



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
REGION IV  
1600 EAST LAMAR BLVD  
ARLINGTON, TEXAS 76011-4511

June 13, 2013

Louis P. Cortopassi, Site Vice President  
Omaha Public Power District  
Fort Calhoun Station FC-2-4  
P.O. Box 550  
Fort Calhoun, NE 68023-0550

Subject: FORT CALHOUN - NRC INTEGRATED INSPECTION REPORT  
NUMBER 05000285/2013004

Dear Mr. Cortopassi:

On May 18, 2013 the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Fort Calhoun Station. The enclosed inspection report documents the inspection results which were discussed on June 3, 2013, with you and other members of your staff.

The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

One NRC identified finding of very low safety significance (Green) was identified during this inspection. The NRC is treating this violation as non-cited violation NCV consistent with Section 2.3.2a of the Enforcement Policy.

If you contest this non-cited violation, 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 IV; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Fort Calhoun Station.

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

L. Cortopassi

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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 Agencywide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Michael C. Hay, Chief  
Project Branch F  
Division of Reactor Projects

Docket No.: 50-285  
License No.: DPR-40

Enclosure: NRC Inspection Report 05000285/2013004  
w/Attachment: Supplemental Information

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

Docket: 05000285  
License: DPR-40  
Report: 05000285/2013004  
Licensee: Omaha Public Power District  
Facility: Fort Calhoun Station  
Location: 9610 Power Lane  
Blair, NE 68008  
Dates: April 1 through May 18, 2013  
Inspectors: J. Kirkland, Senior Resident Inspector  
J. Wingeback, resident Inspector  
P. Elkmann, Senior Emergency Preparedness Inspector  
R. Kumana, Reactor Inspector  
Approved By: Michael Hay, Chief, Project Branch F  
Division of Reactor Projects

## SUMMARY OF FINDINGS

IR 05000285/2013004; 04/01/2013-05/18/2013; Fort Calhoun Station Integrated Resident and Regional Report; Alert Notification System Testing.

The report covered a six-week period of inspection by resident inspectors and an announced baseline inspection by region-based inspectors. One Green non-cited violation of significance was identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." The cross-cutting aspect is determined using Inspection Manual Chapter 0310, "Components Within the Cross-Cutting Areas." Findings for which the significance determination process 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 Findings and Self-Revealing Findings

Cornerstone: Emergency Preparedness

- Green. The inspectors identified a non-cited violation (NCV) of 10 CFR 50.54(q)(2) for failure to follow an emergency plan meeting the planning standards of 10 CFR 50.47(b). Specifically, the licensee did not meet 50.47(b)(5) because they failed to fully implement preventative maintenance requirements of "Design Report for the Outdoor Public Warning System," Revision 1, as determined by Federal Emergency Management Agency (FEMA) Region VII. The failure to fully implement requirements of the FEMA approved alert and notification system design report was a performance deficiency within the licensee's control.

The finding had a credible impact on the Emergency Preparedness Cornerstone objective because it involved the ability to warn the public using the primary alert and notification system. The finding is more than minor because it affected the equipment and facilities and offsite emergency preparedness cornerstone attributes. The finding was evaluated using the emergency preparedness significance determination process and determined to be of very low safety significance because it was not a loss of the planning standard function. It was not a loss of planning standard function because deficiencies in maintenance of the alert and notification system did not degrade system performance. This finding was assigned a cross-cutting aspect of Documentation [H.2(c)] because the licensee did not incorporate up-to-date design documentation into working procedures (Section 1EP2).

### B. Licensee-Identified Violations

None

## REPORT DETAILS

### Summary of Plant Status

The station remained in Mode 5 with the fuel in the spent fuel pool for the entire inspection period.

#### 1. REACTOR SAFETY

##### Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R15 Operability Evaluations and Functionality Assessments (71111.15)

##### a. Inspection Scope

The inspectors reviewed the following assessments:

- May 1, 2013, Operability of the four wide range detectors

The inspectors selected these operability and functionality assessments based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure technical specification operability was properly justified and to verify the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and USAR to the licensee's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. Additionally, the inspectors reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one operability evaluations inspection sample, as defined in Inspection Procedure 71111.15-05.

##### b. Findings

No findings were identified.

#### Cornerstone: Emergency Preparedness

#### 1EP2 Alert Notification System Testing (71114.02)

##### a. Inspection Scope

During an inspection conducted November 26-30, 2012, the inspectors identified that Fort Calhoun did not have documentation that some outdoor warning siren maintenance

activities required by their alert and notification system design report had been completed. Therefore, inspectors documented apparent deviations between siren maintenance requirements and documented maintenance practices in Unresolved Item 05000285/2012012-05 (ML13045B055). The licensee subsequently provided a more detailed analysis of their siren maintenance program, and the NRC requested a review by the FEMA to establish whether the licensee was in compliance with alert and notification system program requirements.

The inspectors reviewed a letter from Mr. Ronald McCabe, Chief, Technological Hazards Branch, Federal Emergency Management Agency Region VII, to Mr. Mark Haire, Chief, Plant Support Branch 1, NRC Region IV, dated March 22, 2013. This letter responded to the NRC's request for an evaluation of Fort Calhoun Station's outdoor warning siren maintenance program. The inspectors also discussed the licensee's siren system maintenance program with FEMA staff during teleconferences conducted January 30 and February 8, 2013. The referenced FEMA letter is attached to this inspection report.

