because of the very low safety significance and because it is entered into your corrective action program, the NRC is treating this finding as a non-cited violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Sequoyah Nuclear Plant.

In addition, if you disagree with the characterization of 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, Region II, and the NRC Resident Inspector at the Sequoyah Nuclear Plant. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

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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/*

Eugene F. Guthrie, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000327/2010002, 05000328/2010002  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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/**

Eugene F. Guthrie, Chief  
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cc w/encl:  
C.R. Church  
Vice President  
Sequoyah Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Soddy-Daisy, TN 37384-2000

K. Langdon  
Plant Manager  
Sequoyah Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Soddy Daisy, TN 37384-2000

B. A. Wetzel  
Manager  
Licensing and Industry Affairs  
Sequoyah Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Soddy Daisy, TN 37384-2000

E. J. Vigluicci  
Assistant General Counsel  
Tennessee Valley Authority  
6A West Tower  
400 West Summit Hill Drive  
Knoxville, TN 37902

County Mayor  
Hamilton County  
Hamilton County Courthouse  
Chattanooga, TN 37402-2801

Division of Radiological Health  
TN Dept. of Environment & Conservation  
401 Church Street  
Nashville, TN 37243-1532

Ann Harris  
341 Swing Loop  
Rockwood, TN 37854

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Letter to R. M. Krich from Eugene Guthrie dated April 29, 2010

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000327/2010002, 05000328/2010002

Distribution w/encl:

C. Evans, RII

L. Slack, RII

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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.: 05000327/2010002, 05000328/2010002

Licensee: Tennessee Valley Authority (TVA)

Facility: Sequoyah Nuclear Plant, Units 1 and 2

Location: Sequoyah Access Road  
Soddy-Daisy, TN 37379

Dates: January 1, 2010 – March 31, 2010

Inspectors: C. Young, Senior Resident Inspector  
M. Speck, Resident Inspector  
R. Baldwin, Senior Operations Engineer (1R11.2)  
C. Kontz, Senior Project Engineer (1R04.2)  
W. Deschaine, Project Engineer  
R. Carrion, Senior Reactor Inspector (4OA5.3)

Approved by: Eugene F. Guthrie, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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## SUMMARY OF FINDINGS

IR 05000327/2010002, 05000328/2010002, 01/01/2010 – 03/31/2010; Sequoyah Nuclear Plant, Units 1 and 2; Event Followup.

The report covered a three-month period of inspection by resident inspectors and announced inspections by regional inspectors. One Green finding was identified. The significance of most findings are indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

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

Cornerstone: Initiating Events

Green. A self-revealing finding was identified for two examples of the licensee's failure to follow station procedures. The licensee failed to follow work order instructions to ensure two valves associated with the main feedwater pump turbine seal steam supply standpipe level switch were placed in their required positions following maintenance. Additionally, the licensee subsequently failed to follow requirements for procedure use and adherence when implementing a system operating procedure step to ensure the main feedwater pump turbine gland steam supply drain valves were in their required positions. This resulted in a manual reactor trip of Unit 2 due to indications of a loss of main feedwater pump turbine condenser vacuum. The licensee entered this event into their corrective action program as PER 209482.

The finding was determined to be greater than minor because it was associated with the configuration control attribute of the initiating events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions. Using Inspection IMC 0609, "Significance Determination Process," Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to have very low safety significance (Green) because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigating systems will not be available.

The cause of this finding was determined to have a cross-cutting aspect in the area of human performance associated with the work practices component. The causes associated with the failures to follow procedures were directly related to inadequate implementation of human error prevention techniques such as self and peer checking, proper documentation of activities, and not proceeding in the face of uncertainty or unexpected circumstances [H.4(a)].

### B. Licensee-Identified Violations

A violation of very low safety significance that was identified by the licensee has been 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 corrective action tracking number are listed in Section 4OA7 of this report.

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## REPORT DETAILS

### Summary of Plant Status:

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

Unit 2 operated at or near 100 percent RTP until March 26, 2010, when power was reduced to approximately 59 percent RTP to facilitate removing the 2A main feedwater pump from service due to the presence of water in the pump oil. Unit 2 remained at approximately 59 percent RTP for the remainder of the inspection period while conducting repairs.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

##### 1R01 Adverse Weather Protection

###### .1 Tornado Watch

###### a. Inspection Scope

The inspectors observed the licensee's response to a tornado warning on January 21, 2010. The inspectors reviewed licensee Procedure AOP-N.02, Tornado Watch/Warning, Revision 24, for its effectiveness to limit the risk of tornado-related initiating events and to adequately protect mitigating systems from the effects of a tornado and verified licensee performance of required actions. In addition, the inspectors verified that no loose debris was in the 500kV and 161kV Switchyards which would serve as missile hazards during a tornado. This activity constituted one inspection sample.

