



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

December 17, 2013

EA-13-020

Mr. Louis Cortopassi, Site Vice President  
and Chief Nuclear Officer  
Omaha Public Power District  
Fort Calhoun Station  
9610 Power Lane, Mail Stop FC-2-4  
Blair, NE 68008

SUBJECT: FORT CALHOUN STATION CLOSURE OF CONFIRMATORY ACTION LETTER

Dear Mr. Cortopassi:

The U. S. Nuclear Regulatory Commission (NRC) staff has completed the necessary inspection, assessment, and licensing activities to resolve the issues identified as contributors to the longstanding degradation in overall station performance, and to independently verify the adequacy of the actions you and your staff have taken to address the impact of flooding at the Fort Calhoun Station (FCS) as described in the Confirmatory Action Letter (CAL) EA-13-020<sup>1</sup>, dated February 26, 2013.

This letter specifically addresses the following areas: CAL closure, coordination of the restart decision with other federal agencies, and continuation of enhanced NRC regulatory oversight of FCS activities after restart.

Confirmatory Action Letter Closure

On September 2, 2011, the NRC issued CAL 4-11-003<sup>2</sup>. CAL 4-11-003 confirmed Omaha Public Power District's (OPPD's) commitment to complete post-flooding recovery actions and other items considered important for restart of the facility. On June 11, 2012, the NRC issued CAL 4-12-002<sup>3</sup> that incorporated all the committed-actions confirmed by CAL 4-11-003 and expanded the scope of activities to resolve the underlying performance issues at the facility that were discovered after CAL 4-11-003 was issued. CAL 4-12-002 included a Restart Checklist, the purpose of which was to identify all of the issues that needed to be resolved before restart. On February 26, 2013, the NRC issued CAL EA-13-020. CAL EA-13-020 incorporated all the actions confirmed by CAL 4-12-002 and expanded the scope of the restart checklist to resolve three additional items prior to restart. CAL EA-13-020 confirmed that FCS would not operate above Hot Shutdown Condition (Operating Mode 3), as defined by Technical Specifications, until the NRC has completed its review of OPPD's actions listed below:

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<sup>1</sup> ADAMS Accession No. ML13057A287

<sup>2</sup> ADAMS Accession No. ML112490164

<sup>3</sup> ADAMS Accession No. ML12163A287

1. OPPD will identify the causes and implement corrective actions to address the safety significant NRC inspection findings and the Safety System Functional Failures Performance Indicator listed in Items 1.a through 1.d and 1.g of the Restart Checklist.
2. OPPD will conduct a third-party safety culture assessment (Restart Checklist Item 1.e) and an integrated organizational effectiveness assessment (Restart Checklist Item 1.f) at FCS and implement actions to address the results of these assessments.
3. OPPD will submit Flood Recovery Plan updates to the NRC for items 2.a and 2.b (of the Restart Checklist). That plan will include an assessment of the long-term flooding impact at FCS on plant systems, structures, and components, and the basis for their readiness for restart. Additionally, OPPD will identify the causes and address the deficiencies associated with Items 2.c and 2.d (of the Restart Checklist).
4. OPPD will assess the FCS programs and processes listed in Restart Checklist Item 3 to verify that they are adequate to support safe plant operation.
5. OPPD will submit Integrated Performance Improvement Plan (IPIP) updates to the NRC (Restart Checklist Item 4). Additionally, OPPD will implement the IPIP and provide a schedule for completing the plan's actions.
6. OPPD will inform the NRC in writing of the results related to CAL actions 1 through 5 listed above.

On December 2, 2013, OPPD submitted an "Integrated Report to Support Restart of Fort Calhoun Station and Post-Restart Commitments for Sustained Improvement." This report details the actions OPPD has taken to address CAL EA-13-020 dated February 26, 2013, and included: (1) the actions taken and results achieved from implementing the IPIP; (2) the basis for closing the Restart Checklist items; (3) the completion of Flood Recovery Plan commitments; and (4) the actions taken to close the CALs.

Based on the NRC's review of OPPD's actions, the NRC has determined that OPPD has satisfied the commitments in CAL EA-13-20. The basis for closure of the CAL and its associated items is contained in Enclosure 1 of this document. All commitments contained in CAL EA-13-020 are closed and the NRC has determined that FCS is safe to restart.

#### Restart Checklist Closure

On December 13, 2011, the NRC informed OPPD via letter<sup>4</sup> that FCS transitioned to Inspection Manual Chapter (IMC) 0350, "Oversight of Reactor Facilities in a Shutdown Condition Due to Significant Performance and/or Operational Concerns." The IMC 0350 process was implemented at FCS due to the plant being in an extended shutdown with significant performance problems, and a significant operational event involving a fire in a safety-related electrical switchgear on June 7, 2011.

As part of the IMC 0350 Process, on January 12, 2012, a Fort Calhoun Oversight Panel (Panel) was chartered to coordinate and oversee NRC activities needed to verify proper licensee safety

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<sup>4</sup> Agencywide Document Access and Management System (ADAMS) Accession No. ML113470721

performance. The Panel also ensured appropriate focus was provided and resources were allocated with regard to reviewing FCS improvement initiatives.

On November 13, 2012, the Panel issued the “U.S. Nuclear Regulatory Commission Manual Chapter 0350 Panel Fort Calhoun Station Restart Checklist Basis Document<sup>5</sup>,” which was developed in accordance with NRC IMC 0350. This document provided details and clarification for the scope and breadth of the Restart Checklist items and the minimum actions that the NRC planned to take to verify that FCS had adequately addressed the specific items in the CAL. The overall scope of these activities was developed to ensure that the issues that resulted in the prolonged performance decline at FCS were understood and resolved. The basis document was developed to provide the public a detailed list of items that the NRC would review, as a minimum, to ensure the operational safety of FCS. In addition, this detailed list of items that OPPD was expected to address in a comprehensive manner through appropriate corrective action, facilitated the planning and scheduling of NRC inspections to provide for independent assessment of the adequacy of OPPD’s actions in resolving each checklist item. On March 7, 2013<sup>6</sup>, September 19, 2013<sup>7</sup>, and November 15, 2013<sup>8</sup>, the NRC issued updates to the Restart Checklist Basis Document.

The NRC staff has completed its inspection and assessment activities and has evaluated the adequacy, and where appropriate, the effectiveness of OPPD’s actions to address the issues that resulted in the extended shutdown of FCS. The Panel’s assessment of OPPD’s actions was based on resident, region-based, and headquarters inspections, supplemented by review and input from headquarters staff technical expertise. NRC inspections were performed individually and by teams, with results documented in reports that are publicly available. These reports include:

- NRC INTEGRATED INSPECTION REPORTS (issued every 6 weeks since entry into MC 0350)
- NRC IMC 0350 SECURITY INSPECTION REPORT 05000285/2013405 (associated with Greater-than-Green security findings)
- NRC SPECIAL INSPECTION REPORT 05000285/2013-012 (associated with the improper design specifications involving the raw water pump anchor bolts)
- MANUAL CHAPTER 0350 TEAM INSPECTION REPORT NO. 05000285/2013008 (focused in the areas of safety culture, corrective action program, engineering programs, regulatory processes, and nuclear oversight)
- NRC IMC 0350 INSPECTION REPORT 05000285/2013010 (focused in the areas of operations and emergency preparedness)
- NRC IMC 0350 SECURITY TEAM INSPECTION REPORT 05000285/2013407 (associated with follow up inspections for the Greater-than-Green security findings)

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<sup>5</sup> ADAMS Accession No. ML12318A319

<sup>6</sup> ADAMS Accession No. ML13066A877

<sup>7</sup> ADAMS Accession No. ML13262A371

<sup>8</sup> ADAMS Accession No. ML13319B251

- MANUAL CHAPTER 0350 TEAM INSPECTION REPORT NO. 05000285/2013013 (focused in the areas of significant performance deficiencies, engineering and maintenance programs, and operability process)

The Panel also conducted frequent public meetings with OPPD to discuss FCS performance and NRC inspection and assessment results. These meetings were documented in public meeting summaries, all of which have been placed in the NRC Public Electronic Reading Room.

Enclosure 2 to this letter provides the Restart Checklist and Restart Checklist Basis Document update reflecting that all inspection activities associated with the Restart Checklist items have been completed. This document also provides a reference to the inspection report that describes the basis for closure of each specific item. Although all inspections have been completed, some inspection reports are currently in progress and have not yet been issued. For these reports, this document references the anticipated number of the inspection report in which the inspection results will be discussed.

#### Confirmation of Commitments in the "Integrated Report to Support Restart of Fort Calhoun Station and Post-Restart Commitments for Sustained Improvement"

OPPD submitted the "Integrated Report to Support Restart of Fort Calhoun Station and Post-Restart Commitments for Sustained Improvement" on December 2, 2013. Enclosure 2 of that report details OPPD's commitments to sustain performance improvement at the Fort Calhoun Station and resolve some specific items. The actions described in Enclosure 2 of the OPPD report are being implemented to ensure the improvements realized remain in place to prevent recurrence of the significant performance deficiencies that resulted in the extended shutdown of FCS. Please provide written notification to the NRC Region IV Regional Administrator should OPPD determine that any of those actions cannot be accomplished consistent with the schedules that are currently contained in the OPPD corrective action program, or should OPPD determine that revision to the commitments is necessary.

#### Coordination of Restart with other Federal Agencies

In accordance with IMC 0350, the NRC staff coordinated with the Federal Emergency Management Agency and determined that there are no offsite emergency preparedness issues related to operation of the FCS following restart. In a letter from FEMA to the NRC dated November 4, 2013<sup>9</sup>, FEMA concluded that offsite radiological emergency preparedness is adequate to provide reasonable assurance that appropriate measures can be taken to protect the health and safety of the public in the unlikely event of a radiological emergency at the FCS.

#### Continuation of Oversight Panel after Restart

Implementation of the routine reactor oversight and assessment processes will continue to be suspended. The Panel will continue to provide NRC regulatory oversight at Fort Calhoun Station. The NRC will continue to monitor FCS startup activities through resident and region-based inspections, including a period of continuous observation during restart of the station. In addition, enhanced inspection oversight will be provided using the additional inspection activities authorized under the MC 0350 process, focusing on those areas the Panel determines warrant

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<sup>9</sup> ADAMS Accession No. ML13316C039

additional oversight. By separate correspondence, OPPD will be provided a copy of the NRC's inspection plans for FCS during the upcoming 18-month period.

In summary, the matters contained in CAL EA-13-020 and its enclosed Restart Checklist have been adequately resolved. The NRC has not identified any issues which would preclude restart under the existing licensing basis.

OPPD remains accountable to assure it operates FCS in compliance with the rules and regulations of the Commission and FCS operating license. The NRC acknowledges OPPD commitments to take post-restart actions to prevent recurrence of significant performance deficiencies.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its Enclosures, and your responses if you choose to respond, will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agency wide Documents Access and Management System (ADAMS). ADAMS is accessible from the Public Electronic Reading Room page of the NRC's public web site at: <http://www.nrc.gov/readingrm/adams.html>.

Sincerely,

/RA/

Marc L. Dapas  
Regional Administrator

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

Enclosures:

1. Confirmatory Action Letter Item Closure
2. Updated Restart Checklist and Restart Checklist Basis Document

cc w/enclosures: Electronic Distribution for FCS

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ADAMS ACCESSION NUMBER:

ADAMS		<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> SUNSI Review Complete	Reviewer Initials: MCH
<input checked="" type="checkbox"/> Publicly Available		<input type="checkbox"/> Non-publicly Available		<input type="checkbox"/> Sensitive	<input checked="" type="checkbox"/> Non-sensitive
MC0350ViceChair	MC0350Chair	ORA/GC	RA		
DDORL	DDNMD				
LLund	AVegel	KFuller	MDapas		
/RA/	/RA/	/RA/	/RA/		
12/16/13	12/16/13	12/16/13	12/17/13		

## Confirmatory Action Letter Item Closure

### **Item 1 (Causes of Significant Performance Deficiencies and Assessment of Organizational Effectiveness)**

“OPPD will identify the causes and implement corrective actions to address the safety significant NRC inspection findings and the Safety System Functional Failures Performance Indicator listed in Items 1.a through 1.d and 1.g of the Restart Checklist.”

#### Item 1. a (Flooding issue – Yellow finding)

Item 1.a (Flooding Issue – Yellow finding) is included in the Restart Checklist for the failure of Fort Calhoun Station (FCS) to maintain procedures and equipment that protects the station from the effects of a design basis flood.

#### Basis for Closure

This finding involved the failure to maintain written procedures for combating a significant external flood, and written procedures that existed at the time which did not adequately prescribe steps to mitigate external flood conditions in the Auxiliary Building and the Intake Building, as documented in the Updated Safety Analysis Report (USAR). In addition, the NRC determined that OPPD failed to classify the six Intake Building exterior sluice gates and their motor operators as Safety Class III, and that FCS did not meet design basis requirements for protection of the safety-related raw water system for design basis flood levels.

Based on the results of its inspection activities, the NRC determined that OPPD adequately evaluated the root and contributing causes for the Yellow Finding, conducted a thorough extent-of-condition review, and implemented appropriate corrective actions to resolve the associated performance deficiencies.

Actions taken by OPPD to resolve the deficiencies include:

- Installation of removable flood barriers with a function to provide protection for vital equipment at the Intake Building and in the Auxiliary Building. OPPD replaced the original flood barriers with improved barriers that provide protection to a design basis flood level.
- Evaluating the physical condition of each flood barrier penetration. OPPD identified deficiencies in those seals used as a flood barrier and repaired/restored each of the deficient seals. OPPD also developed a procedural process to ensure that flood barrier degradations or impairments are properly identified, evaluated, and tracked to restoration, with appropriate compensatory actions specified if flooding conditions should occur during the time that the barrier is degraded or impaired.
- Flood mitigation procedures were reviewed, revised, and validated to ensure protection of vital areas and equipment required to achieve and maintain the reactor in a cold shutdown condition for flooding events up to the design basis flood level.

- Upgraded flood mitigation procedures to provide comprehensive lists of materials credited for use in the procedures. OPPD revised the applicable procedures to ensure that sufficient inventory and preventive maintenance of flood mitigation materials is periodically conducted.
- Implementing a plant modification to bypass around the sluice gates during flooding conditions and providing a means for operators to verify that the sluice gates are closed or nearly closed. In addition, OPPD developed and implemented procedure changes to support the use of installed flood control valves. These changes addressed resolution of the sluice gate motor operators being required for design basis flooding conditions.

Following completion of NRC inspection activities on June 5, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 1.a conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this item are documented, or will be documented, in NRC Inspection Reports 05000285/2010-007, 05000285/2012-002, 05000285/2013-008, 05000285/2013-019.

Item 1.b (Reactor Protection System contact failure – White Finding)

Item 1.b is included in the restart checklist for the failure of FCS to correct a degraded contactor, which subsequently failed, in the reactor protection system (RPS). This deficiency resulted in a White (low-to-moderate safety significance) finding as documented in NRC Inspection Report 05000285/2011007.

Basis for Closure

Based on the results of its inspection activities, the NRC determined that OPPD adequately evaluated the root and contributing causes for the White finding, conducted a thorough extent-of-condition review, and implemented appropriate corrective actions to resolve the associated performance deficiencies.

OPPD identified a number of causes that contributed to the degraded RPS system. These include:

- stopping a surveillance to perform corrective maintenance and then resuming it without designating the test as “failed,”
- operations department staff accepting informal and incorrect information from the engineering organization,
- failing to declare the RPS contactor inoperable and entering a Technical Specification Limiting Condition for Operation when the surveillance tests could not be completed because of an equipment issue,
- electrical maintenance personnel performing unauthorized repairs that were not questioned by other personnel present, and
- tolerating a degraded condition within the RPS system.

OPPD implemented a number of corrective actions to address the causes that included:

- replaced the RPS contactors with a newer model,



- requested and obtained from the NRC a license amendment to define operability of the RPS contactors,
- implemented a comprehensive Safety Culture Improvement Plan, summarizing activities planned to improve nuclear safety culture at FCS,
- revised the “Maintenance Work Control” procedure to strictly define skill-of-the-craft and establish the requirement that craft personnel shall not perform any work activity that is not skill-of-the-craft without authorization of an approved work document or procedure,
- revised SO-G-23, “Surveillance Test Program,” to state that surveillances shall be completed once they are started unless there are extenuating circumstances, any surveillance that is halted or paused for any reason shall be promptly reported to the Shift Manager for purposes of determining the effect of the halted surveillance on operability, and in no case, shall any maintenance activity that could affect the surveillance be performed on any component or system that is under surveillance testing except those activities specifically authorized and controlled within the surveillance.

Following completion of NRC inspection activities on June 5, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 1.b conducted discussions and the Panel determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this item are, or will be, documented in NRC Inspection Reports 05000285/2013-007, 05000285/2013-008, and 05000285/2013-019.