These activities constitute completion of one sample as defined in Inspection Procedure 71114.02-05.

b. Findings

Introduction. A Green NCV was identified for the failure between December 9, 2004, and April 3, 2013, to implement maintenance requirements of the site-specific FEMA alert and notification system design report, as required by 10 CFR 50.47(b)(5).

Description. The NRC identified that Fort Calhoun Station had not completely implemented the outdoor warning siren system maintenance requirements of their approved alert and notification system design report.

The inspectors reviewed the testing and maintenance of the licensee's alert and notification system during an onsite inspection November 26-30, 2012. The inspectors concluded that Section 4.2.2.2 of Fort Calhoun Station's, "Design Report for the Outdoor Public Warning System," Revision 1, dated December 9, 2004, required annual siren inspection and testing according to vendor instructions found in Attachment 6, "Installation, Operation, and Service Manual, Federal Signal Corporation Model DCFCTB," dated October 2003. Service Manual Section 8.2.2, "Annual Inspection," recommended annual performance of the pre-operational testing described in Sections 7.1 through 7.4. Inspectors determined that siren maintenance records did not contain sufficient detail to establish that the licensee had conducted the tests described in sections 7.1, Rotation Current Sensor, Chopper Current Sensor, A/C Power Sensor, and Intrusion Sensor, Section 7.2, Battery Voltage Measurement, Section 7.3, Battery Charger Voltage Measurement, or Section 7.4, 2001TR Transformer-Rectifier Testing. Therefore, the NRC documented the apparent deviations in Unresolved Item 05000285/2012012-05.

Inspectors performed an in-office review of an analysis of Fort Calhoun Station's siren system maintenance program submitted to the NRC on January 21, 2013, and

concluded that maintenance practices deviated from commitments in the alert and notification system design report. The NRC requested by letter, dated February 15, 2013, that FEMA Region VII evaluate the licensee's maintenance program against the requirements of the alert and notification system design report (ML13046A426). In a letter dated March 22, 2013, Federal Emergency Management Agency Region VII concluded that Fort Calhoun Station was not in compliance with commitments in their alert and notification system design report. Specifically, FEMA required that Fort Calhoun Station:

- Perform annual testing of the rotation current sensor, chopper current sensor, A/C power sensor, and intrusion sensor;
- Confirm that EPT-2, Attachment 3, encompass battery charger voltage measurements;
- Document testing to ensure proper ranges are maintained; and
- Ensure the 100 foot radius around each siren is inspected for growth and obstructions.

Based on FEMA Region VII's evaluation, the inspectors concluded that Fort Calhoun Station was not in compliance with the requirements of 10 CFR 50.47(b)(5), which states, in part, that the means to provide early notification to the populace within the plume exposure emergency planning zone have been established. Fort Calhoun Station did not establish the means to provide early notification to the populace because they failed to fully implement the preventative maintenance requirements of "Design Report for the Outdoor Public Warning System," Revision 1.

Analysis. The inspectors determined that the failure to implement the alert and notification system maintenance program as described in the licensee's system design report is a performance deficiency within the licensee's control. The finding had a credible impact on the Emergency Preparedness Cornerstone objective because it involved the ability to warn members of the public in the emergency planning zone of a radiological emergency using the primary alert and notification system. This finding is more than minor because it affected the equipment and facilities (availability of alert and notification system) and offsite emergency preparedness cornerstone attributes. The finding was associated with a violation of NRC requirements. This finding was evaluated using the Emergency Preparedness Significance Determination Process and was determined to be of very low safety significance (Green) because it was a failure to comply with NRC requirements and was not a loss of the planning standard function. It was not a loss of planning standard function because deficiencies in maintenance of the alert and notification system did not degrade system performance. The inspectors determined the alert and notification system reliability performance indicator had remained in the licensee response band. This finding was assigned a cross-cutting aspect of Documentation [H.2(c)] because the licensee did not incorporate up-to-date design documentation into working procedures; specifically, preventative maintenance



requirements in the alert and notification system design report were not included in siren system maintenance procedures.

Enforcement. Title 10 of the Code of Federal Regulations 50.54(q)(2) requires, in part, that a nuclear power reactor licensee follow and maintain the effectiveness of an emergency plan meeting the requirements of Appendix E to Part 50 and the planning standards of 50.47(b). Contrary to the above, between December 9, 2004, and April 3, 2013, Fort Calhoun Station did not follow an emergency plan meeting the planning standards of 50.47(b). Specifically, the licensee did not meet the requirements of 10 CFR 50.47(b)(5), which states, in part, that the means to provide early notification to the populace within the plume exposure emergency planning zone have been established. The licensee did not establish the means to provide early notification to the populace because they failed to fully implement preventative maintenance requirements of "Design Report for the Outdoor Public Warning System," Revision 1, dated December 9, 2004. Because this failure is of very low safety significance and has been entered into the licensee's corrective action system as Condition Report (CR) 2013-06963, this violation is being treated as NCV, consistent with Section 2.3.2a of the NRC Enforcement Policy: NCV 05000285/2013004-01, "Failure to Perform Siren Maintenance as Required by the Alert and Notification System Design Report."

#### **40A2 Problem Identification and Resolution (71152)**

##### **.1 Routine Review of Identification and Resolution of Problems**

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

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. The inspectors reviewed attributes that included the complete and accurate identification of the problem; the timely correction, commensurate with the safety significance; the evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent of condition reviews, and previous occurrences reviews; and the classification, prioritization, focus, and timeliness of corrective actions. Minor issues entered into the licensee's corrective action program because of the inspectors' observations are included in the attached list of documents reviewed.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure, they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

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

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's corrective action program. The inspectors accomplished this through review of the station's daily corrective action documents.