###### b. Findings

No findings of significance were identified.

##### 1R04 Equipment Alignment

###### .1 Partial System Walkdown

###### a. Inspection Scope

The inspectors performed three partial walkdowns of the following system 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

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entered them into the corrective action program (CAP). Documents reviewed are listed in the Attachment.

- Unit 1 Auxiliary Feedwater Turbine-driven and Motor-driven B-train During Motor-driven A-train Scheduled Maintenance
- Emergency Diesel Generators 1A-A, 2A-A, 2B-B During 1B-B Battery Replacement
- Unit 2 Emergency Core Cooling System Train A During Train B Maintenance

b. Findings

No findings of significance were identified.

.2 Complete System Walkdown

a. Inspection Scope

The inspectors performed a complete system walkdown of the Train A Essential Raw Cooling Water (ERCW) 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 Updated Final Safety Analysis Report (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. 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.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

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

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protection equipment were implemented in accordance with the licensee's fire plan. Documents reviewed are listed in the Attachment.

- Control Building Elevation 669 (Mechanical Equipment Room, 250 VDC Battery and Battery Board Rooms)
- Control Building Elevation 706 (Cable Spreading Room)
- Control Building Elevation 685 (Auxiliary Instrument Rooms)
- Essential Raw Cooling Water Building (ERCW)
- Emergency Diesel Generator Building (EDG)
- Control Building Elevation 732 (Mechanical Equipment Room and Relay Room)

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program

.1 Requalification Activities Review by Resident Staff

a. Inspection Scope

The inspectors performed one licensed operator requalification program review. The inspectors observed a simulator session on March 15, 2010. The training scenario involved a heater drain tank level controller failure resulting in turbine runback, followed by a steam generator tube leak. While performing required actions for the leak, the leak degraded to a tube rupture requiring a manual reactor trip, initiation of safety injection, plant cooldown and depressurization and declaration of an alert. Additional anomalies included a failure of the turbine driven auxiliary feedwater pump and 1A EDG to auto start, as well as a failure of a manual reactor trip switch to manually trip the reactor. The inspectors observed crew performance in terms of: communications; ability to take timely and proper actions; prioritizing, interpreting and verifying alarms; correct use and implementation of procedures, including the alarm response procedures; timely control board operation and manipulation, including high risk operator actions; oversight and direction provided by shift manager, including the ability to identify and implement appropriate Technical Specification (TS) action; and, group dynamics involved in crew performance. The inspectors also observed the evaluators' critique and reviewed simulator fidelity to verify that it matched actual plant response. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

.2 Biennial Review by Regional Specialist

a. Inspection Scope

Annual Review of Licensee Regualification Examination Results. On December 17, 2009, the licensee completed the comprehensive biennial requalification written examinations and annual requalification operating tests required to be administered to all licensed operators in accordance with 10 CFR 55.59(a)(2). The inspectors performed an in-office review of the overall pass/fail results of the written examinations, individual operating tests and the crew simulator operating tests. These results were compared to the thresholds established in Manual Chapter 609 Appendix I, Operator Requalification Human Performance Significance Determination Process.

b. Findings

No findings of significance were identified

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the two maintenance activities listed below to verify the effectiveness of the 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.

- U2 Containment Radiation Monitors – 2-RM-90-106 and -112
- MCR Chiller A-train Failures

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the five 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

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assessment tool use and risk categories were in accordance with Standard Programs and Processes Procedure (SPP)-7.1, "On-Line Work Management," Revision 12, and Instruction 0-TI-DSM-000-007.1, "Risk Assessment Guidelines," Revision 8. Documents reviewed are listed in the Attachment. This inspection satisfied five inspection samples for Maintenance Risk Assessment and Emergent Work Control.

- Yellow PSA Risk – Unit 1 – Motor-driven AFW A-train scheduled maintenance
- Intermittent Electrical Ground on 2B MFP Trip Bus Coincident with Scheduled Maintenance on Motor-driven AFW Pump 2A and Unit 2 Digital Feedwater Control System Adjustments
- Yellow PSA Risk – Unit 2 – Motor-driven AFW B-train scheduled maintenance/1B-B Emergency Diesel Generator Battery Replacement
- Unplanned Inoperability of A MCR AHU and 1A EDG during B-train work week
- Unplanned Unavailability of Essential Raw Cooling Water (ERCW) Strainer A1A-A While ERCW B-B Bay Out of Service for Silt Removal

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

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 the 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.