#### Item 1.c (Electrical bus modification and maintenance – Red Finding)

Item 1.c is included in the Restart Checklist for the failure to adequately design, modify, and maintain the electrical power distribution system, resulting in a fire in the safety-related 480 volt electrical switchgear. These deficiencies resulted in a Red (high safety significance) finding as documented in NRC Inspection Report 05000285/2012010.

#### Basis for Closure

Based on the results of its inspection activities, the NRC determined that OPPD adequately evaluated the root and contributing causes for the Red Finding, conducted a thorough extent-of-condition review, and implemented appropriate corrective actions to resolve the associated performance deficiencies.

OPPD replaced the subject breaker and similar breakers in 2009 and determined that the most probable direct cause of the fire was a high resistance connection that was primarily caused by breaker cubicle cradle fingers that engaged the bus stabs in a contact area that had hardened grease and copper oxide buildup. Based on the results of its extent-of-condition inspections, OPPD verified that some cradle fingers did not contact the silver-plated area while others had minimal contact. This resulted in higher resistance connections because the cradle fingers and switchgear bus stabs engaged where there was oxidized copper and old grease instead of at the silver plating. A contributing cause was the failure to “normalize” the bus stabs of the switchgear. A “normalized” breaker compartment is a breaker compartment that has been adjusted and lubricated to the requirements of the new cradle interface specifications.

OPPD further determined that the causes of the cubicle fire potentially extended to other design activities that included specification of post-modification test criteria, preparation of modifications, facility changes, minor configuration changes, procurement specifications,

construction work orders, and field design change requests. In addition, OPPD's design process lacked a requirement to identify and compare critical characteristics when performing modifications.

To address the failure of the design process, OPPD revised FCS design procedures that incorporate guidance for identifying critical characteristics of modified equipment. In accordance with the revised procedures, once the critical characteristics are determined, they are compared with the original with respect to fit, form, and function. In addition, OPPD has expanded the operating experience search criteria for modifications to include Institute of Nuclear Power Operations (INPO) databases: Significant Operating Experience Reports, INPO Event Reports, Significant Event Reports, and Significant Event Notifications. OPPD concluded that these actions will reduce missed opportunities to prevent future modification-related events.

OPPD also implemented a design change to enhance access to the switchgear bus compartments to accommodate periodic preventative maintenance activities, as well as revised inspection and maintenance procedural guidance to provide instructions for verifying the condition of the silver-plated primary disconnect stab areas and to require the removal of hardened grease residue on those stabs. In addition, a step was added to provide independent verification of the primary disconnect stabs cleanliness by the system engineer.

Following completion of NRC inspection activities, on December 15, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 1.c conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this item are, or will be, documented in NRC Inspection Reports 05000285/2012-010, 05000285/2013-002, 05000285/2013-004, 05000285/2013-008, 05000285/2013013, and 05000285/2013-015.

#### Item 1.d (Security – Greater-than-Green Findings)

Item 1.d is included in the Restart Checklist because of Greater-than-Green findings that adversely affected the security cornerstone associated with the Reactor Oversight Process. Information about these findings is located in NRC Inspection Reports 05000285/2011-404, 05000285/2011-406, 05000285/2013-405, and 05000285/2013-407.

#### Basis for Closure

Based on the results of its inspection activities, the NRC determined that OPPD adequately evaluated the root and contributing causes for the Greater-than-Green Findings, conducted a thorough extent-of-condition review, and implemented appropriate corrective actions to resolve the associated performance deficiencies.

Following completion of NRC inspection activities, on July 11, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 1.d conducted discussions and determined this item had been adequately addressed by the OPPD and therefore closed it.

The inspection activities associated with reviewing these issues are documented in NRC Inspection Reports 05000285/2013405 and 05000285/2013407.

### Item 1.g (Safety System Functional Failures White Performance Indicator)

The Safety System Functional Failure Performance Indicator for the third quarter of 2012 moved into the White region based on a number of events being identified, mainly during OPPD discovery efforts to improve overall safety at the facility. This indicator reflects the number of events or conditions that alone prevented, or could have prevented, the fulfillment of the safety function of structures or systems in the previous four quarters.

### Basis for Closure

The NRC concluded that OPPD's collective assessment of the functional failures was adequate and the corrective actions appropriately addressed the identified causes. In addition, the NRC reviewed each specific functional failure to ensure OPPD adequately resolved the associated issues prior to plant restart.

OPPD determined the White Performance Indicator resulted from the failure to maintain an environment within the engineering organization that valued maintaining the license and design basis of the station over continued reliability of the facility, which led to a loss of control over the FCS design and configuration. OPPD performed an extent-of-condition evaluation and determined that the deficiency extended beyond the engineering organization and that the condition had been repeatedly identified as design basis/configuration control anomalies, but actions taken by management to address the dormant nature of existing design basis issues had limited effectiveness.

OPPD's corrective actions to address the causes included increasing the function of the oversight group that performs reviews of documentation, including Title 10 of the Code of Federal Regulations (CFR), Part 50.59, "Changes, tests, and experiments"; modifications; operability evaluations; and other documents developed that use design and licensing bases information.

In addition, OPPD has identified long-term corrective actions specifically addressing design basis information that include:

- establishing a methodology for ensuring current and historical design bases records can be readily retrievable,
- reconstituting the design bases, including historical records required to establish the current bases, and
- establishing a process for assuring design bases documentation remains current, accurate, complete, and retrievable.

Following completion of NRC inspection activities, on December 3, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 1.g conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The details of these inspections will be documented in NRC Inspection Report 05000285/2013-013.

## Item 2

OPPD will conduct a third-party safety culture assessment (Restart Checklist Item 1.e) and an integrated organizational effectiveness assessment (Restart Checklist Item 1.f) at FCS and implement actions to address the results of these assessments.

### Basis for Closure

The NRC completed an IMC 0350 Team Inspection at FCS. The NRC concluded that the third-party assessment was comprehensive, the methods used by the OPPD contractor were acceptable, and that OPPD's actions to communicate the assessment results to the various levels of staff and management were sufficient. In addition, the NRC verified that OPPD has taken appropriate actions to address the issues identified in the third-party assessment.

Insights identified by the OPPD's third party independent assessment include:

While some examples of conservative decision-making were identified, examples of non-conservative decision-making were more prevalent in evaluating significant events. Standards and expectations with respect to work practices and work control needed to be more clearly identified, communicated, and reinforced.

- Many FCS personnel believed that the Corrective Action Program (CAP) was not as effective as it should be. Senior leadership provided weak oversight of the process and management engagement with the process had been very limited. The criticality and ability to self-identify issues and causes needed to be enhanced. Operating experience needed to be better integrated into a learning process and a stronger independent oversight organization was needed to help identify areas for performance improvement.
- The majority of FCS employees believed that even though management says that it does not tolerate retaliation, there was still a widespread perception of fear and punishment across the station. The majority of employees believed that they could not challenge management decisions, that helpful criticism was not encouraged, and that they could not approach management with concerns. Management had not been successful in communicating and reinforcing the values and attitudes that were important for enhancing safety culture.
- Accountability was described by most of the FCS interviewees as the biggest issue for the station. Many individuals in management and supervision did not consistently exhibit desired behaviors and were not challenged by their managers or peers. A significant contributing factor to the accountability issue was the lack of senior management's ownership of many issues.

OPPD conducted a root cause analysis using the results of the independent assessment and based on the results, implemented a number of corrective actions that include:

- developing and conducting training that focused on the role of supervisors and managers in establishing and maintaining a healthy nuclear safety culture and safety conscience work environment,
- conducting routine, small group multi-disciplined employee feedback meetings to identify and prioritize site issues for management action,

- implementing changes to the employee concerns program organizational structure and its reporting relationship to assure independence and accessibility to the staff, and
- monitoring of monthly metrics that measure and monitor safety culture program effectiveness.

A team of independent consultants and OPPD personnel conducted the organizational effectiveness assessment. The overall characterization of the assessment was, "Senior leaders and managers are not providing the necessary leadership to improve organizational performance. In addition, leadership failed to be intrusive, set the right priorities, and hold personnel accountable, and has not understood major processes or issues affecting morale. As a result, timeliness and thoroughness of resolution of important issues has been lacking and station performance declined significantly."

OPPD implemented a number of corrective actions to address the assessment results that include:

- establishing corporate governance and oversight policies, processes, and programs by which OPPD manages FCS,
- implementing a management model that emphasizes nuclear safety and continuous improvement and that defines the FCS fundamental objectives through mission, vision, values, guiding principles, and fundamentals of the organization, and
- implementing an accountability model for the FCS organization.

The NRC concluded that for the Integrated Organizational Effectiveness assessment, the root and contributing causes of risk-significant issues were understood, the extent-of-condition and extent-of-cause of risk-significant issues were identified, and OPPD's corrective actions were appropriate to address the causes and extent-of-condition evaluation results.

Following completion of NRC inspection activities, on June 5, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Items 1.e and 1.f conducted discussions and determined these items were adequately addressed by OPPD and therefore closed them.

The inspection activities associated with these items are documented in NRC Inspection Report 05000285/2013008.

### **Item 3**

OPPD will submit Flood Recovery Plan updates to the NRC for items 2.a and 2.b of the Restart Checklist. That plan will include an assessment of the long-term flooding impact at FCS on plant systems, structures, and components and the basis for their readiness for restart. Additionally, OPPD will identify the causes and address the deficiencies associated with Restart Checklist Items 2.c and 2.d.

### **Items 2.a and 2.b Basis for Closure**

Items 2.a and 2.b of the Restart Checklist are "Flood Recovery Plan actions associated with facility and system restoration," and "System readiness for restart following extended plant shutdown", respectively. On August 10, 2011, OPPD submitted to the NRC the FCS Post-Flooding Recovery Action Plan (ADAMS ML112231755), and a separate non-public Security Recovery Action Plan. OPPD submitted Revision 1 to the Post-Flooding Recovery Action Plan

on August 30, 2011 (ADAMS ML112430102). These plans provide details on actions OPPD implemented to assess the impact of the long-term flooding at FCS on plant systems, structures, and components following the Missouri River flood during the summer of 2011. The post-flood recovery assessments and associated actions involved six focus areas. These areas included Site Restoration, Plant Systems and Equipment, Equipment Reliability, Design and Licensing Basis, Emergency Planning, and Security.

CAL 4-11-003, dated September 2, 2011 described the following specific actions OPPD would implement covering the six focus areas:

Prior to exceeding 210° F in the RCS, OPPD commits to complete the following actions detailed in the Post-Flooding Recovery/Security Plan: Action Items 1.2.1.1; 1.2.1.3; 1.2.1.4; 1.3.1.1 through 1.3.1.12; 1.3.1.14 through 1.3.1.19; 1.3.1.21 through 1.3.1.24; 1.4.1.2 through 1.4.1.6; 2.1.1.1 through 2.1.1.10; 2.2.1.1 through 2.2.1.32; 2.3.1.1 through 2.3.1.16; 3.1.1.1; 3.2.1.1 through 3.2.1.3; 3.3.1.1 through 3.3.1.3; 3.4.1.1; 4.1.1.12 through 4.1.1.17; 4.1.1.20 through 4.1.1.25; 4.2.1.1 through 4.2.1.6; 4.3.1.1 through 4.3.1.4; 4.5.1.1 through 4.5.1.15; 4.6.1.1 through 4.6.1.3; and 5.2.1.

Prior to reactor criticality, OPPD commits to complete the following actions detailed in the Post-Flooding Recovery/Security Plan: Action Items 3.2.2.1 through 3.2.2.4; 3.4.2.1 through 3.4.2.10; 4.2.2.1; 4.2.2.2; 4.2.2.4 through 4.2.2.7; 4.3.2.1; 5.1.2.1 through 5.1.2.8; 5.2.2.1; 5.3.2.1 through 5.3.2.7; 5.3.2.18; 5.4.2.1 through 5.4.2.4; 6.1.2.2 through 6.1.2.16; and 6.1.2.20 through 6.1.2.37.

The NRC determined that OPPD adequately assessed the impact of the long-term flooding at FCS and implemented those restoration actions necessary to support a safe plant restart. Specific actions implemented by OPPD include:

- demobilizing temporary flood protection barriers,
- assessed any flood-related affects to site facilities and structures and implemented appropriate repairs,
- assessed the impact of subsurface water on soils and structures,
- assessed any flood-related affects to plant systems and implemented appropriate repairs,
- assessed any flood-related affects to emergency preparedness facilities and equipment and implemented appropriate repairs,
- assessed any flood-related affects to physical security equipment and implemented appropriate repairs,
- assessed that FCS is in compliance with the NRC approved design and licensing basis for flooding events, and
- performed system health reviews to ensure systems are ready to support plant restart.

Following completion of NRC inspection activities on November 7, 2013, and November 21, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Items 2.a and 2.b conducted discussions and determined these items had been adequately addressed by OPPD and therefore closed them.

The inspection activities associated with Restart Checklist Items 2.a are documented in NRC Inspection Reports 05000285/2012-003, 05000285/2012-004, 05000285/2012-005, 05000285/2012-011, 05000285/2012-012, 05000285/2013-002, 05000285/2013-003,

05000285/2013-004, 05000285/2013-005, 05000285/2013-014, 05000285/2013-015, and 05000285/2013-016.

The inspection activities associated with Restart Checklist Items 2.b are documented in NRC Inspection Reports, 05000285/2013-005, 05000285/2013-014, and 05000285/2013-016.

#### Item 2.c Basis for Closure

Item 2.c of the Restart Checklist is “Qualification of containment electrical penetrations.” During the course of discovery activities in connection with the current shutdown, FCS staff identified that certain containment electrical penetrations contained Teflon material that could degrade under the post-accident radiation conditions inside containment. In response to electrical equipment qualification (EEQ) program requirements and EEQ testing results from an OPPD contractor, many, but not all, non-conforming electrical penetration assemblies containing Teflon were replaced between 1984 and 1986. OPPD determined that the root cause for why some of the electrical penetration assemblies were not replaced was a lack of technical oversight to ensure the information associated with Teflon material used in essential applications was applied to non-essential applications. In addition, OPPD evaluated the use of Teflon in equipment that would be subject to post-accident conditions to ensure no safety functions were adversely affected.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition and implemented appropriate corrective actions to resolve the issue. Specifically, OPPD replaced or capped all containment electrical penetrations that were adversely affected because they contained Teflon material.

Following completion of NRC inspection activities, on December 3, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 2.c conducted discussions and determined this item had been adequately addressed by the OPPD and therefore closed it.

The inspection activities associated with this this item will be documented in NRC Inspection Report 05000285/2013013.

#### Item 2.d Basis for Closure

Item 2.d of the Restart Checklist is “Containment internal structure.” In May 2012, OPPD identified discrepancies between design calculations and design drawings for a concrete beam and a floor slab. Based on the results from its extent-of-condition review, OPPD identified other containment internal structure deficiencies that did not conform to the licensing basis. Although portions of the containment internal structure were found to be non-conforming to the design basis, OPPD was able to demonstrate the structure was operable and fully capable of performing its function under all design basis accident loading conditions.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for this issue and independently verified that OPPD has actions in place via the corrective action process to restore the containment internal structure to its design criteria in a timely manner.

Following completion of NRC inspection activities, on November 7, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 2.d conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this this item will be documented in NRC Inspection Report 05000285/2013-013.

#### **Item 4**

OPPD will assess the FCS programs and processes listed in Restart Checklist Item 3 to verify that they are adequate to support safe plant operation.

Item 3 of the Restart Checklist, "Adequacy of Significant Programs and Processes," focused on evaluating the health of key site programs and processes necessary to ensure safe plant operation. These programs and processes included the following Restart Checklist Items:

- Item 3.a - Corrective Action Program,
- Item 3.b - Equipment Design Qualifications,
- Item 3.c - Design Changes and Modifications,
- Item 3.d - Maintenance Programs,
- Item 3.e - Operability Process, and
- Item 3.f - Quality Assurance

#### **Item 3.a - Corrective Action Program Basis for Closure**

The NRC determined that the Corrective Action Program (CAP) at FCS is adequate in identifying, evaluating, and correcting issues with various degrees of effectiveness, and that FCS staff generally exhibit a low threshold for identifying issues and entering them into the CAP. Issues entered in the CAP were usually prioritized and evaluated based on plant risk and uncertainty, personnel safety, and organizational behaviors. In most instances, corrective actions were implemented in a timely manner, commensurate with the safety significance of the matter.

Based on the results of problem identification and resolution team inspections conducted in 2007, 2009, 2011, and 2013, the NRC identified OPPD performance deficiencies involving inconsistent implementation of the FCS CAP, specifically in the area of casual analysis that supports effective resolution of the associated issue. In addition, from its own self-assessment, OPPD identified several other CAP-related deficiencies that include:

- a culture at FCS of individual and organizational behaviors that precluded the effective and timely detection, evaluation, and correction of performance deficiencies;
- a negative trend in the quality of root cause analyses covering cause determination, corrective action development, and evaluation depth and breadth; and
- an inconsistent establishment and reinforcement of an environment where a healthy questioning attitude, and the reporting of concerns was accepted, supported, and desired.