The inspectors performed these daily reviews as part of their daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings were identified.

**40A3 Followup of Events and Notices of Enforcement Discretion (71153)**

.1 (Closed) Licensee Event Report 05000285/2012-001-00: Inadequate Flooding Protection Procedure

During a review of the station's procedures for responding to external flooding conditions, it was determined that the guidance is not adequate to mitigate a design basis flood event (1,014 feet mean sea level (MSL)).

A root cause analysis is in progress. Following completion of the cause analysis a revision to this Licensee Event Report (LER), will be submitted to provide the results of the analysis.

Compensatory actions have been identified and are being implemented. Additional corrective actions are being evaluated.

The licensee submitted Revision 1 to this LER on May 17, 2013. This LER is closed to Revision 1.

.2 (Open) Licensee Event Report 05000285/2012-001-01: Inadequate Flooding Protection Procedure

On February 10, 2012, during an inspection of flood preparations by the NRC in response to previously identified NRC findings, it was concluded that Abnormal Operating Procedure (AOP) 01 Revision, 28, Acts of Nature, Section I, Flooding, did not adequately protect equipment required to maintain safe shutdown from external flooding to an elevation of 1,014 feet Mean Sea Level (MSL). This condition could have prevented the raw water pumps from being available to provide cooling to the component cooling water system. This condition was entered into the station's corrective action program.

The causal analysis determined that station senior management, at the time the condition was identified, did not effectively lead recovery efforts to address the NRC component design basis inspection (CDBI) and Fort Calhoun Station self-identified flooding issues in AOP-01. This resulted in important flooding related corrective actions not being effectively planned, prioritized or resourced to ensure a success path for AOP-01 within the established timeline.

.3 (Closed) Licensee Event Report 05000285/2012-018-00: Containment Air Cooling Units Operated Outside of Technical Specifications during Cycle 26

While performing NRC Inspection Manual Chapter 0350 checklist reviews, the recovery engineering team identified that the containment air cooling and filtering system was operated outside its design basis during cycle 26, resulting in Fort Calhoun Station being in a condition prohibited by Technical Specifications during that operating cycle.

A cause analysis is in process. When completed, this LER will be supplemented.

The licensee submitted Revision 1 to this LER on May 8, 2013. This LER is closed to Revision 1.

.4 (Open) Licensee Event Report 05000285/2012-018-01: Containment Air Cooling Units Operated Outside of Technical Specifications during Cycle 26

On July 27, 2012, while performing NRC Inspection Manual Chapter 0350 checklist reviews, the Recovery Engineering Team identified that the containment air cooling and filtering system (CACFS) was not properly tested during cycle 26. It was discovered that surveillance test (ST) IC-ST-VA-0013, as written and performed, did not maintain train separation of the system components during single train surveillance testing as required by Technical Specifications 2.4.1.a.i, 2.4.1.a.ii, and 3.6(3)g. This resulted in Fort Calhoun Station being in a condition prohibited by Technical Specifications during operating cycle 26.

Amendment No. 255 changed how pressure is to be controlled during a loss of coolant accident; from the containment spray system to the containment air cooling and filtering system. The revision to the surveillance test, required by this change, failed to incorporate the train separation required by the technical specifications. The surveillance test procedure has been revised and the containment air cooling and filtering system will be tested prior to being required by technical specifications.

.5 (Closed) Licensee Event Report 05000285/2012-019-00: Traveling Screen Sluice Gates Found with Dual Indication

On August 14, 2012, at approximately 2100 hours (CDT), Operations was cycling all 6 traveling screen sluice gates when it was identified that traveling screen sluice gate CW-14E motor was stopping on high torque and provided indication that the gate was approximately 8 inches open. Traveling screen sluice gate CW-14C was also stopping on high torque and providing indication the gate was not fully closed. During a flooding

event, these sluice gates are credited to fully close allowing control of the intake structure cell level with the raw water pumps. Cell level is maintained below elevation 1007-foot, 6-inches. This is the point at which the raw water pump bay could become flooded causing a loss of raw water to the component cooling water heat exchangers. On August 25, 2012, divers removed the sediment and debris from all sluice gate bottoms returning the sluice gates' capability to be fully closed in the event of a design basis flood. The condition was entered into the station's corrective action program as CR 2012-10206.

The apparent cause of the failure of the sluice gates to close was debris under the gates. A cause analysis is in process and when completed; this LER will be supplemented.

The licensee submitted Revision 1 to this LER on May 14, 2013. This LER is closed to Revision 1.

.6 (Open) Licensee Event Report 05000285/2012-019-01: Traveling Screen Sluice Gates Found with Dual Indication

On August 14, 2012, at approximately 2100 hours (CDT), Operations was cycling all 6 traveling screen sluice gates when it was identified that traveling screen sluice gate CW-14E motor was stopping on high torque and provided indication that the gate was approximately 8 inches open. Traveling screen sluice gate CW-14C was also stopping on high torque and providing indication the gate was not fully closed. During a flooding event, these sluice gates are credited to fully close allowing control of the intake structure cell level with the raw water pumps. Cell level is maintained below elevation 1007-foot, 6-inches. This is the point at which the raw water pump bay could become flooded causing a loss of raw water to the component cooling water heat exchangers. On August 25, 2012, divers removed the sediment and debris from all sluice gate bottoms returning the sluice gates' capability to be fully closed in the event of a design basis flood. The condition was entered into the station's corrective action program as CR 2012-10206.