- PER 213177, Main control room air conditioning B-train Air Handling Unit Fan RPM Below Acceptance Range
- PER 162711, Probable maximum flood level evaluation
- Main Bank Transformer 2C Cooling System Failure
- PER 174408, Saturation Monitor Channel Check Allowed Deviation is Excessively Large
- PER 216867, ERCW pump 10 CFR Part 21 evaluation

b. Findings

No findings of significance were identified.

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## 1R18 Plant Modifications

### .1 Temporary Modifications

#### a. Inspection Scope

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

- TACF 0-09-014-032, Temporary Station Air Compressor

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 of significance were identified.

## 1R19 Post-Maintenance Testing

#### a. Inspection Scope

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

- WO 10-770120-000, MCR Chiller A Tripped, Troubleshoot/Repair
- WO 09-772143-000, MCR Air Handling Unit B Fan Belt Preventive Maintenance
- WO 10-771000-000, Repairs Following B-Train ABGTS Failed Draw-down Test
- WO 06-780407-000, Replace Emergency Diesel Generator 1B-B Battery
- WO 10671494, 125V Vital Battery Charger III Erratic Operation
- WO 110701039, Inspect/Adjust Fuse Clip Tension on MCR Air Handling Unit A

#### b. Findings

No findings of significance were identified.

## 1R22 Surveillance Testing

### a. Inspection Scope

For the seven 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 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 seven samples.

#### Routine Surveillance Tests:

- 0-SI-EBT-250-100.5, Performance Testing of 125Vdc Vital Batteries and 125Vdc Vital Battery Charger Test (Vital Battery V), Revision 16
- 0-SI-IFT-030-149.B, Auxiliary Building Gas Treatment System Vacuum Test Train B, Revision 17
- 1-SI-OPS-082-024.A, 1A-A EDG 24 Hour Run and Load Rejection Test, Revision 20
- 0-SI-CEM-000-050.0, Chemistry's Comprehensive Reactivity Management, Nuclear Safety, & Fuel Integrity Monitoring Requirements, Revision 31
- 2-SI-OPS-082-007.B, Electrical Power System Diesel Generator 2B-B, Revision 46

#### In-Service Test:

- 1-SI-SXP-074-201.B, Residual Heat Removal Pump 1B-B Performance Test, Revision 13

#### RCS leakage test:

- 0-SI-OPS-068-137.0, RCS Water Inventory, Revision 23

### b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

## 1EP6 Drill Evaluation

### a. Inspection Scope

Resident inspectors evaluated the conduct of routine licensee emergency drills on March 9, 2010, and March 16, 2010, 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

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control room to verify that event classification and notifications were done in accordance with EPIP-1, Emergency Plan Classification Matrix, Revision 43. 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 of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors sampled licensee submittals for the 2 PIs listed below for the period from January 1, 2009 through December 31, 2009 for both Unit 1 and Unit 2. Definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Indicator Guideline, Revision 6, were used to determine the reporting basis for each data element in order to verify the accuracy of the PI data reported during that period.

Cornerstone: Barrier Integrity

- Reactor Coolant System Activity
- Reactor Coolant System Leakage

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

b. Findings

No findings of significance 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 of significance were identified.

4OA3 Event Follow-up

.1 (Closed) LER 05000328/2009-002-00, Manual Reactor Trip because of Degrading Main Feedwater Pump Turbine Condenser Vacuum

a. Inspection Scope

On November 26, 2009, following a manual reactor trip of Unit 2 as a result of degrading main feedwater pump turbine condenser vacuum, 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 events were reported to the NRC as event notification (EN) 45520 and documented in the licensee corrective action program as PER 209482.

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

The inspectors reviewed the LER and PER 209482 to verify that the cause of the reactor trips was identified and whether corrective actions were appropriate. The licensee's root cause evaluation identified the root and significant contributing causes to be: weaknesses in enforcing proper standards for status control during work development and execution, and failure to properly utilize the fundamental human performance tool of procedure use and adherence. The inspectors concluded that the licensee's corrective actions to this event were appropriate, including clarifying and strengthening requirements for status control in the planning and performance of maintenance work orders. The inspectors also verified that timely notifications were made in accordance with 10 CFR 50.72, that licensee staff properly implemented the appropriate plant procedures, and that available plant equipment performed as required.

One finding of significance was identified, as discussed below. This LER is closed.

b. Findings

Introduction. A Green self-revealing finding was identified for two examples of the licensee's failure to follow station procedures. The licensee failed to follow work order instructions to ensure two valves associated with the main feedwater pump (MFP) turbine seal steam supply standpipe level switch were placed in their required positions following maintenance. Additionally, the licensee subsequently failed to follow

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requirements for procedure use and adherence when implementing a system operating procedure step to ensure the MFP turbine gland steam supply drain valves were in their required positions. This resulted in a manual reactor trip of Unit 2 due to indications of a loss of MFP turbine condenser vacuum.