OPPD conducted an analysis to determine the root and contributing causes for these deficiencies and identified some common themes that include:

- FCS lacked a healthy nuclear safety culture that valued the CAP as part of a strategic process to improve plant performance;
- leadership behaviors did not demonstrate a commitment to safety as it related to the identification of problems and their timely resolution;
- OPPD failed to develop and implement the essential attributes of an effective



- governance and oversight policy that included the FCS CAP; and
- station management failed to own the CAP and adequately oversee it, which caused the resolution of many important issues to be untimely and less than thorough.

OPPD implemented a number of corrective actions to address the identified CAP deficiencies and root/contributing causes, as well as to improve overall CAP performance that include:

- establishing and reinforcing appropriate standards of behavior and mental models, beliefs, and values for timely and effective problem identification and resolution;
- revision of CAP procedures, and training all station leadership and workers on the new procedures, including the CAP review boards;
- establishing CAP performance indicators;
- staffing new Corrective Action Program Coordinator positions to assist with implementation and monitoring of CAP effectiveness; and
- establishing CAP subject matter experts in each department.

Following completion of NRC inspection activities on October 31, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.a conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this item are, or will be, documented in NRC Inspection Report 05000285/2013-005, 05000285/2013008, 05000285/2013-015, and 05000285/2013019.

### Item 3.b - Equipment Design Qualifications

The focus of this item was to verify that OPPD was maintaining systems, structures, and components within their licensing and design basis. The NRC focused particularly on two areas: OPPD's safety-related parts program and High Energy Line Break (HELB)/Electrical Equipment Qualification (EEQ) programs.

For these focus areas, the NRC verified that OPPD performed adequate causal analysis and extent-of-condition evaluations related to the issues. The NRC verified that appropriate corrective actions were identified based on the results of OPPD's causal analysis and extent-of-condition evaluations, and that corrective actions were either implemented or appropriately scheduled for implementation.

### Item 3.b.1 – Safety-Related Parts Program Basis for Closure

Both the NRC and OPPD identified a number of instances where lower-quality level classified material, i.e., parts and components, were used in critical quality element (CQE) applications during maintenance, repair, rework, modification, or replacement activities. Based on these occurrences, OPPD reviewed thousands of material types being used at the facility to ensure they were being appropriately controlled, such that non-safety-related components were not being improperly used in safety-related applications. As part of the discovery phase, OPPD reviewed approximately 30,000 work orders that could have resulted in the installation of lower quality level parts in higher quality level equipment. The review period included multiple operating cycles during which material replacement activities were performed. From its review, OPPD identified 1,700 work orders that incorporated at least one material type that had a lower

quality level safety classification than the associated work order. OPPD subsequently determined that these instances were the result of documentation inadequacies and based on material evaluations, the functionality of the involved systems/components was not compromised. In addition to these material documentation inadequacies, OPPD identified 34 specific material types where the application was deficient and therefore required rework.

OPPD identified several causes for this situation:

- inadequate procedural guidance and a deficient process for training/mentoring resulted in a deficient work planning and review process with the potential for installing lower quality level parts where higher quality level parts were required;
- lack of adequate reference documents and resources/tools for planners, engineers, and maintenance personnel;
- overconfidence in station personnel's abilities to accomplish work resulted in inadequate use of human performance tools and a rationalization that OPPD's current expectations, standards, and performance were sufficient;
- the corrective action program did not fully assess and effectively resolve CQE issues; and
- a gap existed in station personnel's knowledge regarding CQE classification boundaries and dedication requirements.

OPPD implemented several corrective actions to address these causes that include:

- developed procedural guidance to prevent installation of non-CQE components/parts in CQE applications, and
- provided training for maintenance planners, operations staff, and maintenance personnel.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for this issue and independently verified that OPPD has implemented actions via the corrective action process to address the deficiencies associated with implementation of the Safety-Related Parts program.

Following completion of NRC inspection activities, on November 26, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.b.1 conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this this item will be documented in NRC Inspection Report 05000285/2013013.

### Item 3.b.2 - High Energy Line Break and Equipment Qualifications Program Basis for Closure

OPPD identified a number of adverse conditions, weaknesses, and areas for improvement associated with the HELB and EEQ programs. These deficiencies resulted in equipment not being qualified for the environmental conditions they could potentially be exposed to under postulated high energy line piping breaks. From its self-assessment activities, OPPD determined that it had not fully implemented and/or maintained the FCS EEQ program to meet the requirements of 10 CFR Part 50.49, "Environmental Qualifications of Electrical Equipment Important to Safety for Nuclear Power Plants". As a result, the equipment included in the EEQ program, the systems included in the HELB analysis, and the environmental conditions considered as part of the EEQ program, had not been maintained current or in an auditable

manner. This led to inoperable equipment due to a lack of environmental qualifications, electrical equipment outside of containment being impacted by a HELB, and the design temperature ratings for several containment valve actuators being below those required for design basis accidents.

OPPD implemented a number of corrective actions to resolve and prevent recurrence of these HELB/EEQ deficiencies, including:

- revising EEQ procedures such that EEQ engineering activities are performed under the configuration change control process,
- modifying the steam supply piping to the steam-driven auxiliary feedwater pump to correct overstressed conditions,
- modifying the Chemical and Volume Control System and Steam Generator Blowdown piping located in Room 13 to meet volumetric inspection requirements,
- modifying piping supports in various safety-related systems,
- developing a documented basis that demonstrates EEQ equipment is installed and configured in accordance with requirements for functionality in a harsh environment, and
- modifying or replacing electrical equipment such as relays, terminal blocks, conduit, and motors.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for the identified deficiencies pertaining to the HELB/EEQ programs, and implemented appropriate corrective actions to resolve the associated issues.

Following completion of NRC inspection activities, on December 15, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.b.2 conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this this item will be documented in NRC Inspection Report 05000285/2013013.

### Item 3.c - Design Changes and Modifications

The focus of this Restart Checklist item was resolution of known deficiencies affecting OPPD's Vendor Modification Control and 10 CFR Part 50.59 Screening and Safety Evaluation Programs.

#### Item 3.c.1 - Vendor Modification Control Program Basis for Closure

OPPD identified that a number of vendor design change packages lacked the technical rigor necessary to ensure critical characteristics are identified and properly incorporated. In addition, OPPD determined that it did not provide sufficient technical rigor and invoke a questioning attitude when reviewing vendor information. This led to an overreliance on vendor information for design changes, resulting in design change quality deficiencies. OPPD identified several root and contributing causes for these deficiencies, including:

- governance and oversight of (including oversight of contracted engineering services) had not been effective,
- the engineering organization had insufficient knowledge of components, systems, the

- design basis, and the licensing basis resulting in overreliance on the vendor, and
- procedures lacked requirements to identify and evaluate critical characteristics.

OPPD implemented a number of corrective actions to address these root and contributing causes. These include:

- establishing the Engineering Assurance Group (EAG) to review new design change documents for compliance with FCS procedures and accepted industry practices;
- issuing letters to vendors commonly used for design change package development, summarizing discovery results, and reinforcing expectations for quality and procedural adherence; and
- revising multiple applicable engineering procedures to incorporate guidance for critical characteristics and requiring the design engineer to develop a list of critical interface characteristics that must be reviewed and approved by the design team before the design process continues.

OPPD also plans to implement longer-term corrective actions to include:

- establishing a process to monitor and foster improvement in contracted engineering service performance, which involves the integration of governance and oversight from Exelon into FCS processes and procedures;
- establishing a design review board process intended to provide a comprehensive review of configuration changes so that significant aspects of design, scheduling, planning, construction, maintenance, testing, and operations are considered throughout the development of the configuration change package; and
- developing a "Conduct of Engineering – Principles and Expectations" procedure to include as a critical aspect the requirement for the FCS Design Engineering Nuclear group to conduct rigorous reviews of engineering changes outsourced to vendors and contractors.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for the identified deficiencies pertaining to the vendor modification control program, and implemented appropriate corrective actions to resolve the associated issues.

Following completion of NRC inspection activities, on October 24, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.c.1 conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this this item are documented in NRC Inspection Report 05000285/2013-015.

#### Item 3.c.2 - 10 CFR Part 50.59 Screening and Safety Evaluation Program Closure Basis

Both the NRC and OPPD identified a number of historical and more current examples of inadequate implementation of the process for making changes to the facility in accordance with the requirements of 10 CFR Part 50.59, "Changes, tests, and experiments".

OPPD conducted several analyses to evaluate the deficiencies and determine the associated causes. Identified causes for inadequate implementation of the 10 CFR Part 50.59 process at FCS include:

- station management had not provided sufficient direction, governance, goals, and oversight to ensure 10 CFR Part 50.59 requirements were being met with complete and accurate documentation;
- station management failed to promote a safety culture where nuclear safety is an overriding priority to ensure 10 CFR Part 50.59 requirements were met;
- Nuclear Oversight (NOS) reviews of 10 CFR Part 50.59 evaluations were not critical enough, and in many cases, NOS did not recognize the significance of issues;
- FCS management failed to establish and enforce appropriate roles and responsibilities, standards, and expectations;
- FCS personnel performing 10 CFR Part 50.59 activities did not always identify design functions and critical characteristics due to selection of the wrong design change process, unclear licensing basis documents, the database being inaccurate/not updated, low standards of the preparer and reviewer, and lack of knowledge of the current licensing basis.

OPPD implemented a number of corrective actions to address the identified performance deficiencies and associated root and contributing causes that include:

- updating and reinforcing the procedural guidance associated with 10 CFR Part 50.59 reviews,
- establishing the EAG to review design change documents for conformance to FCS procedures and accepted industry practices,
- management providing clear expectations and holding leaders accountable for the proper implementation of the 10 CFR Part 50.59 review process, and
- implementing a design basis reconstitution process.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for the identified deficiencies pertaining to the 10 CFR Part 50.59 screening and safety evaluation program, and implemented appropriate corrective actions to resolve the associated deficiencies.

Following completion of NRC inspection activities, on October 31, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.c.2 conducted discussions and determined this item had been adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this item are, or will be, documented in NRC Inspection Reports 05000285/2013-008 and 05000285/2013-013.

#### Item 3.d - Maintenance Programs

The focus of this Restart Checklist item was resolution of known deficiencies affecting OPPD's Vendor Manual and Vendor Informational Control Program and Equipment Service Life Program.

#### Item 3.d.1 - Vendor Manual and Vendor Informational Control Program Closure Basis

The NRC identified deficiencies involving the control of updates to vendor manuals, as well as adherence to, and implementation of, updated technical requirements in FCS procedures and work orders when servicing and replacing plant components and equipment.

In response to the NRC findings in this area, OPPD conducted a self-assessment which resulted in the identification of a number of related discrepancies, including:

- difficulties in retrieving vendor information,
- engineering changes did not consistently incorporate vendor manual information,
- engineering staff did not routinely verify that impacted components have vendor manuals or technical manuals, and
- the Vendor Manual Program did not incorporate the use of the Operating Experience process to conduct reviews of vendor and technical manual changes.

OPPD implemented a number of corrective actions to address these deficiencies that include:

- reviewing associated FCS procedures and work orders to verify that current vendor instructions were being applied as prescribed;
- contracted with an outside vendor to update FCS vendor materials, resulting in 680 FCS vendor manuals being updated;
- revising FCS procedures to reference applicable vendor documents; and
- incorporating critical information such as lubrication requirements, torque values for mounting equipment, and servicing of equipment, from vendor manuals/documents into FCS procedures.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for the identified deficiencies pertaining to the Vendor Manual and Vendor Information Control Program, and implemented appropriate corrective actions to resolve the associated deficiencies.

Following completion of NRC inspection activities, on November 8, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.d.1 conducted discussions and determined this item was adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this item are documented in NRC Inspection Report 05000285/20130-018.

#### Item 3.d.2 - Equipment Service Life Closure Basis

Both OPPD and the NRC identified deficiencies related to equipment service life (ESL) at FCS. To address these deficiencies, OPPD performed analyses to review component history and identify those components that are beyond their recommended service life. In addition, OPPD conducted a self-assessment which resulted in the identification of several causes for these deficiencies, including:

- leadership failed to consider the station's vulnerability to increasing equipment failure rates when making decisions that delayed maintenance activities;
- engineering organization roles, responsibilities, and work priorities did not support component maintenance strategy development and upkeep;
- FCS staff failed to ensure corrective actions were taken to address safety issues, adverse trends, and issues identified through equipment reliability programs and processes;
- FCS leadership had not demonstrated accountability nor held FCS personnel accountable for implementation of the engineering and work management processes in support of long-term equipment reliability;

- preventive maintenance procedure and process deficiencies had contributed to a lack of awareness of how to develop and implement strategies to avoid operating equipment beyond its service life; and
- training programs/qualification processes had not been effective to ensure personnel have satisfactory skills and knowledge enabling them to execute work management and long-term equipment reliability functions.

OPPD implemented a number of corrective actions to address these causes that include:

- replacing, refurbishing, rebuilding, and overhauling various components to resolve the ESL issues;
- performing engineering evaluations on components to resolve ESL issues as required;
- implementing a management model that defined the OPPD fundamental objectives through the mission, vision, values, guiding principles, and fundamentals of the organization; and
- assigning an Equipment Reliability Restoration manager to address outstanding, incomplete, and not-started initiatives important to high equipment reliability.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for the identified deficiencies pertaining to Equipment Service Life, and implemented appropriate corrective actions to resolve the associated deficiencies.

Following completion of NRC inspection activities, on November 8, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.d.2 conducted discussions and determined this item was adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this this item will be documented in NRC Inspection Report 05000285/2013-013.

#### Item 3.e - Operability Process Basis for Closure

Based on the results of its inspection activities and OPPD self-assessments, respectively, the NRC and OPPD determined that FCS staff did not consistently conduct adequate operability evaluations to ensure that the impacts of degraded conditions on plant operations are fully understood. In addition, the NRC determined through its inspections that some equipment identified as “operable but degraded” remained degraded until subsequent failure occurred. FCS processes did not adequately identify degraded equipment or restore equipment from a degraded condition to full qualifications in a timely manner.

OPPD identified a number of causes for the inconsistent implementation of the operability process that include:

- leadership had not provided adequate governance and oversight for key regulatory-required programs and activities;
- processes to perform, and support the performance of, degraded/non-conforming condition identification and operability determinations were not adequate to ensure consistently accurate and timely determinations;
- knowledge and skills to perform, and support the performance of, degraded/non-conforming condition identification and operability determinations were not adequate to ensure consistently accurate and timely determinations; and
- tools used to perform, and support the performance of, operability evaluations were not adequate to ensure consistently accurate and timely determinations.

OPPD implemented a number of corrective actions to address these causes that include:

- establishing and communicating clear expectations for behaviors relative to accountability and standards, and holding FCS leaders personally accountable to meet those expectations;
- implementing a design basis reconstitution effort;
- integrating leaders into the FCS organization that have perspectives and broad experience-based insights from external organizations (e.g., Exelon) as a means of raising leader performance levels in accountability and standards associated with regulatory compliance; and
- identifying and correcting deficiencies associated with the FCS operability determination process using outside experts that compared the OPPD process to information contained in NRC Regulatory Issue Summary 2005-20, Revision 1, "Revision to NRC Inspection Manual Part 9900 Technical Guidance, Operability Determinations and Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety."

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for the identified deficiencies pertaining to the Operability Process, and implemented appropriate corrective actions to resolve the associated issues.

Following completion of NRC inspection activities, on December 16, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.e conducted discussions and determined this item was adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this item will be documented in NRC Inspection Report 05000285/2014-002.

#### Item 3.f - Quality Assurance Basis for Closure

From the results of external assessments conducted in 2010 and 2011, OPPD identified a number of deficiencies involving the effectiveness of the Nuclear Oversight (NOS) function at FCS. Specifically, OPPD determined that NOS had not identified many of the substantive issues that had resulted in the decline in station performance. OPPD further concluded that NOS lacked sufficient focus on identifying adverse behaviors and conditions that, if corrected, would have arrested declining performance. OPPD determined that issues identified by NOS were not communicated in a manner that compelled station leaders to act, and FCS leadership did not value input from NOS.

OPPD conducted an assessment to identify the root and contribution causes for the performance deficiencies associated with the NOS function. The findings from that assessment include:

- NOS failed to effectively use trending, benchmarking, self-assessments, missed opportunity reviews, and observations, which has inhibited NOS' ability to identify adverse NOS behaviors and conditions that eventually led to the decline in NOS performance and thus a decline in station performance;
- NOS failure to follow written guidance has resulted in deficiencies which have impacted NOS department performance;
- NOS lacks the requisite skills and knowledge in order to drive the station to improve performance; and



- NOS has failed to challenge important safety decisions and prioritization of safety significant issues.