The cause of the failure of the sluice gates to fully close was debris under the gates. The Apparent Cause is the process for closing the Sluice gates within OI CW-2 did not adequately account for river debris obstructions.

.7 (Open) Licensee Event Report 05000285/2013-003-00: Calculations indicate the high pressure safety injection (HPSI) Pumps will Operate in Run-out During a DBA

At approximately 5:21 p.m. Central Standard Time, on January 30, 2013, during hydraulic evaluations for the alternate hot leg injection project, Design Engineering determined that design basis calculations indicated that the high pressure safety injection (HPSI) pumps would operate in a run-out condition under worst case design basis accident conditions. Previous changes to the operation of the HPSI pumps and the containment spray pumps have resulted in an increase in the injection phase time and an increase in HPSI pump flow during the accident. This could have resulted in the

HPSI pumps operating in run-out for longer than the one hour manufacturer's recommended time limit.

A preliminary causal analysis identified that the station failed to obtain vendor technical information on HPSI pump performance in a 10 CFR 50, Appendix B, Quality Assurance validated format. An analysis of HPSI pump performance during the injection phase will be performed and design or procedural actions to prevent HPSI pump operation in the extended flow region to ensure that sufficient net positive suction head is available will be taken.

.8 (Open) Licensee Event Report 05000285/2013-004-00: Inverters Inoperable During Emergency Diesel Generator Operation

On February 22, 2013, while performing testing of the diesel generators in accordance with OP-STESF-0002, the Ametek inverters "A" and "C," instrument bus "A" and "C" Low Voltage/Ground alarms came in and cleared repeatedly. A slight smell of smoke was detected by several personnel in the Control Room in the vicinity of AI-40A. The following equipment had failed and/or was damaged: LIC-2802, PIC-2802, A/PIA-102X, C-VOPT and possibly one or more of the CCW HX/RW temperature meters.

Fort Calhoun had replaced the original Elgar inverters with new Ametek SCI inverters during the 2008 refueling outage. After installation continuing intermittent inverter trouble alarms and instrument bus low voltage/ground alarms occurred when loads are placed on or removed from various a-c buses. A design change completed in April of 2011 removed a ground connection between two capacitors in the inverters. However, testing of the modification was not completed before the 2011 flood and the station did not operate with the modification installed. A causal analysis is in progress and the results of the analysis will be published in a supplement to this Licensee Event Report.

.9 (Open) Licensee Event Report 05000285/2013-005-00: Control Room HVAC Modification Not Properly Evaluated

On February 27, 2013, while reviewing a response to an NRC question, an issue was identified where the modification which moved the control room air conditioner condensers from inside the control room to the auxiliary building roof should have obtained prior NRC approval. The condensers are located in close proximity to one another and are protected by a grating that is not rated to withstand a tornado missile. Therefore, it is possible that both the A and B trains could be struck and rendered inoperable by the same missile. The review determined that prior NRC approval had not been obtained for the modification and the condition was entered in to the station's corrective action program. At the time of discovery, the unit was shutdown with fuel removed.

A causal analysis is in progress. The results of the analysis will be published in a supplement to this LER.

.10 (Open) Licensee Event Report 05000285/2013-006-00: Use of Teflon in LPSI and CS Pump Mechanical Seals

On March 4, 2013, at approximately 2:00 p.m. (CST), it was identified that the mechanical seals used in the two low pressure safety injection pumps and the three containment spray pumps are made of a material (Teflon®) that may not maintain the designed integrity of the systems under certain accident conditions. This seal design has been installed since original plant construction. This issue was discovered while the core was off-loaded by plant personnel while researching requirements for the replacement parts during scheduled outage activities.

A causal analysis is in progress. The results of the analysis will be published in a supplement to this LER.

**40A4 IMC 0350 Inspection Activities (92702)**

Inspectors continued implementing IMC 0350 inspection activities, which include follow-up on the restart checklist items contained in the Confirmatory Action Letter (CAL) issued February 26, 2013 (EA-13-020, ML 13057A287). The purpose of these inspection activities is to assess the licensee's performance and progress in addressing its implementation and effectiveness of Fort Calhoun Station's Integrated Performance Improvement Plan (IPIP), significant performance issues, weaknesses in programs and processes, and flood restoration activities.

Inspectors used the criteria described in baseline and supplemental inspection procedures, various programmatic NRC inspection procedures, and IMC 0350 to assess the licensee's performance and progress in implementing its performance improvement initiatives. Inspectors performed on-site and in-office activities, which are described in more detail in the following sections of this report. Specific documents reviewed during this inspection are listed in the attachment.

The following inspection scope, assessments, observations, and findings are documented by CAL restart checklist item number.

**.2 Flood Restoration and Adequacy of Structures, Systems, and Components**

Section 2 of the Restart Checklist contains those items necessary to ensure that important structures, systems and components affected by the flood and safety significant structures, systems and components at Fort Calhoun Station are in appropriate condition to support safe restart and continued safe plant operation. Section 2 reviews will also include an assessment of how the licensee appropriately addressed the Nuclear Regulatory Inspection Procedure 95003 key attributes as described in Section 6.