Description. On November 26, 2009, with Unit 2 operating at approximately 30 percent RTP during startup from a refueling outage, operators observed indications of degrading MFP turbine condenser vacuum. The 2A MFP was in service at the time. Operators responded in accordance with plant procedures by manually tripping the reactor due to the potential for a loss of main feedwater supply to the steam generators to occur.

The MFP turbine gland steam supply drain valves, 2-FCV-47-291 and 2-FCV-47-292, are normally shut and, when open, port gland seal steam to the MFP turbine condenser drain lines for the purpose of allowing accumulated condensation in the seal steam supply lines to drain. The opening of these valves is controlled by a standpipe level switch on the seal steam supply line. Valves 2-47-400A and 2-47-401A, which are isolation valves for the level switch, were found to be closed.

The licensee entered this event into their corrective action program as PER 209482. The licensee's root cause evaluation determined that maintenance had been conducted on the level switch per WO 08-778672-000 during the time period of November 8, 2009, through November 24, 2009. The WO required the level switch isolation valves to be verified shut, which was accomplished prior to maintenance on November 16, 2009. The WO post maintenance test step 1.1.a required: "Valve in LS-47-184 by ensuring 2-47-400A & 401A are open." This step was signed off with a date of November 24, 2009. The licensee's root cause evaluation determined the worker performing this step mistakenly assumed that the step could be signed off based on the previously completed post maintenance testing of the level switch, and proceeded to do so without positioning the isolation valves.

Subsequent to this, operations personnel were performing the required sections of 2-SO-2/3-1, "Condensate and Feedwater System," revision 68, during plant startup. This procedure was classified as a continuous use procedure per SPP 2.2, "Administration of Site Technical Procedures," revision 16, which requires that each step must be performed exactly as written and in the exact sequence specified unless the procedure allows working steps out of sequence. Step 5.13.1.4 contained a requirement to "ensure drain valves on MFPT glad steam supply closed," which was preceded by a note which indicated that "if the level switch has actuated, the valves will remain open until reset using local handswitch." Attempts to reset the drain valves were unsuccessful (since the level switch remained isolated with an open signal locked in). Operations personnel continued on with the procedure without adequately addressing the inability to meet the requirements of the step. SPP-2.2, "Administration of Site Technical Procedures," revision 16, section 3.1.A.4.a required "stopping performance of a procedure, if the procedure cannot be performed or completed as written." Section 3.2.1.B.3 also required "where sign-offs of steps are required, each step must be signed-off as complete before proceeding."

Analysis. The licensee's failure to follow work order procedure steps to ensure valves 2-47-400A and 2-47-401A were placed in their required positions following maintenance was a performance deficiency. Additionally, the licensee's failure to follow requirements for procedure use and adherence when implementing a system operating procedure step to ensure the MFP turbine gland steam supply drain valves were in their required positions was a performance deficiency. This resulted in a manual reactor trip during plant startup due to indications of degrading MFP turbine condenser vacuum. The finding was determined to be greater than minor because it was associated with the configuration control attribute of the initiating events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions. Using Inspection IMC 0609, "Significance Determination Process," Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to have very low safety significance (Green) because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigating systems will not be available.

The cause of this finding was determined to have a cross-cutting aspect in the area of human performance associated with the work practices component. The causes associated with the failures to follow procedures were directly related to inadequate implementation of human error prevention techniques such as self and peer checking, proper documentation of activities, and not proceeding in the face of uncertainty or unexpected circumstances [H.4(a)].

Enforcement. Enforcement action does not apply because the performance deficiency did not involve a violation of regulatory requirements. No violation of NRC requirements was identified since the procedures and affected equipment were not safety-related. Because this finding has been entered into the licensee's corrective action program as PER 209482, and has very low safety significance, it is identified as FIN 05000328/2010002-01, "Reactor Trip due to Inadequate Configuration Control."

.2 (Closed) LER 05000327,328/2009-007-00, Failure to Perform a Technical Specification (TS) Action within the Required Timeframe

On September 23, 2009, the licensee discovered that approximately 2 hours and 45 minutes had elapsed since the 2B EDG had been declared inoperable for scheduled surveillance testing, and that TS LCO 3.8.1.1, action b, required that SR 4.8.1.1.1.a be performed within 1 hour of this condition being established. The SR was satisfactorily completed within 15 minutes of discovery. The event was documented in the licensee corrective action program as PER 202616.