OPPD implemented a number of corrective actions to address these root and contributing causes, that include:

- establishing expectations for using trending, benchmarking, self-assessment, missed opportunity reviews, and observations requirements to ensure NOS performance issues are identified and resolved in a timely manner;
- establishing and publishing a monthly NOS Procedure Use and Adherence Key Performance Indicator based on NOS observations and condition reports;
- establishing a NOS Policy to conduct annual NOS self-assessments to include industry peers as team members; and
- completing crucial conversations, problem statement, and insight development training for Nuclear Oversight personnel.

The NRC determined that OPPD appropriately evaluated the cause and extent-of-condition for the identified deficiencies pertaining to the Quality Assurance function, and implemented appropriate corrective actions to resolve the associated issues.

Following completion of NRC inspection activities on June 5, 2013, the IMC 0350 Panel and NRC staff involved in reviewing Restart Checklist Item 3.f conducted discussions and determined this item was adequately addressed by OPPD and therefore closed it.

The inspection activities associated with this this item are documented in NRC Inspection Report 05000285/2013-008.

#### **Item 5**

OPPD will submit Integrated Performance Improvement Plan (IPIP) updates to the NRC (Restart Checklist Item 4). In addition, OPPD will implement the IPIP and provide a schedule for completing the plan's actions.

#### **Basis for Closure:**

IPIP Revision 3 was submitted to the NRC on July 9, 2012 and updated in Revisions 4 and 5, which were submitted on November 1, 2012 and June 19, 2013, respectively.

#### **Item 6**

OPPD will inform the NRC in writing of the results related to CAL actions 1 through 5.

#### **Basis for Closure:**

On December 2, 2013, OPPD submitted its "Integrated Report to Support Restart of Fort Calhoun Station and Post-Restart Commitments for Sustained Improvement." This letter provided the results of OPPDs actions to address CAL EA-13-020 items 1 through 5.

**U.S. Nuclear Regulatory Commission  
Manual Chapter 0350 Panel  
Fort Calhoun Station Restart Checklist**

Item Number	Description	Date Closed By Oversight Panel
1	<b>Causes of Significant Performance Deficiencies and Assessment of Organizational Effectiveness</b>	
1.a	Flooding Issue – Yellow finding	June 5, 2013
1.b	Reactor Protection System contact failure – White finding	November 8, 2013
1.c	Electrical bus modification and maintenance – Red finding	December 15, 2013
1.d	Security – Greater than Green findings	July 11, 2013
1.e	Third-Party Safety Culture Assessment	June 5, 2013
1.f	Integrated Organizational Effectiveness Assessment	June 5, 2013
1.g	Safety System Functional Failures White Performance Indicator	December 3, 2013
2	<b>Flood Restoration and Adequacy of Structures, Systems, and Components</b>	
2.a	Flood Recovery Plan actions associated with facility and system restoration	November 7, 2013
2.b	System readiness for restart following extended plant shutdown	November 21, 2013
2.c	Qualification of containment electrical penetrations	December 3, 2013
2.d	Containment internal structure	November 7, 2013

3	<b>Adequacy of Significant Programs and Processes</b>	
3.a	Corrective Action Program	October 31, 2013
3.b	Equipment design qualifications	December 16, 2013
3.c	Design changes and modifications	December 16, 2013
3.d	Maintenance programs	November 8, 2013
3.e	Operability process	December 16, 2013
3.f	Quality assurance	June 5, 2013
4	<b>Review of Integrated Performance Improvement Plan</b>	December 16, 2013
5	<b>Assessment of NRC Inspection Procedure 95003 Key Attributes</b>	
5.a	Design	December 15, 2013
5.b	Human performance	June 5, 2013
5.c	Procedure quality	October 31, 2013
5.d	Equipment performance	November 21, 2013
5.e	Configuration control	November 29, 2013
5.f	Emergency response	July 11, 2013
5.g	Occupational radiation safety	July 11, 2013

5.h	Public radiation safety	July 11, 2013
5.i	Security	July 11, 2013
6	<b>Licensing Issue Resolution</b>	
6.a	Review of necessary licensing amendments or actions	December 16, 2013
6.b	Review of licensing commitments necessary for restart	June 5, 2013
7	<b>Readiness for Restart</b>	
7.a	Operations organization ready for restart	November 7, 2013
7.b	Systems ready for restart and Mode restraints properly addressed	December 16, 2013
7.c	Final review of corrective actions program for restart items	December 16, 2013
8	<b>Confirmatory Action Letter Resolution</b>	
8.a	Verification that all restart-related Confirmatory Action Letter items are appropriately resolved	December 16, 2013
8.b	Conduct public meeting regarding plant readiness for restart	November 21, 2013
9	<b>Final Recommendation for Restart</b>	
9.a	Manual Chapter 0350 Panel recommends restart to Region IV Administrator. Region IV Administrator obtains concurrence for restart from the Deputy Executive Director for Reactor and Preparedness Programs and the Director of the Office of Nuclear Reactor Regulation.	December 16, 2013

## Fort Calhoun Restart Checklist Basis Document Closure

The NRC has completed its review of all restart checklist items and determined that all items were adequately addressed by OPPD and that the plant and FCS staff performance are adequate to support safe restart and facility operations. The following is the final update of the restart checklist items providing the status of the item and the public document in which the item was reviewed by the NRC.

### Section 1: Causes of Significant Performance Deficiencies and Assessment of Organizational Effectiveness

Section 1 of the Restart Checklist contains those items necessary to develop a comprehensive understanding of the root causes of the performance deficiencies identified at Fort Calhoun Station for all greater than green findings. In addition, Section 1 includes the independent safety culture assessment with the associated root causes and findings. The integration of the assessments under Item 1.f will identify the fundamental aspects of organizational performance in the areas of organizational structure and engagement, values, standards, culture, and human behaviors that have resulted in the protracted performance decline and are critical for sustained performance improvement. Section 1 reviews will also include an assessment against appropriate NRC Inspection Procedure 95003 key attributes as described in Section 5.

As additional critical areas for improvement are identified during the root cause evaluations and other assessments, it may be necessary to supplement the Restart Checklist or the Restart Checklist Basis Document to reflect those new items.

#### Item 1.a Flooding Issue – Yellow Finding

Item 1.a is included in the restart checklist for the failure of Fort Calhoun Station to maintain procedures and equipment that protect the plant from the effects of a design basis flood. These deficiencies resulted in a Yellow (substantial safety significance) finding as documented in NRC Inspection Report 05000285/2010007, (ML102800342). With respect to this finding, the NRC verified that the licensee adequately identified the root and contributing causes of the risk significant issues; verified that the extent-of-condition and extent of causes of the risk significant issues were identified, and verified that the corrective actions adequately addressed the causes to preclude repetition.

Specific inspections included:

Item	Actions to be Verified Prior to Restart	Status
1.a.1	Flooding Yellow Finding root and contributing cause evaluation	Closed IR 2013-019 To be issued
1.a.2	Flooding Yellow Finding extent-of-condition and cause evaluation	Closed IR 2013-019 To be issued

1.a.3	Flooding Yellow Finding corrective actions addressing root and contributing causes	Closed IR 2013-019 To be issued
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The NRC verified that the actions related to the Yellow Finding implemented by the licensee were adequate to support plant restart. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

Action Item Number	Actions to be Verified Prior to Restart	Status
4.2.1.1	Review / observe all external flood barrier configurations and verify that they have not been altered during flood response or outage activities	Closed IR 2013-008 ML13197A261
4.2.1.2	Issue SO-G-124, Flood Barrier Impairment program	Closed IR 2013-008 ML13197A261
4.2.1.3	Document external flood barrier impairments as applicable in accordance with SO-G-124	Closed IR 2013-008 ML13197A261
4.2.1.6	Identify flood barriers which will not have adequate qualification basis before leaving Cold Shutdown.	Closed IR 2013-008 ML13197A261

The following NRC items are specifically related to the Yellow finding and therefore needed to be evaluated prior to restart of the facility. For these specific items, the NRC verified that the licensee performed adequate root cause and extent-of-condition evaluations related to the associated deficiencies that protect the plant from the effects of a design basis flood. In addition, the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent-of-condition evaluations and that these corrective actions are either implemented or appropriately scheduled for implementation.

Item	Description	Status
LER 2012-001	Inadequate Flooding Protection Procedure	Closed IR 2013-019 To be issued
LER 2012-019	Traveling Screen Sluice Gates Found with Dual Indication	Closed IR 2013-019 To be issued
LER 2011-003	Inadequate Flooding Protection Due to Ineffective Oversight	Closed IR 2013-019 To be issued
LER 2011-001	Inadequate Flooding Protection Due to Ineffective Oversight	Closed IR 2013-008 ML13197A2611

VIO 2012002-01	Inadequate Procedures to Mitigate a Design Basis Flood Event	Closed IR 2013-019 To be issued
VIO 2012002-02	Failure to Classify Intake Structure Sluice Gates as Safety Class III	Closed IR 2013-019 To be issued
VIO 2012002-03	Failure to Meet Design Basis Requirements for Design Basis Flood Event	Closed IR 2013-019 To be issued
VIO 2010007-01	Failure to Maintain External Flood Procedures	Closed IR 2013-019 To be issued

**Item 1.b Reactor Protection System Contactor Failure – White Finding**

Item 1.b is included in the restart checklist for the failure of Fort Calhoun Station to correct a degraded contactor, which subsequently failed, in the reactor protection system (RPS). This deficiency resulted in a White (low to moderate safety significance) finding as documented in NRC Inspection Report 05000285/2011007, (ML 11200064). With respect to this finding the NRC verified that the licensee adequately identified the root and contributing causes of the risk significant issue; verified that the extent-of-condition and extent of causes of the risk significant issue were identified, and verified that the corrective actions adequately addressed the causes to preclude repetition.

Specific inspection items included:

<b>Item</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
1.b.1	RPS White Finding root and contributing cause evaluation	Closed IR 2013-013 To be issued
1.b.2	RPS White Finding extent-of-condition and cause evaluation	Closed IR 2013-013 To be issued
1.b.3	RPS White Finding corrective actions addressing root and contributing causes	Closed IR 2013-013 To be issued

The following NRC item is specifically related to the White finding and therefore was evaluated prior to restart of the facility.

<b>Item</b>	<b>Description</b>	<b>Status</b>
VIO 2011007-01	Failure to Correct a Degraded Contactor in the Reactor Protective System	Closed IR 2013-013 To be issued

**Item 1.c Electrical Bus Modification and Maintenance – Red Finding**

Item 1.c is included in the restart checklist for the failure to adequately design, modify, and maintain the electrical power distribution system, resulting in a fire in the safety-related 480 volt electrical switchgear. These deficiencies resulted in a Red (high safety significance) finding as documented in NRC Inspection Report 05000285/2012010, (ML 12101A193). With respect to this finding the NRC verified that the licensee adequately identified the root and contributing causes of the risk significant issue; verified that the extent-of-condition and extent of causes of the risk significant issue were identified, and verified that the corrective actions adequately addressed the causes to preclude repetition.

Specific inspection items included:

<b>Item</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
1.c.1	Electrical Fire Red Finding root and contributing cause evaluation	Closed IR 2013-013 To be issued
1.c.2	Electrical Fire Red Finding extent-of-condition and cause evaluation	Closed IR 2013-013 To be issued
1.c.3	Electrical Fire Red Finding corrective actions addressing root and contributing causes	Closed IR 2013-013 To be issued

In addition, the NRC verified that the actions related to the Red Finding being implemented by the licensee were adequate to support plant restart. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

<b>Action Item Number</b>	<b>Description</b>	<b>Status</b>
1.3.1.1	Rebuild the 1B4A load center	Closed IR 2013-013 To be issued
1.3.1.2	Provide documentation for the dedication of the rebuilt load center in accordance with Contract 163495	Closed IR 2013-013 To be issued
1.3.1.3	Complete Engineering Change 53257 and obtain PRC approval to authorize the use of the rebuilt load center, 1B4A	Closed IR 2013-013 To be issued
1.3.1.4	Test all cables that terminate in 1B4A load center	Closed IR 2013-015 ML13312A876



1.3.1.5	Repair or replace defective cables terminating in 1B4A load center	Closed IR 2013-015 ML13312A876
1.3.1.6	Perform testing on the insulation of the cables that were potentially impacted by the fire located in the cable tray above 1B4A load center using EPRI technology	Closed IR 2013-015 ML13312A876
1.3.1.7	Complete Engineering Change 53517 that details the repair to the cable jackets for cables located in the cable tray above 1B4A load center	Closed IR 2013-013 To be issued
1.3.1.8	Repair or replace the cables located in the cable tray above load center 1B4A that have had jacket damage	Closed IR 2013-013 To be issued
1.3.1.9	Witness Factory Acceptance Testing of the new Square D circuit breakers that will be used in the 1B4A load center to replace the existing AK-25 breakers and the two Square D input and bus tie breakers	Closed IR 2013-002 ML13092A286
1.3.1.10	Calibration of the internal relays and protection equipment for Bus1B4A	Closed IR 2013-013 To be issued
1.3.1.11	Install new 4160 to 480 volt transformer T1B4A	Closed IR 2013-002 ML13092A286
1.3.1.12	Calibrate new Square D circuit breakers	Closed IR 2013-013 To be issued
1.3.1.14	Clean equipment in the switchgear room that has been coated with by-products from the fire	Closed IR 2013-015 ML13312A876
1.3.1.15	Provide any required Engineering Change for the non-segregated bus between 1B4A and 1B3A-4A	Closed IR 2013-015 ML13312A876
1.3.1.16	Repair 1B4A to 1B3A-4A non-segregated bus section	Closed IR 2013-015 ML13312A876
1.3.1.17	Perform testing of all circuits associated with 1B4A load center	Closed IR 2013-013 To be issued
1.3.1.18	Perform testing of all circuits associated with cabling not associated with the 1B4A load center (i.e. cables located in the cable tray above the load center)	Closed IR 2013-015 ML13312A876
1.3.1.19	Submit, track, and seek approval of procedures that are changed as the result of EC 53257 and are required to be issued before the System Acceptance Process.	Closed IR 2013-013 To be issued
1.3.1.21	Declare bus 1B4A Operable	Closed IR 2013-013 To be issued
1.3.1.22	Temporary Modification restoration	Closed IR 2013-002 ML13092A286

1.3.1.23	Extent-of-condition repair requirements. Provide repair requirements for extent-of-condition.	Closed IR 2013-013 To be issued
1.3.1.24	Implement the requirements supplied by System Engineering regarding the extent-of-condition.	Closed IR 2013-013 To be issued

The following NRC items are specifically related to the Red finding and therefore were evaluated prior to restart of the facility. For these specific items the NRC verified that the licensee had performed adequate root cause and extent-of-condition evaluations related to the failure of the 1B4A breaker and associated electrical fire in the vital switchgear. In addition, the NRC verified that adequate corrective actions were identified associated with the root and contributing causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

<b>NRC Item</b>	<b>Description</b>	<b>Status</b>
VIO 2012010-01	Failure to Ensure that the 480 VAC Electrical Power Distribution System Design Requirements were Implemented and Maintained	Closed IR 2013-013 To be issued
VIO 2012007-01	Failure to Provide Adequate Post-Fire Safe Shutdown Actions in the Switchgear Rooms	Closed IR 2013-015 ML13312A876
VIO 2012007-02	Failure to Maintain Command and Control Function During Fire Fighting Activities in the Protected Area	Closed IR 2013-013 To be issued
VIO 2012004-04	Failure to Ensure Breaker Coordination of 480 VAC Electrical Power Distribution System Was Maintained	Closed IR 2013-013 To be issued
URI 2011014-02	Failure to Perform Adequate 10 CFR 50.59 Review	Closed IR 2013-008 ML13197A261
URI 2011014-03	Cause of Breaker 1B3A Trip Not Understood	Closed IR 2012-004 ML12276A456
LER 2011-010	Fire Causes a Circuit Breaker to Open Outside Design Assumptions	Closed IR 2013-013 To be issued

#### **Item 1.d Security – Greater-than-Green Findings**

Item 1.d is included in the restart checklist because of Greater-than-Green findings that adversely affected the security cornerstone. Information about these findings is located in NRC Inspection Reports 05000285/2011404 (ML 111460688) and 05000285/2011406 (ML 12108A186).

With respect to these findings, the NRC verified that the licensee adequately identified the root and contributing causes of the risk significant issues; verified that the extent-of-condition and extent of causes of the risk significant issues were identified, and verified that the corrective actions adequately address the causes to preclude repetition.

A description of the security findings and the specific licensee actions to be reviewed by the NRC are contained in a separate document which contains Security Related Information in accordance with 10 CFR 2.390(d)(1) and its disclosure to unauthorized individuals could present a security vulnerability and will not be made publicly available.

All the security-related items were closed in two inspection reports, 2013-405 ML13115A095 and 2013-407 ML13213A497.