**.a Flood Recovery Plan Actions Associated With Facility and System Restoration**

Item 2.a is the Nuclear Regulatory Commission's independent evaluation of Fort Calhoun Station's Flood Recovery Plan. An overall flood recovery plan is important to

ensure the station takes a comprehensive approach to restoring the facility structures, systems, and components to pre-flood conditions.

The areas to be inspected are identified in the CAL. Inspection items are considered complete when the licensee has submitted a closure package that has been satisfactorily reviewed by the inspectors.

(1) CAL Action Item 2.2.1.1

i. Inspection Scope

The purpose of Action Item 2.1.1 was to assess the effects of the flood on the Auxiliary Cooling System (ACS) and identify actions to restore the system. This item was required to be completed prior to exceeding 210 degrees fahrenheit in the Reactor Coolant System.

The inspectors independently reviewed the system to identify if there were any temporary modifications in place as a result of the flood, if there were any outstanding preventive maintenance activities that had been deferred due to the flood, and reviewed condition reports to determine if there were any deficiencies noted due to the flood. The inspectors reviewed condition reports that were related to flooding, written between April 1, 2011 and December 31, 2011. The inspectors also conducted a complete system walkdown to identify any adverse conditions related to flooding. The inspectors compared the results of their independent assessment to those contained in the licensee's "Flooding Recovery Startup System Health Assessment" report.

The Auxiliary Cooling System is comprised of four separate systems: the Component Cooling Water System; the Raw Water System; the Spent Fuel Pool Cooling System; and the Turbine Plant Cooling Water System. The Component Cooling Water System provides cooling water for engineered safeguards and reactor plant components. The Component Cooling Water System acts as a monitored, intermediate cooling system to prevent the release of radioactivity to the environment. The Raw Water System performs the following: provides a heat sink for the Component Cooling Water heat exchangers; provides emergency cooling directly to heat loads required for safe shutdown of the plant if the Component Cooling Water System is lost; provides backup source of makeup to the emergency feedwater storage tank (EFWST); and receives drains and/or overflows from various plant systems. The Spent Fuel Pool Cooling System removes decay heat from spent fuel assemblies stored in the storage pool and transfers the heat to the Component Cooling Water System. The Turbine Plant Cooling Water System provides cooling to steam cycle components. The function is similar to the Component Cooling Water System, but the components served are not safety-related, nor potentially contaminated.

The inspectors identified no temporary modifications in place and two preventive maintenance activities that were deferred because of the flooding. The two

corrective maintenance activities were to replace the two raw water strainer backwash valves, HCV-2805A and HCV-2805B. These valves could not be replaced until the river level was lower than 993.5 feet mean sea level (msl). The replacement HCV-2805B was installed on November 8, 2011, and the replacement HCV-2805B was installed on January 31, 2012.

The independent walkdown performed by the inspectors identified no adverse conditions to any of the Auxiliary Cooling Water Systems or their individual components. The inspectors reviewed actions associated with leaks found at the raw water pump baseplates. Leakage around the pump baseplates were noted prior to the onset of the flood, and were again noted during the flood. The leakage was not excessive and was within the capacity of the intake structure sump pumps. However, since the flood levels reached during 2011 were several feet below the license basis flood level, the seals would need to be replaced after the flood waters subsided. After the flood levels receded, the inspectors verified the pump gaskets were replaced.

The inspectors reviewed 19 condition reports written related to the flood. The inspectors reviewed the corrective actions associated with these condition reports and determined that there were no outstanding issues associated with any of the Auxiliary Cooling Water Systems.

This activity constitutes completion of Action Item 2.2.1.1 as described in CAL EA-13-020. It should be noted that the purpose of this action item was to assess the effects of the flood on the Auxiliary Cooling Water system. A detailed evaluation of the health of the Auxiliary Cooling Water system will be conducted prior to plant startup. This evaluation will be conducted and documented in accordance with section 2.b.1.1 of the Fort Calhoun Station Restart Checklist Basis Document.

ii. Findings

No findings were identified.

(2) CAL Action Item 2.2.1.6

i. Inspection Scope

The purpose of Action Item 2.2.1.6 was to assess the effects of the flood on the Circulating Water System and identify actions to restore the system. This item was required to be completed prior to exceeding 210 degrees fahrenheit in the Reactor Coolant System.

The inspectors independently reviewed the system to identify if there were any temporary modifications in place as a result of the flood, if there were any outstanding preventive or corrective maintenance activities that had been deferred due to the flood, and reviewed condition reports to determine if there were any deficiencies noted due to the flood. The inspectors queued condition



reports that were related to flooding, written between April 1, 2011 and December 31, 2011. The inspectors also conducted a complete system walkdown to identify any adverse conditions related to flooding. The inspectors compared the results of their independent assessment to those contained in the licensee's "Flooding Recovery Startup System Health Assessment" report.

The Circulating Water System removes heat from the steam discharged from the low-pressure turbines into the main condensers, removes heat from the bearing water coolers and condensate cooler, and transfers that heat to the Missouri River.

The inspectors identified no temporary modifications in place and no preventive or corrective maintenance was deferred because of the flooding.

The inspectors reviewed 23 condition reports written related to the flood. The inspectors reviewed the corrective actions associated with these condition reports and determined that there were no outstanding issues associated with the Circulating Water System as a result of the flood. The majority of the items identified were related to water intrusion in the pump motors following the failure of the water filled berm during the flood. The flood recovery plan identified specific actions to ensure issues associated with the Circulating Water Pumps were corrected. Action items 2.3.1.4, 2.3.1.7 and 2.3.1.8 remain open at this time, pending completion packages from the licensee.