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

The inspectors reviewed the LER and PER 202616 to verify that the cause of the reactor trips was identified and whether corrective actions were appropriate. The root cause was identified as being inadequate oversight by the unit supervisor for the assignment, performance, and verification of the action required by the applicable TS action statement. The inspectors concluded that the licensee's corrective actions to this event were appropriate, including revision to the applicable operations department procedures to include action statement verification requirements for planned activities.

The inspectors also reviewed PER 202688, which documented that the operators inappropriately invoked the provisions of TS LCO 4.0.3 upon discovery that the actions required by TS 3.8.1.1.b had not been met. The inspectors noted that this action was contrary to TS LCO 3.0.2, but that the time interval during which TS LCO 3.8.1 was not met while in an applicable Mode was less than that which was allowed by TS LCO 3.0.3.

No findings of significance were identified. The inspectors determined that the licensee's failure to comply with LCO action 3.8.1.1.b constituted a TS violation of minor significance that is not subject to enforcement action in accordance with the NRC's Enforcement Policy. Specifically, the violation of TS LCO 3.8.1.1 was determined to be similar to Example 4.I. of IMC 0612 Appendix E, in that the required surveillance was not conducted, but the system was subsequently found to meet the applicable acceptance criteria. This LER is closed.

.3 (Closed) LER 05000327,328/2009-008-00 and 2009-008-01, Fuel assemblies in Spent Fuel Pool not stored in conformance with Technical Specifications

On October 28, 2009, four used fuel assemblies in the spent fuel pool were determined to be stored adjacent to new fuel assemblies which is not in conformance with criticality control requirements of TS 5.6.1.1.c. Following the discovery, the spent fuel pool boron concentration was verified to be within TS limits and verified at least every 72 hours per TS surveillance requirement 4.7.13.2 until the pool configuration was returned to an allowable configuration on October 31, 2009. The licensee verified that adequate margin to criticality existed and documented the issue in PER 206113, which included a root cause analysis.

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

The inspectors reviewed the LER and PER 206113 to verify that the cause of the improper storage of the fuel was identified and whether corrective actions were appropriate. The cause of the event was determined to be insufficient procedural guidance for designing a SFP arrangement to meet the requirements of TS, which resulted in inadequate criticality reviews prior to fuel movement. A contributing factor was inadequate supervisory oversight during the SFP design and subsequent review and verification. The inspectors concluded that the licensee's corrective actions to this event were appropriate. Immediate actions included verifying adequate spent fuel pool

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boron concentration and moving fuel assemblies to conform to TS requirements. Additional corrective actions included additional training for reactor engineers and changes to procedures for managing spent fuel pool configurations.

One licensee-identified violation was identified and is documented in section 4OA7. These LERs are closed.

#### 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 of significance were identified.

##### .2 Holtec Multi-Purpose Canister Helium Leak Rate Testing (IP 60853)

###### a. Inspection Scope

On January 19 to 22, the inspectors witnessed helium leak testing of Holtec Multi-Purpose Canisters (MPC) # 105 and 106 by Leak Testing Specialists, Inc. (LTS) under contract to the canister fabricator, Holtec International. The inspectors observed LTS personnel perform the helium leak rate testing in accordance with Procedure No. MSLT-MPC-HOLTEC, "Helium Mass Spectrometer Leak Test Procedure - Hood Technique." Revision MPC-Field-LT-03. The inspectors verified the Mass Spectrometer Leak Detector (MSLD) had a minimum sensitivity of 2.0E-9 atm-cc/second, and was properly calibrated using a calibrated leak standard of 1.52 E-7 atm-cc/second. The measured helium leak rates on MPC #105 and 106 were determined to be 1.3E-7 atm-cc/second and no detectable leakage, respectively, which was less than the maximum allowable leak rate of 2.0E-7 atm-cc/second. The inspectors also reviewed leak test reports for all 11 MPC's tested, reviewed calibration records for test equipment used and qualification records for the test director.

###### b. Findings

No findings of significance were identified.

.3 Preoperational Testing of an Independent Spent Fuel Storage Facility Installations at Operating Plants (60854.1, Revision 0)

a. Inspection Scope

The inspectors conducted a review of the licensee's vendor's activities regarding pre-operational test procedures for evacuating water from the canister and vacuum drying the canister in preparation for beginning a campaign to remove high heat load (greater than 28.7 kilowatts) spent fuel assemblies and high burn-up fuel assemblies from the Spent Fuel Pool and move them to the Independent Spent Fuel Storage Facility Installation (ISFSI) for dry storage. The review was conducted to verify that the preoperational test procedures had been prepared, reviewed, and initially approved in accordance with the licensee's administrative programs; to determine if the licensee's vendor had completed a verification and validation of the procedures; and to verify that the vendor's personnel had been trained and were qualified to perform the work.

b. Findings

No findings of significance were identified.