**Item 1.e Third Party Safety Culture Assessment**

Item 1.e is included in the restart checklist because the NRC recognizes the importance of nuclear plant licensees establishing and maintaining a strong safety culture—a work environment where management and employees are dedicated to putting safety first. In addition, nuclear power plants should have a work environment where employees are encouraged to raise safety concerns, and where concerns are promptly reviewed, given the proper priority based on their potential safety significance, and appropriately resolved with timely feedback to the originator of the concerns and to other employees.

The NRC evaluated the results of the safety culture assessment performed by an organization independent of Fort Calhoun Station. The scope of the inspection related to safety culture was based on the results of the validation of the licensee’s third party safety culture assessment and root cause evaluation. The NRC concluded that the third-party assessment was comprehensive, the methods used by contractor were acceptable, and that the licensee’s actions to communicate the results to the various levels of staff and management were adequate. Based upon observations gathered from the NRC’s graded safety culture assessment, the licensee has taken actions to address the issues identified in the assessment that appear sufficient to address the identified issue.

Specific inspection items included:

Item	Actions to be Verified Prior to Restart	Status
1.e.1	Verification of comprehensiveness of licensee third party safety culture assessment	Closed IR 2013-008 ML13197A261
1.e.2	Methods used by the third-party assessment team to collect and analyze the data were adequate and appropriate	Closed IR 2013-008 ML13197A261
1.e.3	Verification that licensee’s assessment team members were independent and qualified	Closed IR 2013-008 ML13197A261

1.e.4	Licensee's activities to communicate results of the assessment to various levels of management and staff	Closed IR 2013-008 ML13197A261
1.e.5	Licensee's corrective actions to the assessment results	Closed IR 2013-008 ML13197A261

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies (FPD's) that resulted in the overall performance decline at the station. Nuclear Safety Culture and Safety Conscience Work Environment were identified as areas for improvement.

The NRC verified the effectiveness of the licensee's assessment of Nuclear Safety Culture and Safety Conscience Work Environment, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

Item	Actions to Be Verified Prior to Restart	Status
1.e.6	Licensee Assessment of the Fundamental Performance Deficiency associated with Nuclear Safety Culture	Closed IR 2013-008 ML13197A261
1.e.7	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-008 ML13197A261
1.e.8	Adequacy of corrective actions	Closed IR 2013-008 ML13197A261
1.e.9	Licensee Assessment of the Fundamental Performance Deficiency associated with Safety Conscience Work Environment	Closed IR 2013-008 ML13197A261
1.e.10	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-008 ML13197A261
1.e.11	Adequacy of corrective actions	Closed IR 2013-008 ML13197A261

#### **Item 1.f Integrated Organizational Effectiveness Assessment**

Item 1.f is included on the restart checklist because organizational effectiveness was identified as a potential key contributor to the overall station performance. Organizational effectiveness can impact multiple activities and programs across multiple functional areas at the facility.

At the completion of the assessments performed under Restart Checklist Items 1.a through 1.e, Fort Calhoun Station integrated the outcomes of each of those assessments to determine what aspects of its organization and human performance needed additional focus and improvement. The integration of the root cause and safety culture assessments under Item 1.f identified those fundamental aspects of organizational performance in the areas of organizational structure and engagement, values, standards, culture and human behaviors that have resulted in the protracted performance decline, and are critical for sustained performance improvement. The licensee performed this assessment using qualified individuals with independent oversight.

The NRC reviewed the licensee's assessments of organizational effectiveness and any connections to safety culture insights (from Item 1.e). The NRC verified that proper corrective actions were established and incorporated to resolve organizational effectiveness issues that adversely affected station performance.

Specific inspections items included:

Item	Actions to be Verified Prior to Restart	Status
1.f.1	Verification of comprehensiveness of licensee Integrated Organizational Effectiveness assessment	Closed IR 2013-008 ML13197A261
1.f.2	Methods used by assessment team to collect and analyze the data were adequate and appropriate	Closed IR 2013-008 ML13197A261
1.f.3	Verification that licensee's assessment team members were independent and qualified	Closed IR 2013-008 ML13197A261
1.f.4	Licensee's activities to communicate results of the assessment to various levels of management and staff	Closed IR 2013-008 ML13197A261
1.f.5	Licensee's corrective actions to the assessment results	Closed IR 2013-008 ML13197A261

The site performed an integrated assessment and identified fifteen FPD's that resulted in the overall performance decline at the station. These deficiencies included Leadership/Organizational Effectiveness, Nuclear Safety Culture, Safety Conscious Work Environment, Corrective Action Program, Site Operational Focus, Resource Management, Processes for Meeting Regulatory Requirements, Equipment Reliability/Work Management, Engineering Design/Configuration Control, Performance Improvement, Procedure Quality/Procedure Management, Nuclear Oversight, Emergency Response Organization, and Security.

The licensee identified that the most significant FPD that resulted in performance decline at the station was Leadership/Organizational Effectiveness. Examples included lack of accountability throughout the organization; standards, policies, and administrative controls are outdated, ineffective, and sometimes ignored; programs such as the Corrective Action Program, Maintenance Rule Program, and Equipment Service Life Program, were not managed to a level ensuring station improvement.

The NRC verified the effectiveness of the licensee's assessment of Leadership/Organizational Effectiveness, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
1.f.6	Licensee Assessment of Leadership/Organizational Effectiveness Fundamental Performance Deficiency	Closed IR 2013-008 ML13197A261
1.f.7	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-008 ML13197A261
1.f.8	Adequacy of corrective actions	Closed IR 2013-008 ML13197A261

#### **Item 1.g Safety System Functional Failures White Performance Indicator**

The Safety System Functional Failure Performance Indicator for the 3<sup>rd</sup> quarter of 2012 moved into the White region based on a number of events being identified, mainly during the licensee's discovery efforts to improve overall safety at the facility. This indicator reflects the number of events or conditions that alone prevented, or could have prevented, the fulfillment of the safety function of structures or systems in the previous four quarters. In the past four quarters, nine functional failures were identified and reported by the licensee.

With respect to these functional failures, the NRC verified that the licensee adequately identified the root and contributing causes; verified that the extent-of-condition and extent of causes were identified, and verified that the corrective actions adequately addressed the causes.

These events are already captured in this basis document as items that were reviewed by the NRC. The following table provides a reference to the section in this document where these items are addressed:

<b>Item</b>	<b>Description</b>	<b>Section</b>
LER 2012-017	Containment Valve Actuators Design Temperature Ratings Below those Required for Design Basis Accidents	3.b.2
LER 2012-015	Electrical Equipment Impacted by High Energy Line Break Outside Containment	3.b.2
LER 2012-014	Containment Beam 22 Loading Conditions Outside of the Allowable Limits	2.d
LER 2012-011	Emergency Diesel Inoperability Due to Bus Loads During a LOOP	3.a

LER 2012-009	Inoperable Equipment Due to Lack of Environmental Qualifications	3.b.2
LER 2012-005	Technical Specification Violation Due to Inadequate Testing of Emergency Diesel Fuel Pumps	5.d
LER 2012-004	Inadequate Analysis of Drift Affects Safety Related Equipment	3.a
LER 2012-001	Inadequate Flooding Protection Procedure	1.a
LER 2011-010	Fire Causes a Circuit Breaker to Open Outside Design Assumptions	1.c

**Section 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.

**Item 2.a Flood Recovery Plan Actions Associated with Facility and System Restoration**

Item 2.a is the NRC’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 NRC verified that the following flood recovery actions being implemented by the licensee adequately addressed the physical restoration of the facility to design basis conditions that were in place prior to the 2011 flood. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

Action Item Number	Actions to be Verified Prior to Restart	Status
1.2.1.1	Determine if equipment in the intake structure and cells has been damaged	Closed IR 2013-003 ML13130A050
1.2.1.4	Return B.5.b materials to proper location	Closed IR 2012-005 ML12318A341
1.4.1.2	Inspect 13.8kV underground pad mount T&D switch SW1062	Closed IR 2012-003 ML12226A630
1.4.1.3	Inspect and/or test T&D 13.8 kV transformer T1B-3C-1 (T&D 13TN43G)	Closed IR 2012-003 ML12226A630
1.4.1.4	Inspect manholes and ducts for MH01 through MH04 from T&D switch SW1062 to transformer T1B-3C-1 to facilitate pulling new 1/0 cable	Closed IR 2012-003 ML12226A630

1.4.1.5	Inspect ducts associated with manholes MH1 through MH4 between T&D switch SW1062 to T&D transformer 13TN43G and repair as necessary	Closed IR 2012-003 ML12226A630
1.4.1.6	Inspect and/or test Circuit 231 from T&D switch SW1062 to T&D transformer 13TN43G and repair as necessary	Closed IR 2012-003 ML12226A630
2.1.1.2	Repair any damaged or non-functional fire hydrants located inside the protected area or connected to the main fire protection header ring	Closed IR 2012-012 ML 13045B055
2.1.1.3	Flush fire protection system piping connected to the fire protection header ring which flowed river water during flood mitigation actions	Closed IR 2012-005 ML12318A341
2.1.1.4	Inspect all SO-G-103 fire barriers in plant buildings affected by flood waters. Includes Pyrocrete barriers in Intake Structure.	Closed IR 2012-003 ML12226A630
2.1.1.6	Restore the exterior fire hose houses impacted by flooding to functional condition	Closed IR 2012-012 ML 13045B055
2.1.1.7	Verify proper functioning of flood affected fire hose houses	Closed IR 2012-012 ML 13045B055
2.1.1.8	Complete FP System PMs and STs on flood impacted equipment which was not accessible for inspection and testing	Closed IR 2013-003 ML13130A050
2.1.1.9	Complete full flow testing of fire pumps	Closed IR 2012-005 ML12318A341
2.1.1.10	Remove the plugs that were installed in the transformer pits for drainage from the rocks	Closed IR 2012-003 ML12226A630
2.3.1.1	Assess whether wetted motors are to be tested for possible use, refurbished or replaced. Motors that were wetted for a short timeframe will be "Tested for Possible Use." Motors that were wetted for an extended period of time will be "Refurbished" or "Replaced."	Closed IR 2012-005 ML12318A341
2.3.1.2	Take oil sample from bearing housings of wetted motors.	Closed IR 2012-005 ML12318A341
2.3.1.3	Evaluate if water has gotten in contact with bearings.	Closed IR 2012-005 ML12318A341
2.3.1.4	Refurbish motor if water contamination is present in oil. Replace motor in whole is an additional option.	Closed IR 2013-004 ML13164A359
2.3.1.5	Perform visual and boroscope inspection of wetted motor internals (to included termination box) looking for silt, pools of water, corrosion, etc.	Closed IR 2012-005 ML12318A341
2.3.1.6	Evaluate visual inspection results for possible actions (removal of moisture, cleaning, refurbishment of motor)	Closed IR 2012-005 ML12318A341



2.3.1.7	If bearing are in good condition and wetted motor is visibly in good condition, static test motor	Closed IR 2013-014 ML13266A225
2.3.1.8	If static test results are SAT, motor can be started. Maintenance oversight of initial run. Vibration data to be taken during initial run.	Closed IR 2013-015 ML13312A876
2.3.1.9	Remove wetted motor and prepare for shipment to vendor.	Closed IR 2012-003 ML12226A630
2.3.1.10	Refurbish wetted motor	Closed IR 2012-003 ML12226A630
2.3.1.11	Install refurbished motor	Closed IR 2012-003 ML12226A630
2.3.1.12	Post Maintenance Testing of motor	Closed IR 2012-003 ML12226A630
2.3.1.13	Ensure spare motor is available or order new motor	Closed IR 2012-004 ML12276A456
2.3.1.14	Remove degraded motor	Closed IR 2012-004 ML12276A456
2.3.1.15	Install new motor	Closed IR 2012-004 ML12276A456
2.3.1.16	Post Maintenance Testing of motor	Closed IR 2012-004 ML12276A456
3.1.1.1	Document review of all Engineering Programs	Closed IR 2013-015 ML13312A876
3.2.1.1	Test Maintenance Rule Medium Voltage Power Cables subjected to wetting/ submergence	Closed IR 2013-004 ML13164A359
3.2.1.2	Test Maintenance Rule Low Voltage Power Cables subjected to wetting/ submergence	Closed IR 2012-005 ML12318A341
3.2.1.3	Test Maintenance Rule Low Voltage Control and Instrumentation Cables subjected to wetting/ submergence	Closed IR 2012-005 ML12318A341
3.2.2.1	Test or replace 13.8kV medium voltage cable for emergency power feed and met tower feed	Closed IR 2013-002 ML13092A286
3.2.2.2	Inspect manholes and vaults for damage and integrity of water seals at penetrations	Closed IR 2013-014 ML13266A225

3.2.2.3	Contingency cable replacement (if identified defective cable during testing)	Closed IR 2013-002 ML13092A286
3.2.2.4	Testing of contingency cables installed after replacement (if needed)	Closed IR 2013-002 ML13092A286
3.3.1.2	Assess results of ground penetrating radar (GPR)	Closed IR 2013-005 ML13221A584
4.2.1.4	Perform walkdown of all flood mitigation devices (i.e., berms, sandbags, HESCO barriers, to determine if each device is to be removed or is to remain	Closed IR 2013-003 ML13130A050
4.2.1.5	Initiate actions to remove flood mitigation devices which have been determined to not be permanent fixtures	Closed IR 2013-003 ML13130A050
4.2.2.1	Identify degraded flood barriers	Closed IR 2013-004 ML13164A359
4.2.2.2	Repair flood barriers as required	Closed IR 2013-004 ML13164A359
4.2.2.4	Prepare SO-G-124 documentation for all flood barriers which do not have adequate qualification	Closed IR 2013-004 ML13164A359
4.2.2.5	Review restoration plans for each impaired flood barrier per SO-G-124 form FC-1411	Closed IR 2013-004 ML13164A359
4.2.2.6	Review impaired flood barriers as identified in accordance with SO-G-124 form FC-1411	Closed IR 2013-004 ML13164A359
4.2.2.7	Removal of all flood mitigation devices which have been determined to not be permanent fixtures	Closed IR 2013-016 ML 13345B304
4.3.2.1	Completion of all ECs/restoration required for plant start-up	Closed IR 2013-016 ML 13345B304

The NRC verified that the licensee adequately addressed systems that were potentially affected by the flood of 2011. These activities verified the capability of selected systems to fulfill their intended functions. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
2.2.1.1	Assess the effects of the flood on the Auxiliary Cooling System (ACS) and identify actions to restore the system.	Closed IR 2013-004 ML13164A359
2.2.1.2	Assess the effects of the flood on the Auxiliary Feedwater System (AFW) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.3	Assess the effects of the flood on the Auxiliary Instrumentation System (AIS) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.4	Assess the effects of the flood on the Control Rod Drive System (CRD) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.5	Assess the effects of the flood on the Chemical and Volume Control System (CVC) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.6	Assess the effects of the flood on the Circulating Water System (CWS) and identify actions to restore the system.	Closed IR 2013-004 ML13164A359
2.2.1.7	Assess the effects of the flood on the Emergency Core Cooling System (ECC) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.8	Assess the effects of the flood on the Emergency Diesel Generator System (EDG) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.9	Assess the effects of the flood on the Electrical Distribution System (EDS) and identify actions to restore the system.	Closed IR 2013-003 ML13130A050
2.2.1.10	Assess the effects of the flood on the Engineered Safety Features System (ESF) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.11	Assess the effects of the flood on the Fuel Handling System (FHS) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.12	Assess the effects of the flood on the Fire Protection System (FPS) and identify actions to restore the system.	Closed IR 2013-003 ML13130A050
2.2.1.13	Assess the effects of the flood on the Hoisting Equipment System (HES) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.14	Assess the effects of the flood on the Instrument Air System (IAS) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.15	Assess the effects of the flood on the Main Feedwater System (MFW) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158

2.2.1.16	Assess the effects of the flood on the Reactor Coolant System (RCS) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.17	Assess the effects of the flood on the Radiation Monitoring System (RMS) and identify actions to restore the system.	Closed IR 2012-011 ML12366A158
2.2.1.18	Assess the effects of the flood on the Reactor Protection System (RPS) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.19	Assess the effects of the flood on the Spent Fuel Pool System (SFP) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.20	Assess the effects of the flood on the Steam Generator System (SGS) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.21	Assess the effects of the flood on the Sampling System (SLS) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.22	Assess the effects of the flood on the Structures System (STR) and identify actions to restore the system.	Closed IR 2013-016 ML 13345B304
2.2.1.23	Assess the effects of the flood on the Turbine Generator System (TGS) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.24	Assess the effects of the flood on the Turbine Plant Cooling System (TPC) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.25	Assess the effects of the flood on the Ventilating Air Conditioning System (VAC) and identify actions to restore the system.	Closed IR 2013-003 ML13130A050
2.2.1.26	Assess the effects of the flood on the Waste Disposal System (WDS) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.27	Assess the effects of the flood on the Demineralized Water / Potable Water System (DW/PW) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.28	Assess the effects of the flood on the Vents and Drains System (VDS) and identify actions to restore the system. This will include Sanitary and Storm Drains.	Closed IR 2013-004 ML13164A359
2.2.1.29	Assess the effects of the flood on the Auxiliary Steam System (AUS) and identify actions to restore the system. This will include the Auxiliary Boiler.	Closed IR 2013-004 ML13164A359
2.2.1.30	Assess the effects of the flood on the Meteorological Monitoring System (MMS) and identify actions to restore the system.	Closed IR 2012-012 ML 13045B055
2.2.1.31	Assess the effects of the flood on the Plant Security Systems (SEC) and identify actions to restore the system.	Closed IR 2013-407 ML13213A497

2.2.1.32	Assess the effects of the flood on the Communications Systems (COM) and identify actions to restore the system.	Closed IR 2012-005 ML12318A341
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**Item 2.b System Readiness from Extended Shutdown**

Systems that have been shut down for prolonged periods may be subject to different environments than those experienced during power operations. The NRC evaluated the effects of the extended shutdown, and verified that the structures, systems, and components are ready for plant restart and they conform to the licensing and design bases requirements.