The independent walkdown performed by the inspectors identified no current adverse conditions to the Circulating Water System and its individual components as a result of the flood.

This activity constitutes completion of Action Item 2.2.1.6 as described in CAL EA-13-020. It should be noted that the purpose of this action item was to assess the effects of the flood on the Circulating Water System. A detailed evaluation of the health of the Circulating Water System will be conducted prior to plant startup. This evaluation will be conducted and documented in accordance with section 2.b.1.12 of the Fort Calhoun Station Restart Checklist Basis Document.

ii. Findings

No findings were identified.

(3) CAL Action Item 2.2.1.28

i. Inspection Scope

The purpose of Action Item 2.2.1.28 was to assess the effects of the flood on the Vents and Drains Systems and identify actions to restore the system. This item was required to be completed prior to exceeding 210 degrees fahrenheit in the Reactor Coolant System.

The inspectors independently reviewed the system to identify if there were any temporary modifications in place, any outstanding preventive or corrective maintenance required, and reviewed all open condition reports, as well as all condition reports created since January 1, 2011. The inspectors also conducted a complete system walkdown to identify any adverse conditions and to verify all system components were functioning properly. The inspectors compared the results of their independent assessment to those contained in the licensee's "Flooding Recovery Startup System Health Assessment" report.

The Vents and Drains System consists of components for non-radioactive fluids and gasses to be transported, including building drainage systems, storm drains, and the sanitary system and lagoons.

The inspectors identified no temporary modifications in place and no preventive or corrective maintenance were deferred because of the flooding. No condition reports were identified that indicated any issues with the Vents and Drains System.

The independent walkdown performed by the inspectors identified no current adverse conditions to the Vents and Drains System and its individual components as a result of the flood.

This activity constitutes completion of Action Item 2.2.1.28 as described in CAL EA-13-020.

ii. Findings

No findings were identified.

(4) CAL Action Item 2.2.1.29

ii. Inspection Scope

The purpose of Action Item 2.2.1.29 was to assess the effects of the flood on the Auxiliary Steam System and identify actions to restore the system. This item was required to be completed prior to exceeding 210 degrees fahrenheit in the Reactor Coolant System.

The inspectors independently reviewed the system to identify if there were any temporary modifications in place, any outstanding preventive or corrective maintenance required, and reviewed all open condition reports, as well as all condition reports created since January 1, 2011. The inspectors also conducted a complete system walkdown to identify any adverse conditions and to verify all system components were functioning properly. The inspectors compared the results of their independent assessment to those contained in the licensee's "Flooding Recovery Startup System Health Assessment" report.

The Auxiliary Steam System supplies the plant ventilation heating units and other equipment requiring a source of low-pressure steam

The inspectors identified no temporary modifications in place and no preventive or corrective maintenance were deferred because of the flooding. No condition reports were identified that indicated any issues with the Vents and Drains System.

The independent walkdown performed by the inspectors identified no current adverse conditions to the Auxiliary Steam System and its individual components as a result of the flood.

This activity constitutes completion of Action Item 2.2.1.29 as described in CAL EA-13-020.

ii. Findings

No findings were identified.

(5) CAL Action Item 2.3.1.4

iii. Inspection Scope

The purpose of Action Item 2.3.1.4 was to refurbish the motor(s) if water contamination was present in the oil. This item was required to be completed prior to exceeding 210 degrees fahrenheit in the Reactor Coolant System.

Flood Recovery Plan (FRP) Actions 2.3.1.2 (Take oil sample from bearing housings) and 2.3.1.3 (Evaluate if water has gotten in contact with bearings) were performed to determine if the Circulating Water (CW) Pump motors needed to be refurbished. These action items were evaluated and closed in Inspection Report 2012-005 (ML12318A341). It was determined that CW-1A-M and CW-1C-M needed to be refurbished.

The licensee shipped both motors offsite to be refurbished. Once the motors were reinstalled, the inspectors observed the starting of the pumps to ensure the motors were functioning properly.

This activity constitutes completion of Action Item 2.3.1.4 as described in CAL EA-13-020.

ii. Findings

No findings were identified.

(6) CAL Action Item 3.2.1.1

i. Inspection Scope

The purpose of Action Item 3.2.1.1 was to test maintenance rule medium voltage power cable on cables which had been subjected to wetting/submergence. This item was required to be completed prior to exceeding 210 degrees fahrenheit in the Reactor Coolant System.

The licensee performed AC hipot, partial discharge, and tan-delta testing on medium voltage (41600 volt) cable in October, 2011. The inspectors observed portions of each of the tests. The population of cables was those which were exposed to water, traversing through manholes 5 and 31: the power cables for the motor driven fire pump, FP-1A; the three circulating water pumps, CW-1A, CW-1B and CW-1C; and the four raw water pumps, AC-10A, AC-10B, AC-10C and AC-10D.

The hipot test is a nondestructive test that determines the adequacy of electrical insulation normally occurring over voltage transient. The test is essentially a go/no-go test since the cable is exposed to a voltage potential greater than its normal operating voltage and if the insulation does not fail then the cable is considered to be acceptable.

Partial discharges are small electrical arcs that occur within the insulation of electrical cables. Each discrete partial discharge is the result of an electrical breakdown of an air pocket within the insulation. These discharges erode insulation and eventually result in insulation failure. The acceptance criteria for the partial discharge test is 3 picocoulombs (pC) at 4.5 kV measured over a two minute period.