4OA6 Meetings

Exit Meeting Summary

An entrance meeting for the ISFSI inspection was conducted on February 16, 2010 with licensee management. As there were no findings of significance identified, a formal exit meeting was not held with licensee management. Comments by the inspector with respect to observed activities were discussed with the licensee's Corporate Project Manager, the licensee's Site Program Coordinator, and the vendor's Project Manager

On April 6, 2010, the resident inspectors presented the inspection results to Mr. Ken Langdon 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.

4OA7 Licensee-identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements that meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an NCV.

- Units 1 and 2 TS 5.6.1.1.c required that used fuel assemblies not be stored adjacent to new fuel assemblies in the spent fuel pool due to criticality concerns. Contrary to this, on October 1, 2009 and October 7, 2009, the licensee performed fuel moves that placed 4 used assemblies adjacent to new fuel. During a review on October 28, 2009, the licensee discovered the error and took action to verify and maintain adequate spent fuel boron concentration at or above the level required by TS LCO 3.7.13 to ensure adequate margin to criticality existed until fuel moves were conducted to restore compliance on October 31, 2009. The licensee entered the

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issue into the corrective action program as PER 206113 and reported the event in LER 05000327,328/2009-008-00 and 2009-008-01. Manual Chapter 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria," was used since the Significance Determination Process guidance for at-power and shutdown conditions does not apply to spent fuel pool criticality control. This finding was determined to be of very low safety significance (Green) because the spent fuel pool configuration was determined, by analysis, to be bounded by the calculation of record specified in the FSAR and TS bases.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee personnel**

S. Bowman, Licensing Engineer  
C. Church, Site Vice President  
D. Clift, Site Support Manager  
J. Dvorak, Outage and Site Scheduling Manager  
D. Foster, Performance Improvement Manager  
J. Furr, Quality Assurance Manager  
Z. Kitts, Licensing  
R. Krich, Licensing Vice President  
K. Langdon, Plant Manager  
T. Marshall, Maintenance and Modifications Manager  
S. McCamy, Radiation Protection Manager  
M. McDowell, Corporate Project Manager  
W. Nurnberger, Chemistry/Environmental Manager  
D. Porter, Operations Procedures  
R. Proffitt, Licensing Engineer  
P. Simmons, Operations Manager  
R. Thompson, Emergency Preparedness Manager  
B. Wetzel, Director, Safety and Licensing  
K. Wilkes, Operations Superintendent  
J. Williams, Site Engineering Director  
S. Young, Site Security Manager

#### **NRC personnel**

W. Rogers, Region II, Senior Reactor Analyst  
S. Lingam, Project Manager, Office of Nuclear Reactor Regulation

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened and Closed

05000328/2010002-01	FIN	Reactor Trip due to Inadequate Configuration Control (Section 4OA3.1)
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### Closed

05000328/2009-002-00	LER	Manual Reactor Trip Because of Degrading Main Feedwater Pump Turbine Condenser Vacuum (Section 4OA3.1)
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05000327,328/2009-007-00	LER	Failure to Perform a Technical Specification (TS) Action Within the Required Timeframe (Section 4OA3.2)
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05000327,328/2009-008-00	LER	Fuel Assemblies in Spent Fuel Pool Not Stored in Conformance With TS (Section 4OA3.3)
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05000327,328/2009-008-01	LER	Fuel Assemblies in Spent Fuel Pool Not Stored in Conformance With TS (Section 4OA3.3)
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## **LIST OF DOCUMENTS REVIEWED**

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

1,2-47W810-1, Flow Diagram Residual Heat Removal System, Revision 53  
1,2-47W811-1, Flow Diagram Safety Injection System, Revision 72  
1,2-47W803-1, Flow Diagram Auxiliary Feedwater System, Revision 64  
CDE 2356 9/22/08  
CDE 2425 8/02/09  
Drawings 1,2-47W845-1,2,3,4,5  
System 67 Health Report 10/01/09 – 1/31/10  
AOP-M.01 LOSS OF ESSENTIAL RAW COOLING WATER Revision 21  
AOP-P.01 LOSS OF OFFSITE POWER Revision 24  
AOP-N.02 TORNADO WATCH/WARNING Revision 24  
AOP-N.03 FLOODING Revision 30  
AOP-N.04 BREAK OF DOWNSTREAM DAM Revision 0008  
AOP-N.05 EARTHQUAKE Revision 15  
EA-67-1 ERCW OPERATION Revision 7  
EA-67-2 ERCW HEADER CROSS-TIE Revision 1  
0-SO-67-3 ERCW STRAINERS AND TRAVELING SCREENS Revisions 22 & 25  
Work Orders - 04-784178, 05-773171,05-777645, 07-770645, 07-780927, 08-781382, 08-779853, 09-778368  
PERs -153058, 163565, 177952