**Item 2.b.1 System Health Reviews**

The purpose of this item is to validate structures, systems, and components are in satisfactory working order. The licensee performed system health reviews on safety significant and maintenance rule systems.

The NRC inspected the system health reviews conducted by Fort Calhoun Station. These inspections included comprehensive system walkdowns and reviews of key information regarding system health (e.g. commitments, open and closed condition reports, open and closed work orders, preventative maintenance activities, modifications, operating experience, violations of NRC requirements, open change-initiating documents, open operational concerns, etc.).

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
2.b.1.1	Auxiliary Cooling System	Closed IR 2013-016 ML 13345B304
2.b.1.2	Auxiliary Feedwater System	Closed IR 2013-016 ML 13345B304
2.b.1.3	Spent Fuel Pool System	Closed IR 2013-014 ML13266A225
2.b.1.4	Sampling System	Closed IR 2013-014 ML13266A225
2.b.1.5	Chemical and Volume Control System	Closed IR 2013-016 ML 13345B304
2.b.1.6	Emergency Core Cooling System	Closed IR 2013-016 ML 13345B304
2.b.1.7	Hoisting Equipment System	Closed IR 2013-014 ML13266A225

2.b.1.8	Waste Disposal System	Closed IR 2013-014 ML13266A225
2.b.1.9	Control Rod Drive System	Closed IR 2013-016 ML 13345B304
2.b.1.10	Reactor Coolant System	Closed IR 2013-014 ML13266A225
2.b.1.11	Demineralized and Potable Water Systems	Closed IR 2013-005 ML13221A584
2.b.1.12	Circulating Water System	Closed IR 2013-005 ML13221A584
2.b.1.13	Emergency Diesel Generator	Closed IR 2013-016 ML 13345B304
2.b.1.14	Ventilation, Heating and Air Conditioning System	Closed IR 2013-016 ML 13345B304
2.b.1.15	Main Feedwater System	Closed IR 2013-016 ML 13345B304
2.b.1.16	Structures	Closed IR 2013-016 ML 13345B304
2.b.1.17	Steam Generator System	Closed IR 2013-016 ML 13345B304
2.b.1.18	Steam Generator Blowdown Turbine Plant Cooling	Closed IR 2013-014 ML13266A225
2.b.1.19	Instrument Air System	Closed IR 2013-014 ML13266A225
2.b.1.20	Turbine Generator and Support Systems	Closed IR 2013-014 ML13266A225
2.b.1.21	Auxiliary Instrumentation System	Closed IR 2013-014 ML13266A225
2.b.1.22	Electrical Distribution System	Closed IR 2013-016 ML 13345B304
2.b.1.23	Engineered Safeguards System	Closed IR 2013-016 ML 13345B304

2.b.1.24	Radiation Monitoring System	Closed IR 2013-016 ML 13345B304
2.b.1.25	Fuel Handling System	Closed IR 2013-014 ML13266A225
2.b.1.26	Reactor Protective System	Closed IR 2013-016 ML 13345B304
2.b.1.27	Fire Protection System	Closed IR 2013-005 ML13221A584

**Item 2.b.2 Detailed Review of Alternating and Direct Current Electrical Distribution, High Pressure Safety Injection System, Emergency Diesel Generator System, and Reactor Protection System**

Fort Calhoun Station performed a comprehensive review to evaluate and verify the capability of selected systems to fulfill their intended safety functions as defined by the licensing and design basis and identify broad-based safety, organizational, and performance issues. The review was structured consistent with NRC Inspection Procedure 95003 (Sections 02.03 and 03.03).

The selected systems for detailed review (vertical slice) as part of the Reactor Safety Strategic Performance Area were based on their high risk significance, input from system health reports, performance indicators, condition reports, and licensee event reports. Teams of Omaha Public Power District and independent external experts performed the Reactor Safety Strategic Performance Area reviews.

Systems selected were:

- AC and DC Electrical Distribution Systems. These systems include the 4160V breakers, 480V breakers, batteries, and battery chargers. Electrical distribution systems at Fort Calhoun Station provide necessary power for Mitigating Systems. The AC and DC systems provide power to key pumps, motors, valves, and instruments required to monitor and respond to plant conditions. From the plant's probabilistic assessment, the AC and DC electrical systems account for a substantial portion of plant risk. The electrical distribution system was selected for self-assessment by the licensee based on both identified issues and their importance to safety.
- High Pressure Injection System. This system is important to provide mitigation for postulated accident conditions in the reactor plant. This review assessed and validated key aspects of the suction and discharge pathways, system alignments, power sources, and emergency actuation.
- The Emergency Diesel Generator System (EDGS) furnishes a reliable source of 4160V AC power for safe plant shutdown and operation of engineered safeguards when the normal sources of off-site power are lost. The EDGs are safety related and are required to mitigate the consequences of events that have the potential to cause a release of

radioactivity. The emergency diesel generator's function as an emergency power source during all phases of reactor operation.

- The Reactor Protection System (RPS) is designed to rapidly shut down the nuclear chain reaction prior to reaching a condition that could damage the reactor core.

The NRC assessed the adequacy for each of the licensee's detailed reviews and selected samples to independently verify that the licensee properly assessed each system.

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
2.b.2.1	Detailed review of Alternating and Direct Current Electrical Distribution	Closed IR 2013-013 To be issued
2.b.2.2	Detailed review of High Pressure Safety Injection System	Closed IR 2013-013 To be issued
2.b.2.3	Detailed review of Emergency Diesel Generating System	Closed IR 2013-013 To be issued
2.b.2.4	Detailed review of Reactor Protection System	Closed IR 2013-013 To be issued

### **Item 2.b.3 Impact of Sub-Surface Water on Soils and Structures**

Fort Calhoun Station was subjected to flood waters for several months. The licensee performed an assessment to evaluate:

- functionality of site systems, structures, and components, (SSC's) affected by the flood
- condition of subsurface soil
- floodwater impacts on subsurface SSC's

The NRC verified that the following actions being implemented by the licensee adequately addressed the flooding impact of sub-surface water on soils and structures. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
1.2.1.3	Repair any structural damage identified in the intake structure	Closed IR 2013-005 ML13221A584
2.1.1.1	Ensure underground FP piping is intact and no unacceptable voids are present near FP piping	Closed IR 2013-005 ML13221A584
2.1.1.5	Verify soil compaction and moisture content in areas of underground fire protection main header ring and attached piping is per NFPA requirements	Closed IR 2013-005 ML13221A584



3.3.1.1	Inspect underground Raw Water, EDG Fuel Oil and Fire Protection piping and tanks using GPR (Ground Penetrating Radar)	Closed IR 2013-005 ML13221A584
3.3.1.3	Resolve any deficiencies affecting operability or functionality (if needed)	Closed IR 2013-016 ML13345B304
4.1.1.12	Review structure design features to assess potential for damage due to flooding	Closed IR 2013-005 ML13221A584
4.1.1.14	Assess post-inundation condition of structures	Closed IR 2013-005 ML13221A584
4.1.1.15	Prepare remediation alternatives (if appropriate)	Closed IR 2013-005 ML13221A584
4.1.1.16	Create report of findings	Closed IR 2013-005 ML13221A584
4.1.1.17	Review findings and recommendations with FCS and document results	Closed IR 2013-005 ML13221A584
4.1.1.20	Inspect Non-Class 1 Priority 1 Structures	Closed IR 2013-005 ML13221A584
4.1.1.21	Assess post-inundation condition of structures	Closed IR 2013-005 ML13221A584
4.1.1.22	Prepare remediation alternatives (if appropriate)	Closed IR 2013-005 ML13221A584
4.1.1.23	Create report of findings	Closed IR 2013-005 ML13221A584
4.1.1.24	Review findings and recommendations with FCS and document results	Closed IR 2013-005 ML13221A584
4.1.1.25	Post-Flood River Channel Evaluation	Closed IR 2013-016 ML 13345B304
4.1.1.30	Verify no geotechnical or structural impact to Turbine Building and Auxiliary Building/Containment as a result of the 2011 flood	Closed IR 2013-016 ML 13345B304
4.1.1.32	Remediation of the Turbine Building and Class 1 structure void	Closed IR 2013-016 ML 13345B304
4.1.2.2	Verify no geotechnical or structural impact to site structures	Closed IR 2013-016 ML 13345B304

4.1.3.10	Remediation of the loose soils area under the Turbine Building and Class 1 structures if required	Closed IR 2013-016 ML 13345B304
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**Item 2.c Qualification of Containment Electrical Penetrations**

During the course of discovery activities, Fort Calhoun Station staff identified that certain containment electrical penetrations contain materials that could degrade under the post-accident radiation profile inside containment. This issue was entered into the licensee’s Corrective Action Program.

With respect to this issue, the NRC verified that the licensee adequately identified the root and contributing causes of the issue; verified that the extent-of-condition and extent of causes of the issue were identified, and verified that the corrective actions adequately addressed the problem.

Specific inspection items included:

<b>Item</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
2.c.1	Containment electrical penetrations root and contributing cause evaluation	Closed IR 2013-013 To be issued
2.c.2	Containment electrical penetrations extent-of-condition and cause evaluation	Closed IR 2013-013 To be issued
2.c.3	Containment electrical penetrations corrective actions	Closed IR 2013-013 To be issued
LER 2012-002	Inadequate Qualifications for Containment Penetrations Renders Containment Inoperable	Closed IR 2013-013 To be issued

**Item 2.d Containment Internal Structure**

During the course of discovery activities, Fort Calhoun Station staff identified that certain containment internal structural members did not fully meet design specifications described in the licensing basis. The structural design of the containment internal structures was re-analyzed by the licensee to assess the extent-of-condition and determine the scope of corrective actions.

With respect to this issue, the NRC verified that the licensee adequately identified the root and contributing causes; verified that the extent-of-condition and extent of causes of the issue were identified, and verified that the corrective actions adequately addressed the problem.

Specific inspection items included:

<b>Item</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
2.d.1	Containment internal structure root and contributing cause evaluation	Closed IR 2013-013 To be issued
2.d.2	Containment internal structure extent-of-condition and cause evaluation	Closed IR 2013-013 To be issued
2.d.3	Containment internal structure corrective actions	Closed IR 2013-013 To be issued
LER 2012-014	Containment Beam 22 Loading Conditions Outside of the Allowable Limits	Closed IR 2013-013 To be issued

### **Section 3: Adequacy of Significant Programs and Processes**

Section 3 of the Restart Checklist addresses major programs and processes in place at Fort Calhoun Station. Section 3 reviews also include an assessment of the adequacy of licensee reviews in context of NRC Inspection Procedure 95003 key attributes as described in Section 5.

#### **Item 3.a Corrective Action Program**

The Corrective Action Program and the use of industry Operating Experience at a nuclear power plant is a key element in ensuring the licensee's ability to effectively detect, correct, and prevent problems. Based upon problems with Corrective Action Program effectiveness the licensee is performing a comprehensive review of this program.

The NRC assessed the licensee's evaluations and associated improvement actions related to the Corrective Action Program. The NRC conducted independent and Team inspections to validate whether the Corrective Action Program is appropriately being implemented.

The NRC verified the effectiveness of the licensee's assessment of the Corrective Action Program, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.a.1	Licensee Assessment of Corrective Action Program	Closed IR 2013-019 To be issued
3.a.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-019 To be issued
3.a.3	Adequacy of corrective actions	Closed IR 2013-019 To be issued

3.a.4	Adequacy of effectiveness measures to monitor program improvements	Closed IR 2013-019 To be issued
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The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. The Corrective Action Program was identified as one of these areas for improvement. Examples identified by the licensee included problems not being thoroughly evaluated to determine the causes; corrective actions lack clarity or don't correlate to the root and contributing causes, condition reports are assigned incorrect significance levels, and corrective actions are not completed in a timely manner.

The NRC verified the effectiveness of the licensee's assessment of the Fundamental Performance Deficiency associated with the Corrective Action Program, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.a.5	Licensee Assessment of the Fundamental Performance Deficiency associated with the Corrective Action Program	Closed IR 2013-019 To be issued
3.a.6	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-019 To be issued
3.a.7	Adequacy of corrective actions	Closed IR 2013-019 To be issued

Licensee evaluations identified that the site Operating Experience Program is not effectively implemented to enhance the performance of the Station. The practice of learning from internal and external industry events has not been internalized. The screening process is not being consistently applied to preclude events. There are weaknesses in the training and qualification of individuals assigned to administer and implement the program. Program expectations are unclear and there is a lack of management oversight to ensure adequate implementation.

The NRC verified the effectiveness of the licensee's assessment of the Operating Experience Program, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.a.8	Licensee Assessment of Operating Experience Program	Closed IR 2013-019 To be issued
3.a.9	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-019 To be issued
3.a.10	Adequacy of corrective actions	Closed IR 2013-019 To be issued
3.a.11	Adequacy of effectiveness measures to monitor program improvements	Closed IR 2013-019 To be issued

Specific independent inspections included assessing the Corrective Actions Program effectiveness in resolving the following previously identified non-cited violations of NRC requirements. The NRC verified that adequate corrective actions were identified associated with the licensee's causal analysis and extent-of-condition evaluations and that implementation of corrective actions were either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Description</b>	<b>Status</b>
NCV 2012004-01	Failure to report an event to the NRC within 60 days for an operation prohibited by Technical Specifications	Closed IR 2013-008 ML13197A261
VIO 2011006-02	Inadequate Corrective Actions to Ensure Reliability of Raw Water Pump Power	Closed IR 2013-019 To be issued
NCV 2011006-06	Failure to Implement an Adequate Trending Program	Closed IR 2013-019 To be issued
NCV 2011004-01	Failure to Incorporate Design Information into Procedures	Closed IR 2013-008 ML13197A261
NCV 2011002-02	Failure to Determine the Cause of the Out Of Tolerance Condition Regarding Reactor Protection System Channel A Trip Unit 6	Closed IR 2013-008 ML13197A261
NCV 2011002-03	Failure to Submit a Timely Licensee Event Report	Closed IR 2013-008 ML13197A261
NCV 2011002-04	Failure to Verify Design Adequacy of Refueling Water Tank Vortex Eliminator	Closed IR 2013-008 ML13197A261
NCV 2010002-01	Inadequate Reportability Guidance	Closed IR 2013-008 ML13197A261

NCV 2010003-01	Failure to Provide Adequate Limiting Condition for Operation for High River Level	Closed IR 2013-019 To be issued
NCV 2010003-05	Failure to Submit a Required Licensee Event Report	Closed IR 2013-008 ML13197A261
NCV 2010004-02	Failure to Submit a Required Licensee Event Report	Closed IR 2013-008 ML13197A261
NCV 2010004-04	Failure to Translate Calculation into Calibration Procedure	Closed IR 2013-008 ML13197A261

Specific independent inspections included assessing the Corrective Actions Program effectiveness in resolving the issues submitted in the following Licensee Event Reports.

<b>Item</b>	<b>Description</b>	<b>Status</b>
LER 2012-011	Emergency Diesel Inoperability Due to Bus Loads During a LOOP	Closed IR 2013-005 ML13221A584
LER 2012-010	Seismic Qualification of Instrument Racks	Closed IR 2013-019 To be issued
LER 2012-007	Failure of Pressurizer Heater Sheath	Closed IR 2013-019 To be issued
LER 2012-006	Operation of Component Cooling Pumps Outside Manufacturers Recommendation	Closed IR 2013-013 To be issued
LER 2012-004	Inadequate Analysis of Drift Affects Safety Related Equipment	Closed IR 2013-013 To be issued
LER 2012-003	Non-Conservative Error in Calculation for Alternate Hot Leg Injection Results in Hot Leg Injection Results in Unanalyzed Condition	Closed IR 2013-08 ML13197A261

Because the overall health of a licensee's corrective action program is key to sustaining operational safety the NRC not only performed routine inspections of this program, but also performed a Team inspection following the guidance in NRC Inspection Procedure 71152, "Problem Identification and Resolution." This inspection focused on ensuring that the corrective action program was effectively being implemented and addressing those items related to design, human performance, procedure quality, equipment performance, configuration control, emergency response, occupational radiation safety, and public radiation safety. These items are defined as "Key Attributes" in NRC Inspection Procedure 95003. Additionally, the NRC followed up on the resolution of specific equipment issues that were known to exist.