Dissipation factor testing, more commonly known as Tan-Delta testing, is used to locate weaknesses in electrical insulation. The cable is exposed to three different voltages; 1.2 kV; 2.4 kV; and 3.6 kV. The measurements at 1.2 kV and 2.4 kV are used to derive the change in tan-delta. If the cable insulation is perfect the loss factor (tan-delta) will not change much as the test voltage is increased. The acceptance criteria for tan-delta testing is included in IEEE 400.2, "Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency."

The testing was conducted on 24 cables (three cables for each of the eight pumps). All 24 cables passed the hipot test, and the partial discharge test resulted in 0 pC for all 24 cables. For the tan-delta testing, the criteria for “no action required,” from IEEE 400.2, is less than or equal to  $20 \times 10^{-3}$ , or a change in tan-delta of less than or equal to  $2 \times 10^{-3}$ . The cable test results showed a maximum tan-delta of  $13.2 \times 10^{-3}$  (phase “A” of the C raw water pump) and a maximum change in tan-delta of  $0.18 \times 10^{-3}$  (phase “B” of the D raw water pump).

The results of the testing conclude that the cables for all eight pumps suffered no noticeable damage during the flood and are acceptable for use.

This activity constitutes completion of Action Item 3.2.1.1 as described in CAL 4-12-002.

ii. Findings

No findings were identified.

(7) CAL Action Items 4.2.2.1, 4.2.2.2, 4.2.2.4, 4.2.2.5, and 4.2.2.6

ii. Inspection Scope

The purpose of these action items were to identify degraded flood barriers (4.2.2.1); repair flood barriers as required (4.2.2.2); prepare SO-G-124 documentation for all flood barriers which do not have adequate qualification (4.2.2.4); review restoration plans for each impaired flood barrier per SO-G-124 form FC-1411 (4.2.2.5); and review impaired flood barriers as identified in accordance with SO-G-124 form FC-1411 (4.2.2.6). Each item was required to be completed prior to making the reactor critical.

The licensee was issued a yellow violation in 2010 (inspection report 2010007. ML 102800342) that was in part due to inadequate flood barriers. Since the issuance of the yellow finding, the licensee wrote two LERs (2011001 and 2011003 plus three revisions) documenting inadequate flood barriers.

The inspectors reviewed condition reports, LERs, and notes, and participated in several walkdowns to identify all flood penetrations, not just those that were degraded.

Action item 4.2.2.1 was to identify degraded flood barriers. The flood barriers that were degraded were the 36 penetrations in manhole 31, transitioning into the intake structure.

Action item 4.2.2.2 was to repair the degraded flood barriers. The inspectors observed the installation of the penetration seals in manhole 31. The licensee used a Polywater expanding foam sealant around the conduits.

Action items 4.2.2.4 through 4.2.2.6 were to document penetrations that were not qualified, and measures to correct the qualification problems. A report by Burns & McDonnell was prepared in March 2012, which was an evaluation of the qualification of flood barrier penetrations. The inspectors accompanied Fort Calhoun and Burns & McDonnell on these walkdowns. In addition to the 36 noted penetrations in manhole 31, the walkdown identified 85 other penetrations that had not been previously qualified.

Issues with the seal qualification were for unknown depth of sealant, unknown material, and no internal seal. The licensee repaired all of the 85 unqualified penetrations with qualified seals, and the inspectors observed a sampling of seal replacement.

This activity constitutes completion of Action Item 4.2.2.1, 4.2.2.2, 4.2.2.4, 4.2.2.5, and 4.2.2.6 as described in CAL 4-12-002.

ii. Findings

No findings were identified.

**40A5 Other Activities**

.1 Temporary Instruction 2515/182 - Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks

a. Inspection Scope

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

The inspectors reviewed the licensee's programs for buried pipe, underground piping and tanks in accordance with TI-2515/182 to determine if the program attributes and completion dates identified in Sections 3.3 A and 3.3 B of NEI 09-14 Revision 1 were contained in the licensee's program and implementing procedures. For the buried pipe and underground piping program attributes with completion dates that had passed, the inspectors reviewed records to determine if the attribute was in fact complete and to determine if the attribute was accomplished in a manner which reflected good or poor practices in program management.

Based upon the scope described above, Phase I was found to meet all applicable aspects of NEI 09-14, Revision 1, as set forth in Table 1 of TI-2515/182.

b. Findings

No findings were identified.

**40A6 Meetings, Including Exit**

Exit Meeting Summary

On April 5, 2013, the inspectors conducted a telephonic exit meeting to present the results of in-office inspection of the licensee's alert and notification system maintenance program to Mr. L. Cortopassi, Site Vice President, and other members of the licensee's staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

On June 3, 2013, the inspectors presented the inspection results to Mr. L. Cortopassi, Site Vice President and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

J. Ruth, Director, Site Training  
A. Stella, Manager, Shift Operations  
C. Cameron, Supervisor Regulatory Compliance  
E. Matzke, Senior Licensing Engineer, Regulatory Assurance  
E. Plautz, Supervisor, Emergency Planning  
J. Bousum, Manager, Emergency Planning and Administration  
K. Ihnen, Manager, Site Nuclear Oversight  
K. Kingston, Manager, Chemistry  
L. Cortopassi, Site Vice President  
M. Ferm, Manager, System Engineering  
M. Prospero, Plant Manager  
R. Cade, Manager, Operations Training  
R. Hugenroth, Supervisor, Nuclear Assurance  
S. Miller, Manager, Design Engineering  
S. Swanson, Manager, Operations  
T. Orth, Director, Site Work Management  
T. Simpkin, Manager, Site Regulatory Assurance  
V. Naschansy, Director, Site Engineering