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

TVAN Fire Protection Report, Revision 25

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

Simulator Exam Guide "Turbine Runback, SGTL, RPS Failure" Revision 3  
AOP-S.04, "Total or Partial Loss of #3 Heater Drain Tank Pump Flow," revision 15  
AOP-R.01, "Steam Generator Tube Leak," revision 26  
EPIP-1, "Emergency Plan Classification Matrix," revision 43  
E-3, "Steam Generator Tube Rupture," revision 17

### **Section R12: Maintenance Rule Implementation**

1-SI-IFT-090-106.0, Functional Test of Containment Building Lower Compartment Air Monitors  
1-R-90-106, Revision 17  
2-SI-IFT-090-106.0, Functional Test of Containment Building Lower Compartment Air Monitors  
2-R-90-106, Revision 12  
1-SI-IFT-090-112.0, Functional Test of Containment Building Lower Compartment Air Monitors  
1-R-90-112, Revision 16  
2-SI-IFT-090-112.0, Functional Test of Containment Building Lower Compartment Air Monitors  
2-R-90-112, Revision 19  
1-PI-IPM-090-106.0, Filter Paper Replacement and Pump Swap-over Instructions for  
Containment Building Lower Compartment Air Monitor 1-R-90-106, Revision 19

Functional Failure CDEs 2416, 2380, 2059, 2106, 2447, 2452, 2453, and 2107  
PERs 212714

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

Sentinel Risk Model runs 18-JAN-10 to 07-Feb-10 dated January 19, 2010 and January 20, 2010

0-TI-DSM-000-007.1, Risk Assessment Guidelines, Revision 9

SPP-7.3, Work Activity Risk Management Process, Revision 5

Sentinel Risk Model runs 22-Feb-10 to 7-Mar-10 dated February 22, 23, and 24, 2010

Sentinel Risk Model runs 6-Mar-10 to 28-Mar-10 dated March 11, 2010

Tagout Clearance 1-67-0675A-W/W, ERCW Strainer A1A-A

Tagout Clearance 0-67-0116-W/W, ERCW Bay B-B

Tagout Clearance 0-67-0118-W/W, ERCW Bay B-B

0-SO-67-1, Essential Raw Cooling Water, Revision 83

PER 144458, Missed Sentinel Evaluation: A1A-A ERCW Strainer

### **Section R15: Operability Evaluations**

PERs 203852, 155933

LER 05000482/2008-008-02

LER 05000400/2009-002-00

Westinghouse Nuclear Safety Advisory Letter NSAL-09-8, Presence of Vapor in Emergency Core Cooling System/Residual Heat Removal System in Modes 3/4 Loss-of-Coolant Accident Conditions

Westinghouse Nuclear Safety Advisory Letter NSAL-93-004, RHRS Operation as Part of the ECCS During Plant Startup

SRs 113736, 114285, 114473, 114476

0-GO-1, Unit Startup From Cold Shutdown to Hot Standby, Revision 54

0-GO-7, Unit Shutdown From Hot Standby to Cold Shutdown, Revision 59

Calculation SQN-SQS2-0155, Safety limit and setpoint for the maximum RHR pump

temperature to avoid flashing at the pump suction when aligned to the RWST, Revision 1

Calculation SQN-SQS4-0107, NPSH Calculations for the CCP, SIP, CSP and RHR Pumps

Operating in the RWST Injection Mode Following a LOCA, Revision 3

Calculation MDQ0072980034, CCP, SIP, CSP, and RHR Pump NPSH Evaluation, Revision 3

Crane Technical Paper No. 410, Flow of Fluids Through Valves, Fittings, and Pipe, Thirteenth Printing, 1973.

GOI-6, Apparatus Operations, Revision 132

2-AR-XFMR-2C-LCL, Unit 2 Main Bank Transformer Alarm Response, Revision 0

0-SO-57-1, Main Bank Transformer Cooling System, Revision 22

WO 09-772143-000, Preventive Maintenance – MCR Chiller B-train

PER 162711, River System Operation Impact on PMF, FE 43152, Revision 2

Standing Order 09-006, Revision 1, Probable Maximum Flood Issue

WO 09-771564-000, Install flood protection at diesel generator building

WO 09-771564-001, Install flood protection at the SFPC pump platform

0-FP-MXX-000-011.0, Flood Preparation SFPC Pump Enclosure Caps, SFPCS Heat

Exchangers, RCP Thermal Barrier Booster Pumps, and RHR Heat Exchanger Spool Pieces