<b>Item</b>	<b>Description</b>	<b>Status</b>
3.a.12	Perform NRC Team Problem Identification and Resolution inspection	Closed IR 2013-019 To be issued
3.a.13	Raw Water Pump C high vibrations	Closed IR 2013-015 ML13312A876
3.a.14	Reactor cavity leakage	Closed IR 2013-015 ML13312A876
3.a.15	Effects on equipment impacted by reactor cavity leakage	Closed IR 2013-015 ML13312A876

### **Item 3.b Equipment Design Qualifications**

This item of the Restart Checklist verifies that plant components were maintained within their licensing and design basis. Additionally, this item provides monitoring of the capability of the selected components and operator actions to perform their functions. As plants age, modifications may alter or disable important design features making the design bases difficult to determine or obsolete. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully.

The NRC verified that the following actions implemented by the licensee adequately addressed equipment design concerns. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
4.6.1.1	Address concerns identified with the Reactor Coolant Pump oil collection system	Closed IR 2013-014 ML13266A225
4.6.1.2	Address non-conservative 161 kV minimum voltage to support operation of a main feedwater pump in a Safety Injection Actuation Signal (SIAS)-only scenario (CR 2011-6725)	Closed IR 2013-015 ML13312A876
4.6.1.3	Provide analysis of Steam Generator accident ring (CR 2011-6825)	Closed IR 2013-013 To be issued

The following items are specifically related to maintaining systems, structures, and components within their licensing and design basis. For these specific items the NRC verified that the licensee had performed adequate causal analysis and extent-of-condition evaluations related to the issues. The NRC verified that adequate corrective actions were identified associated with the licensee's causal analysis and extent-of-condition evaluations and that implementation of corrective actions were either implemented or appropriately scheduled for implementation.

These assessments provided the NRC insights regarding the licensee's ability to effectively resolve equipment design qualification problems.

Specific inspection items included:

<b>Item</b>	<b>Description</b>	<b>Status</b>
LER 2012-020	Raw Water Pump Anchors	Closed IR 2013-012 ML13144A772
LER 2012-016	Unanalyzed Charging System Socket Welds to the Reactor Coolant System	Closed IR 2013-013 To be issued
LER 2012-013	Inadequate Calculation of Uncertainty Results in a Technical Specification Violation	Closed IR 2013-019 To be issued
NCV 2011003	Failure to Adequately Design a Reactor Coolant Pump Lube Oil Collection System	Closed IR 2013-014 To be issued
LER 2013-003	Unanalyzed Condition Due to Possible Run-Out of High Pressure Safety Injection Pump	Closed IR 2014-02 To be issued
LER 2013-004	Inverters Potentially Inoperable During Emergency Diesel Generator Operation	Closed IR 2013-016 ML 13345B304
LER 2013-001	Relay Backing Plate Fasteners Discovered to be at Less than Specified Torque	Closed IR 2014-002 To be issued
LER 2013-006	Low Pressure Safety Injection and Containment Spray Pumps Mechanical Seals	Closed IR 2013-013 To be issued

### **Item 3.b.1 Safety Related Parts Program**

A number of instances have been identified where non-safety-related parts have been installed into safety-related applications. Fort Calhoun Station performed reviews to identify conditions where a non-safety-related component or sub-component were improperly used in a safety-related application.

The NRC assessed the licensee's equipment design quality classifications review for inconsistent quality classifications. Additionally, the NRC assessed the licensee's review of the use of non-safety-related parts in safety-related applications. This will ensure proper design attributes have been incorporated and implemented.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.b.1.1	Licensee Assessment of equipment design quality classifications	Closed IR 2014-002 To be issued



3.b.1.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2014-002 To be issued
3.b.1.3	Adequacy of corrective actions	Closed IR 2014-002 To be issued

### Item 3.b.2 High Energy Line Break Program and Equipment Qualifications

Fort Calhoun Station reviewed high energy line break calculations and identified examples of inadequate documentation and calculations associated with high energy line break effects in some areas. The NRC verified the high energy line break analyses and documents ensured the plant is within their license and design basis for high energy line break effects.

The NRC verified the licensee's qualifications and documentation that certify equipment for harsh environments. These equipment qualifications are required by regulations (e.g., 10 CFR 50.49).

The NRC verified that the following actions being implemented by the licensee adequately addressed high energy line break and equipment qualification concerns. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

Action Item Number	Actions to be Verified Prior to Restart	Status
3.b.2.1	Licensee assessment of high energy line break program and equipment qualifications	Closed IR 2013-013 To be issued
3.b.2.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-013 To be issued
3.b.2.3	Adequacy of corrective actions	Closed IR 2013-013 To be issued
4.5.1.8	Complete EEQ Harsh Environment analysis for Room 13 crack in Steam Generator Blowdown system	Closed IR 2013-013 To be issued
4.5.1.9	Develop plan to address Room 13 EEQ harsh environment qualification of electrical equipment	Closed IR 2013-013 To be issued
4.5.1.10	Initiate actions to resolve Room 13 EEQ harsh environment qualification of equipment which must be addressed prior to leaving cold shutdown	Closed IR 2013-013 To be issued
4.5.1.11	Resolve Room 13 EEQ harsh environment qualification of equipment which must be addressed prior to leaving cold shutdown	Closed IR 2013-013 To be issued

4.5.1.12	Perform analysis to address HCV-1385/1386 Main Steam Line Break/Feedwater isolation concern (CR 2011-6757)	Closed IR 2013-013 To be issued
4.5.1.13	Implement resolution of HCV-1385/1386 Main Steam Line Break/Feedwater isolation concern	Closed IR 2013-013 To be issued
4.5.1.14	Perform HELB analysis of Auxiliary Steam piping in the auxiliary building	Closed IR 2013-013 To be issued
4.5.1.15	Implement resolution of Auxiliary Steam piping in the auxiliary building	Closed IR 2013-013 To be issued

The following items are specifically related to high energy line break and equipment qualification concerns. For these specific items the NRC verified that the licensee had performed adequate root cause and extent-of-condition evaluations related to the failures resulting in the event. In addition, the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

Specific inspection items included:

Item	Description	Status
LER 2012-017	Containment Valve Actuators Design Temperature Ratings Below those Required for Design Basis Accidents	Closed IR 2013-013 To be issued
LER 2012-015	Electrical Equipment Impacted by High Energy Line Break Outside Containment	Closed IR 2013-013 To be issued
LER 2012-009	Inoperable Equipment Due to Lack of Environmental Qualifications	Closed IR 2013-005 ML13221A584

### Item 3.c Design Changes and Modifications

Modifications to risk-significant structures, systems, and components can adversely affect their availability, reliability, or functional capability. Modifications to one system may also affect the design bases and functioning of interfacing systems. Similar modifications to several systems could introduce potential for common cause failures that affect plant risk. A temporary modification may result in a departure from the design basis and system success criteria. Modifications performed during increased risk configurations could place the plant in an unsafe condition.

This item assesses the effectiveness of the licensee's implementation of changes to facility structures, systems, and components, risk significant normal and emergency operating

procedures, test programs, evaluations required by 10 CFR 50.59, and the updated final safety analysis report.

The NRC verified that the following actions being implemented by the licensee adequately address design changes and modifications to the facility. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

Action Item Number	Actions to be Verified Prior to Restart	Status
4.5.1.1	Review of EC 53202; FW-10 Steam Line HELB Modification	Closed IR 2013-013 To be issued
4.5.1.2	Final SMART Review of EC 53202; FW-10 Steam Line HELB Modification	Closed IR 2013-013 To be issued
4.5.1.3	Plant Review Committee review of EC 53202; FW-10 Steam Line HELB Modification	Closed IR 2013-013 To be issued
4.5.1.4	Develop Construction Work Orders for EC 53202; FW-10 Steam Line HELB Modification	Closed IR 2013-013 To be issued
4.5.1.5	Complete installation of EC 53202; FW-10 Steam Line HELB Modification	Closed IR 2013-013 To be issued
4.5.1.6	Prepare EC 52662; Add a new Pipe Support on the SGBD vertical line above FW-1020	Closed IR 2013-013 To be issued
4.5.1.7	Install EC 52662; Add a new Pipe Support on the SGBD vertical line above FW-1020	Closed IR 2013-013 To be issued

**Item 3.c.1 Vendor Modification Control**

NRC inspections and licensee evaluations have identified that vendor modification packages did not consistently ensure critical characteristics were identified and properly addressed. Additionally, examples exist that demonstrated an engineering overreliance on vendor knowledge and skill and the failure to provide the appropriate level of oversight for vendor related activities.

The NRC verified that the licensee’s assessment of the vendor modification control processes was thorough, their extent-of-condition and causal analysis and corrective actions being implemented to address the deficiencies were adequate.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.c.1.1	Licensee assessment of vendor modification control processes	Closed IR 2013-015 ML13312A876
3.c.1.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-015 ML13312A876
3.c.1.3	Adequacy of corrective actions	Closed IR 2013-015 ML13312A876

**Item 3.c.2 10 CFR 50.59 Screening and Safety Evaluations**

NRC inspections indicated that several changes to the facility were not properly screened or evaluated per the requirements 10 CFR 50.59. Plant and procedure modifications were reviewed to determine if modifications required a 10 CFR 50.59 review. The licensee also determined that the 50.59 Program was not being effectively implemented consistently and performed a root cause analysis. The NRC verified the adequacy of the licensee's assessment, the thoroughness of their extent-of-condition and causal analysis, and the adequacy of identified corrective actions to ensure proper treatment of changes to the facility.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.c.2.1	Licensee Assessment of the 50.59 process	Closed IR 2013-008 ML13197A261
3.c.2.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-013 To be issued
3.c.2.3	Adequacy of corrective actions	Closed IR 2013-013 To be issued

The following NRC items are specifically related to 10 CFR 50.59 concerns. For these specific items the NRC verified that the licensee had performed adequate root cause and extent-of-condition evaluations related to the event. In addition, the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Description</b>	<b>Status</b>
URI 2011014-02	Failure to Perform Adequate 10 CFR 50.59 Review	Closed IR 2013-008 ML13197A261
NCV 2010004-05	Failure to Perform a 10 CFR 50.59 Evaluation	Closed IR 2013-008 ML13197A261

### **Item 3.d Maintenance Programs**

Inadequate maintenance activities that are not detected prior to returning the equipment to service can result in a significant increase in unidentified risk for the subject system.

The Maintenance Rule (10 CFR 50.65) requires licensees to monitor the performance or condition of structures, systems and components within the scope of the rule against licensee-established goals to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions. These goals are to be commensurate with safety and, where practical, should take into account industry-wide operating experience.

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. Equipment Reliability/Work Management was identified as one of the areas for improvement. Examples identified by the licensee included intolerance to equipment failures has not been established; engineering and maintenance strategies were not focused on critical components; long term strategies had not been developed for age related degradation; the maintenance rule function to monitor the performance of plant equipment had not been effectively implemented. With respect to this FPD the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.d.1	Licensee Assessment of the Fundamental Performance Deficiency associated with Equipment Reliability/Work Management	Closed IR 2013-013 To be issued
3.d.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-013 To be issued
3.d.3	Adequacy of corrective actions	Closed IR 2013-013 To be issued

### Item 3.d.1 Vendor Manuals and Vendor Informational Control Programs

NRC inspections and licensee evaluations identified that vendor manuals and information had not been adequately maintained, which resulted in adverse conditions at Fort Calhoun Station. The licensee performed a review to identify and incorporate updates to vendor manual technical documentation. This review applies to all equipment and components classified as a Critical Quality Element (safety-related).

Changes in vendor guidance was evaluated to determine what impact, if any, the new information had on scheduled work, work completed since the last vendor manual update was made, and changes to plant documentation.

The NRC verified the effectiveness of the licensee's incorporation of vendor information into applicable plant procedures and design documents to ensure proper maintenance and operation of facility equipment.

Specific inspection items included:

Item	Actions to Be Verified Prior to Restart	Status
3.d.1.1	Licensee Assessment of Vendor Informational Control Program	Closed IR 2013-008 ML13197A261
3.d.1.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-008 ML13197A261
3.d.1.3	Adequacy of corrective actions	Closed IR 2013-008 ML13197A261

The following NRC item is specifically related to vendor manual and vendor information control concerns. For this specific item the NRC verified that the licensee had performed adequate causal analysis and extent-of-condition evaluations related to the issue. In addition, the NRC verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

Specific inspection items included:

Item	Description	Status
NCV 2011006-05	Failure to Establish Adequate Measures to Maintain Vendor Manual Design Control Information	Closed IR 2013-008 ML13197A261

### Item 3.d.2 Equipment Service Life

NRC inspections determined that the licensee opted to keep some plant equipment in service beyond the vendor recommended service life or standard industry guidelines. Operating equipment past the recommended replacement timeline has resulted in age-related failures at

Fort Calhoun Station. In response, the licensee performed an assessment to evaluate the service life of safety-related plant equipment and the effectiveness of programs used to implement service life requirements. The NRC verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.d.2.1	Licensee Assessment of equipment service life program	Closed IR 2013-013 To be issued
3.d.2.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-013 To be issued
3.d.2.3	Adequacy of corrective actions	Closed IR 2013-013 To be issued

The NRC verified that the following actions being implemented by the licensee adequately addressed equipment service life issues at the facility. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
3.4.1.1	Replace Non-RPS CQE (reactor protection system critical quality equipment) power supplies that will be beyond their recommended service life	Closed IR 2013-013 To be issued
3.4.2.1	Establish High Impact Team with a Charter	Closed IR 2013-002 ML13092A286
3.4.2.2	Identify all CQE power supplies; priority will be on RPS CQE power supplies and then non-RPS CQE power supplies	Closed IR 2013-013 To be issued
3.4.2.3	Determine the installation date for FCS CQE power supplies; these dates will be used to define those CQE power supplies that are beyond their service life	Closed IR 2013-013 To be issued
3.4.2.4	Conduct an industry and FCS specific analysis of historical performance for CQE power supplies; determine the effectiveness of the current Equipment Reliability (ER) Strategies at the FCS component level	Closed IR 2013-013 To be issued
3.4.2.5	Conduct an analysis of the current FCS ER Strategy for power supplies; contact vendors, review industry documentation, benchmark other plants	Closed IR 2013-013 To be issued

3.4.2.6	Determine the recommended service life for CQE power supplies based on analyses performed earlier in this action plan. These service lives will be based on: (1) manufacturer and model, (2) qualified life testing, (3) vendor recommendations and communication with vendors, (4) remnant life based on stress testing of removed power supplies, (5) industry and FCS specific historical performance and (6) actual duty cycle and service condition where these power supplies are installed	Closed IR 2013-013 To be issued
3.4.2.7	Conduct a failure modes and effects analysis on each power supply to ensure the impact of failures is understood	Closed IR 2013-013 To be issued
3.4.2.8	Document the time based replacement strategy and basis for CQE and RPS power supplies This strategy and basis will provide the tasks to be performed and the basis for the scope and frequency of those tasks. This action is being completed before start up to ensure each power supply has been analyzed and a recommended service life defined	Closed IR 2013-013 To be issued
3.4.2.9	Define those power supplies that are beyond their service life. This will include power supplies that will be beyond their service life before the next planned refueling outage	Closed IR 2013-013 To be issued
3.4.2.10	Replace RPS CQE power supplies beyond their service life	Closed IR 2013-013 To be issued
3.4.2.11	Replace Non-RPS CQE power supplies that will be beyond their recommended service life	Closed IR 2013-013 To be issued

The following NRC open item is specifically related equipment service life concerns and therefore was reviewed by the NRC prior to restart of the facility. For this specific item the NRC verified that the licensee had performed adequate causal analysis and extent-of-condition evaluations related to the failures. In addition, the NRC verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection item included:

Item	Description	Status
NCV 2011003-04	Failure to Provide Procedural Guidance to Replace or Evaluate Age Degraded Components	Closed IR 2013-013 To be issued

### Item 3.e Operability Process

Improper evaluations of degraded and/or non-conforming conditions may result in continued operation with a structure, system, or component that is not capable of performing its design function.



NRC inspections activities and site assessment activities determined that Fort Calhoun Station did not consistently conduct adequate Operability Evaluations to ensure that the impacts of degraded conditions on plant operations are fully understood. Additionally, NRC inspection determined that some equipment identified as “operable but degraded” remained degraded until subsequent failure occurred. Fort Calhoun Station processes did not adequately identify degraded equipment or restore equipment from a degraded condition to full qualifications in a timely manner.

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. One of the deficiencies identified was “Processes to Meet Regulatory Requirements.” Examples in this area included the site does not consistently recognize degraded-nonconforming conditions; and operability determinations and functional assessments are not sufficiently rigorous.