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

#### **Opened**

2515/182	TI	Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks (Section 4OA5)
05000285/2012-001-01	LER	Inadequate Flooding Protection Procedure (Section 4OA3.2)
05000285/2012-018-01	LER	Containment Air Cooling Units Not Properly Tested during Cycle 26 (Section 4OA3.4)
05000285/2012-019-01	LER	Traveling Screen Sluice Gates Found with Dual Indication (Section 4OA3.6)
05000285/2013-003-00	LER	Calculations Indicate the high pressure safety injection (HPSI) Pumps will Operate in Run-out During a DBA (Section 4OA3.7)
05000285/2013-004-00	LER	Inverters Inoperable During Emergency Diesel Generator Operation (Section 4OA3.8)
05000285/2013-005-00	LER	Control Room HVAC modification Not Properly Evaluated (Section 4OA3.9)
05000285/2013-006-00	LER	Use of Teflon in LPSI and CS Pump Mechanical Seals (Section 4OA3.10)



Opened and Closed

05000285/2013004-01 NCV Failure to Perform Siren Maintenance as Required by the Alert and Notification System Design Report (Section 1EP2)

Closed

05000285/2012-001-00 LER Inadequate Flooding Protection Procedure (Section 4OA3.1)

05000285/2012-018-00 LER Containment Air Cooling Units Not Properly Tested during Cycle 26 (Section 4OA3.3)

05000285/2012-019-00 LER Traveling Screen Sluice Gates Found with Dual Indication (Section 4OA3.5)

05000285/2012012-05 URI Failure to Perform Siren Maintenance as required by the Alert and Notification System Design Report (Section 1EP2)

**LIST OF DOCUMENTS REVIEWED**

**Section 1R15: Operability Evaluations**

PROCEDURES

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
NOD-QP-31	Operability Determination Process	54

CONDITION REPORTS

2013-09192

**Section 4OA2: Problem Identification and Resolution (71152)**

PROCEDURES

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
FCSG-24-1	Condition Report Initiation	4
FCSG-24-3	Condition Report Screening	6a
FCSG-24-4	Condition Report and Cause Evaluation	6a
FCSG-24-6	Corrective Action Implementation and Condition Report Closure	8
SO-R-2	Condition Reporting and Corrective Action	53b

**Section 40A4: IMC 0350 Inspection Activities**

CONDITION REPORTS (CR)

2011-2472	2011-2667	2011-2946	2011-3101	2011-3414
2011-3837	2011-4014	2011-4134	2011-4170	2011-4309
2011-4646	2011-4771	2011-4830	2011-4871	2011-4902
2011-4982	2011-4996	2011-5012	2011-5027	2011-5114
2011-5173	2011-5215	2011-5254	2011-5377	2011-5508
2011-5531	2011-5700	2011-5749	2011-5750	2011-5782
2011-5805	2011-5810	2011-5819	2011-5932	2011-5944
2011-6003	2011-6085	2011-6218	2011-6235	2011-6268
2011-6298	2011-6308	2011-6478	2011-6546	2011-6557
2011-6605	2011-6614	2011-6623	2011-6670	2011-6671
2011-6712	2011-6968	2011-6997	2011-6999	2011-6999
2011-7181	2011-7199	2011-7223	2011-7319	2011-7371
2011-7377	2011-7404	2011-7512	2011-7571	2011-7634
2011-7669	2011-7985	2011-8123	2011-8169	2011-8254
2011-8963	2011-9420	2011-9684	2011-10028	2011-10383
2011-10468				

WORK ORDERS (WO)

397767	397769	397770	397771	397772
397773	397774	397775	426489	421703

ENGINEERING CHANGE (EC)

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
54662	Manhole 31 Restoration	0
53835	Seal AE-13A& B with Dow Coming 3-6548 for Flood Qualification	0
53917	Seal Flood Penetrations with Dow Corning 3-6548 for Flood Qualification	0
53921	Modify/Repair Various Intake Structure/Auxiliary Building Penetrations with Grout	0

ENGINEERING CHANGE (EC)

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
53923	Modify Penetration 19-S-60 to Protect Against Design Basis Flood	0
53924	Seal Penetration 19-S-E27 with Polywater Fst 250 Foam	0
53925	Cap Spare Penetrations in Pullboxes 127T, 128T & 129T	0
53931	Apply Thread Sealant to Existing Capped Penetrations for Flood Barrier Qualification	0
53932	Raw Water Pumps (AC-10A/B/C/D) Mounting Plate Gasket	0

MISCELLANEOUS DOCUMENTS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION / DATE</u>
SL-FC-11-436	Manhole 31 Leakage Evaluation, Sargent & Lundy	10/31/2011
EA-12004	Technical Evaluation and Qualification of Flood Barrier Penetrations at Fort Calhoun Station, Burns & McDonnell	3/14/2012

**Section 40A5: Other Activities**

PROCEDURES

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
PBD-28	Buried Piping and Components	8

MISCELLANEOUS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
NEI 09-14	Guidance for the Management of Underground Piping and Tank Integrity	1