Calculation SQN-DC-V-12.1, Sequoyah Nuclear Plant – Flood protection Provisions, revision 10  
 Calculation CDQ000020080054, PMF Determination for Tennessee River Watershed, revision 0

### **Section R18: Plant Modifications**

SPP-10.10, Control of Transient Combustibles, Revision 5  
 0-SO-32-1, Control Air System, Revision 69  
 1-AR-M15-15B, Miscellaneous 1-XA-55-15B, Annunciator Response, Revision 28  
 0-GO-14-4, Operator Rounds-Turbine Bldg 2 Round, Revision 25

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

MMDP-3, Guidelines for Planning and Execution of Troubleshooting Activities, Revision 5  
 SPP-6.5, Foreign Material Control, Revision 14  
 TI-50, Air Flow Measurement and Balancing Methods, Revision 18  
 1, 2-47W866-2, Flow Diagram Heating & Ventilation Air Flow, Revision 13  
 1, 2-47W866-10, Flow Diagram Heating & Ventilation Air Flow, Revision 19  
 1, 2-47W866-11, Flow Diagram Heating & Ventilation Air Flow, Revision 10  
 SQN-DC-V-13.9.4, Design Document-Auxiliary Building Secondary Containment Ventilation System – System 30-SC, Revision 5  
 FSAR Section 6.2.3.1.3, Auxiliary Building Gas Treatment System  
 MI-10.54, Diesel Generator Battery Replacement and/or Battery Bank Bus Rework, Revision 20  
 0-SI-EBT-082-238.2, Diesel Generator Battery Quarterly Operability, Revision 16  
 0-PI-EBT-082-238.4, Modified Performance Testing of 125vdc Diesel Generator Batteries, Revision 16  
 0-PI-EBM-000-001.2, Battery Bank High Level Equalize Charge Systems 82, Revision 20  
 0-PI-EBM-000-001.1, Battery Equalize Charge, Revision 8

### **Section R22: Surveillance Testing**

0-PI-EBM-000-001.2, Battery Bank High Level Equalize Charge Systems 82, 244, 250, Revision 19  
 0-SI-EBT-250-100.2, 125Vdc Vital Battery Quarterly Operability, Revision 14  
 FSAR 8.3.2, Direct Current (DC) Power System  
 IEEE Std 450-2002, IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications  
 Regulatory Guide 1.129, for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Nuclear Power Plants, Revision 2  
 PER 212580, Vital Battery V Reached 85% of Service Life  
 1, 2-47W810-1, Flow Diagram Residual Heat Removal System, Revision 53  
 FSAR 9.5.4, Diesel Generator Fuel Oil System  
 0-TI-CEM-260-012.7, RCS Sample Depressurization, Revision 5  
 1-TI-CEM-000-016.31, Primary Sampling - Reactor Coolant, Refueling Canal and Transfer Canal, Revision 6

**Section EP6: Drill Evaluation**

EPIP-1, "Emergency Plan Classification Matrix," Revision 43  
 ES-0.5, Equipment Verifications," Revision 2

**Section 4OA1: Performance Indicator Verification**

SPP-3.4, Performance Indicator Program, Revision 10  
 NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 6

**Section 4OA3: Event Followup**

SPP-2.2, Administration of Site Technical Procedures, revision 16  
 2-SO-2/3-1, Condensate and Feedwater System, revision 68  
 AOP-S.01, Main Feedwater Malfunctions, revision 16  
 WO 08-778672-000, MFPT seal steam supply standpipe level switch  
 SPP-6.3, Pre-/Post-Maintenance Testing, revision 3  
 2-47W805-2, Flow Diagram Low Pressure Heater Drains and Vents, Revision 36  
 2-47W807-1, Flow Diagram Turbine Drains and Miscellaneous Piping, Revision 22  
 SPP-10.1, System Status Control, revision 4  
 MMDP-1, Maintenance Management System, revision 16

**Section 4OA5: Other Activities**Procedures

SQN-DCS-300.10, Forced Helium Dehydration System Operation, Revision 0000  
 SQN-DCS-300.11, Supplemental Cooling System Operation, Revision 0000

Other

LP-HOL-DCPP-06, Holtec Training Lesson Plan, Forced Helium Dehydrator (FHD) Operation Training, Revision 0, and related examination module  
 OJT/TPE Qualification Data Sheets (Qual Cards) for the technicians performing the demonstrations (from NPG Training Procedure, TRN-3, Revision 0016, Appendix D)  
 Pre-Job Briefing Sheet of attendees prior to beginning the demonstration