The NRC verified the effectiveness of the licensee’s assessment of the Operability Determination Process, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.e.1	Licensee Assessment of the Fundamental Performance Deficiency associated with “Processes to Meet Regulatory Requirements” specifically related to the Operability Determination Process	Closed IR 2014-002 To be issued
3.e.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2014-002 To be issued
3.e.3	Adequacy of corrective actions	Closed IR 2014-002 To be issued

**Item 3.f Quality Assurance**

Quality Assurance is an important program at nuclear power plants. It is designed to be an independent group that assesses plant workers in the performance of a broad range of safety-related work or evaluations. Through quality assurance assessments or audits, problems and trends can be identified before they become significant plant problems.

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. One of these deficiencies involved the effectiveness of “Nuclear Oversight (NOS).” Examples included NOS did not identify many of the substantive issues that have resulted in the decline in station performance; NOS has not performed critical and intrusive reviews focused on behaviors; NOS neither collected nor integrated performance data from line organizations; and issues identified by NOS are not communicated in a manner that compels site leaders to act.

The NRC verified the effectiveness of the licensee’s assessment of Nuclear Oversight, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.f.1	Licensee assessment of the Fundamental Performance Deficiency associated with Nuclear Oversight effectiveness	Closed IR 2013-008 ML13197A261
3.f.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-008 ML13197A261
3.f.3	Adequacy of corrective actions	Closed IR 2013-008 ML13197A261
3.f.4	Adequacy of recent Nuclear Oversight audits	Closed IR 2013-008 ML13197A261
3.f.5	Effectiveness of Safety Audit and Review Committee	Closed IR 2013-008 ML13197A261

#### **Section 4: Review of Integrated Performance Improvement Plan**

Section 4 of the Restart Checklist is provided to assess Fort Calhoun Station’s Integrated Performance Improvement Plan. OPPD has docketed the Integrated Performance Improvement Plan, which details the plans and actions needed to address the conditions that transitioned FCS to NRC oversight under IMC 0350.

The Integrated Performance Improvement Plan (IPIP) should address pre-restart and post-restart actions. The IPIP should have a sufficient level of detail so that the NRC staff will be capable of developing inspections plans to assess and review the plan’s actions.

The NRC reviewed the IPIP and all changes to the IPIP to ensure its pre-startup and post-startup actions and plans were adequate to address the conditions that led to the protracted decline in plant performance.

Specific inspection items included:

<b>Item</b>	<b>Description</b>	<b>Status</b>
4.1	Review of Integrated Performance Improvement Plan	Closed

## Section 5: Assessment of NRC Inspection Procedure 95003 Key Attributes

Section 5 of the Restart Checklist is provided to assess the key attributes of NRC Inspection Procedure 95003. The key attributes are listed as separate subsections below. It is intended that the activities in these subsections be conducted in conjunction with reviews and inspections for Sections 1 – 4, rather than a stand-alone review. In addition, the NRC reviewed the effectiveness of licensee short term and long term corrective actions associated with these areas to ensure they are adequate to support sustained plant performance improvement.

### Item 5.a Design

The NRC independently assessed the extent of risk significant design issues. The review covered the as-built design features of the auxiliary feedwater system. This review will verify its capability to perform its intended functions with a sufficient margin of safety. The basis for selecting the auxiliary feedwater system was its high risk significance in the specific individual plant evaluation, and input from system health reports, performance indicators, condition reports, and licensee event reports. Inspection focus was on modifications rather than original system design. Information from this inspection was used to assess the licensee's ability to maintain and operate the facility in accordance with the design basis. The NRC review included the following:

- assessment of effectiveness of corrective actions for deficiencies involving design
- selection of several modifications to the auxiliary feedwater system to determine if the system is capable of functioning—as specified by the current design and licensing documents, regulatory requirements, and commitments for the facility
- determination if the auxiliary feedwater system is operated consistent with the design and licensing documents
- evaluation of the interfaces between engineering, plant operations, maintenance, and plant support groups

Specific inspection item included:

Item	Description	Status
5.a.1	Perform NRC design engineering team inspection of the Auxiliary Feedwater System	Closed IR 2013-013 To be issued

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. One of the deficiencies identified was “Engineering Design/Configuration Control.” Examples in this area included changes to plant configuration and design and licensing basis are not effectively analyzed, controlled, and implemented; incomplete documentation and poorly written justifications in modification packages; and evaluations of fit, form, and function have been inadequate.

The NRC verified the effectiveness of the licensee's assessment of “Engineering Design/Configuration Control” and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Description</b>	<b>Status</b>
5.a.2	Licensee Assessment of the Fundamental Performance Deficiency associated with Engineering/Configuration Control	Closed IR 2013-013 To be issued
5.a.3	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-013 To be issued
5.a.4	Adequacy of corrective actions	Closed IR 2013-013 To be issued

The following NRC items are specifically related to design concerns associated with the auxiliary feedwater system and therefore will be reviewed by the NRC to assess the effectiveness of the licensees' ability to resolve design issues. For these specific items the NRC verified that the licensee performed adequate causal analysis and extent-of-condition evaluations related to the failures. In addition, the NRC verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Description</b>	<b>Status</b>
NCV 2010006-01	Failure to Correct Repeated Tripping of the Turbine-driven Auxiliary Feedwater Pump FW-10	Closed IR 2013-013 To be issued
NCV 2010006-02	Failure to Verify that the Turbine-driven Auxiliary Feedwater Pump Exhaust Backpressure Trip Lever was Fully Latched	Closed IR 2013-008 ML13197A261
NCV 2010006-03	Failure to Vent Control Oil Following Maintenance Results in Failure of the Turbine-driven Auxiliary Feedwater Pump to Start	Closed IR 2013-008 ML13197A261
NCV 2010006-04	Turbine-driven Auxiliary Feedwater Pump Trip Due to Inadequate Design Margin	Closed IR 2013-008 ML13197A261

### **Item 5.b Human Performance**

By nature of the design of nuclear power plants and the role of plant personnel in maintenance, testing and operation, human performance plays an important part in normal, off-normal and emergency operations. Human performance impacts each of the cornerstones and therefore should be considered across all inspections conducted at Fort Calhoun Station.

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. One of the

deficiencies identified was “Human Performance.” Examples in this area included the station lacks an integrated approach to solving human performance issues; station leaders do not reinforce use of the tools that reduce human performance errors, human performance improvement tools are not consistently utilized; and weaknesses in the site observation program are contributing to ongoing human performance problems.

The NRC verified the effectiveness of the licensee’s assessment of Human Performance, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

Item	Description	Status
5.b.1	Licensee Assessment of the Fundamental Performance Deficiency of Human Performance	Closed IR 2013-008 ML13197A261
5.b.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-008 ML13197A261
5.b.3	Adequacy of corrective actions	Closed IR 2013-008 ML13197A261

### Item 5.c Procedure Quality

Inadequate procedures can cause initiating events by inducing plant personnel to take inappropriate actions during plant operations, maintenance, calibration, testing, or event response. Adequate procedures also assure proper functioning of mitigating systems during operation, maintenance, and testing. Emergency and abnormal operating procedures are also essential for mitigating system performance and assuring appropriate actions will be taken to preserve reactor coolant system (RCS) and containment integrity.

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. One of the deficiencies identified was “Procedure Quality/Procedure Management.” Examples in this area included inaccurate or incomplete procedures have contributed to multiple significant events; some emergency and abnormal operating procedures are technically inaccurate; discrepancies occur within and between procedures; verification and validation of station procedures is not always rigorous; and the procedure maintenance group suffers from funding, training, personnel resources, and management support.

The NRC verified the effectiveness of the licensee’s assessment of Procedure Quality/Procedure Management, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

Specific inspection items included:

<b>Item</b>	<b>Description</b>	<b>Status</b>
5.c.1	Licensee Assessment of the Fundamental Performance Deficiency of Procedure Quality/Procedure Management	Closed IR 2013-019 To be issued
5.c.2	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-019 To be issued
5.c.3	Adequacy of corrective actions	Closed IR 2013-019 To be issued

The following NRC items are specifically related to procedural quality concerns and therefore were evaluated by the NRC to assess the effectiveness of the licensees' ability to resolve procedural issues. For these specific items the NRC verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

<b>Item</b>	<b>Description</b>	<b>Status</b>
NCV 2012301-01	Seven Examples of Inadequate Procedures for the Mitigating Systems Cornerstone	Closed IR 2013-019 To be issued
NCV 2012301-04	Five Examples of Inadequate Procedures for the Initiating Events Cornerstone	Closed IR 2013-019 To be issued
NCV 2012301-06	Inadequate Procedures with Four Examples for the Barrier Integrity Cornerstone	Closed IR 2013-019 To be issued
NCV 2011002-01	Inadequate Operating Instruction Results in a Loss of Auxiliary Feedwater	Closed IR 2013-019 To be issued
NCV 2010004-10	Inadequate Maintenance Procedure Results in a Plant Shutdown	Closed IR 2013-019 To be issued

#### **Item 5.d Equipment Performance**

Equipment failure or degradation can cause initiating events during power operation and losses of decay heat removal during shutdowns. To limit challenges to safety functions due to equipment problems, licensees should have programs to achieve a high degree of availability and reliability of equipment that can cause initiating events. The availability and reliability of equipment is also critical to mitigating the impact of initiating events on plant safety. Strong preventive and corrective maintenance programs are an integral part of assuring equipment availability and reliability.

As discussed in other sections of this basis document the NRC:

- Assessed the effectiveness of corrective actions for deficiencies involving equipment performance, including equipment designated for increased monitoring via implementation of the Maintenance Rule.
- Assessed the operational performance of the auxiliary feedwater system to verify its capability of performing the intended safety functions.
- Reviewed a sample of Emergency Preparedness related equipment and facilities (including communications gear) against Plan commitments. Review the adequacy of the surveillance program to maintain equipment and facilities. Review the correction of deficiencies identified by the surveillance program.
- Assessed licensee corrective actions associated the significant equipment deficiencies involving flooding concerns, reactor protection system failures, and electrical bus deficiencies.

The following NRC items are specifically related to equipment performance concerns and therefore were reviewed by the NRC to assess the effectiveness of the licensee’s ability to resolve these issues. For these specific items the NRC verified that the licensee has performed adequate causal analysis and extent-of-condition evaluations related to the failures. In addition, the NRC verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

Item	Description	Status
LER 2012-018	Containment Air Cooling Units Operated Outside of Technical Specification during Cycle 26	Closed IR 2013-013 To be issued
LER 2012-005	Technical Specification Violation Due to Inadequate Testing of Emergency Diesel Fuel Pumps	Closed IR 2013-008 ML13197A261
NCV 2010004-09	Failure to perform vendor and industry recommended testing on safety-related and risk significant 4160 V and 480 V circuit breakers	Closed IR 2013-013 To be issued

**Item 5.e Configuration Control**

The NRC inspected and assessed the licensee’s ability to maintain risk-significant systems and the principle fission product barriers in configurations which support their safety functions by completing the following inspection activities discussed in this basis document:

- Assessed the effectiveness of corrective actions for deficiencies involving configuration control.
- Assessed licensee actions ensuring systems are ready to support safe plant operation following an extended shutdown
- Performed walkdowns of selected systems (AC and DC Electrical Distribution Systems, High Pressure Injection System, Emergency Diesel Generators, Reactor Protection System, and the Auxiliary Feedwater System) to validate they are ready for safe operation.

- Reviewed licensee actions regarding the identified Fundamental Performance Deficiency involving Engineering Design/Configuration Control

The NRC verified that the following actions implemented by the licensee adequately addressed configuration control requirements at the facility. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
4.3.1.1	Finalize identification of all configuration changes for restoration	Closed IR2012-012 ML 13045B055
4.3.1.2	Finalize identification of configuration changes to be made permanent	Closed IR2012-012 ML 13045B055
4.3.1.3	Establish Priority/Schedule for restoration	Closed IR2012-012 ML 13045B055
4.3.1.4	Initiate actions to remove non-permanent configuration changes	Closed IR2012-012 ML 13045B055

The following NRC items are specifically related to configuration control concerns and therefore were reviewed by the NRC to assess the effectiveness of the licensees' ability to resolve these issues. For these specific items the NRC verified that the licensee had performed adequate root cause and extent-of-condition evaluations related to the failures. In addition, the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

<b>Item</b>	<b>Description</b>	<b>Status</b>
LER 2012-012	Multiple Safety Injection Tanks Rendered Inoperable	Closed IR 2013-019 To be issued
LER 2012-008	Technical Specification Violation for Fuel Movement (VA-66)	Closed IR 2013-019 To be issued

#### **Item 5.f      Emergency Response**

Implementation of the Emergency Response Plan is dependent on the readiness of the emergency response organization to respond to an emergency. In this usage, "readiness" means the ability of the licensee to activate timely Emergency Response Organization augmentation of on shift personnel as necessary to implement the emergency plan.



Self-assessments of readiness during drills and activation tests are used to identify areas for improvement. Self-assessment and corrective action resolution is critical to Emergency Response Organization readiness. The NRC review included the following:

- Assessed the effectiveness of corrective actions for deficiencies involving Emergency Response Organization readiness.
- Verified that adequate staffing is available on shift for emergencies.
- Verified the capability to activate and staff the emergency response facilities and augment the response organization within the requirements of the licensee emergency response plan

The NRC implemented the following NRC Emergency Preparedness Inspection Procedures.

<b>Item</b>	<b>Description</b>	<b>Status</b>
5.f.1	IP 71114.01, "Exercise Evaluation"	Closed IR 2012-002 ML 12132A395
5.f.2	IP 71114.02, "Alert and Notification System Testing"	Closed IR 2012-012 ML 13045B055
5.f.3	IP 71114.03, "Emergency Preparedness Organization Staffing and Augmentation System"	Closed IR 2012-012 ML 13045B055
5.f.4	IP 71114.04, "Emergency Action Level and Emergency Plan Changes"	Closed IR 2012-002 ML 12132A395
5.f.5	IP 71114.05, "Maintenance of Emergency Preparedness"	Closed IR 2012-002 ML 12132A395
5.f.6	IP 71114.06 "Drill Evaluation"	Closed IR 2012-002 ML 12132A395

The NRC verified that the following licensee actions in the area of emergency response were adequately addressed. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
5.1.2.1	Procure 10 solar charging kits for nine affected sirens	Closed IR 2013-002 ML 13092A286
5.1.2.2	Perform fly over of flood affected sirens to determine status and potential condition of the equipment	Closed IR 2013-002 ML 13092A286
5.1.2.3	Based on siren inspection procure replacement siren heads, poles, electronics, and power supplies	Closed IR 2012-004 ML 12276A456

5.1.2.4	If siren damage and/or infrastructure is such that timely repair of sirens is not possible, work with FEMA, state, and local governments for potential exemptions or long term plan	Closed IR 2012-003 ML 12226A630
5.1.2.5	Replace batteries in the affected sirens	Closed IR 2012-004 ML12276A456
5.1.2.6	Install solar charging kits on the affected sirens	Closed IR 2013-002 ML13092A286
5.1.2.7	Conduct siren inspections using the communications developed check list	Closed IR 2012-004 ML12276A456
5.1.2.8	Conduct a full siren test after sirens have been restored to functional status	Closed IR 2012-012 ML 13045B055
5.1.3.1	Conduct Emergency Planning Test EP-37, Emergency Sign Verification	Closed IR 2012-004 ML12276A456
5.2.1.1	Develop a field monitoring and environmental sampling plan	Closed IR 2012-003 ML12226A630
5.2.2.1	Conduct a Protective Measure table top with the states of Nebraska and Iowa	Closed IR 2012-003 ML12226A630
5.3.2.1	Perform ERDS testing	Closed IR 2012-003 ML12226A630
5.3.2.2	Perform normal communications testing	Closed IR 2012-004 ML12276A456
5.3.2.3	Restore area radiation monitors	Closed IR 2012-004 ML12276A456
5.3.2.4	Ensure effluent radiation monitors are functional	Closed IR 2012-004 ML12276A456
5.3.2.5	Restore equipment used for emergency classification	Closed IR 2012-004 ML12276A456
5.3.2.6	Perform normal facility inventories and assessments	Closed IR 2013-002 ML13092A286
5.3.2.7	Conduct Meeting with FEMA, NRC, local Emergency Manager, and State Emergency Managers	Closed IR 2012-003 ML12226A630
5.3.2.18	Obtain statement of Reasonable Assurance from FEMA	Closed IR 2012-004 ML12276A456

5.4.2.1	MET tower restoration	Closed IR2012-012 ML 13045B055
5.4.2.2	MET tower building restoration	Closed IR2012-012 ML 13045B055
5.4.2.3	Secondary Evacuation Route restoration	Closed IR 2012-003 ML 12226A630
5.4.2.4	Critique Flooding event	Closed IR 2012-004 ML12276A456

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. One of the deficiencies identified was "Emergency Response Organization." Examples in this area included important emergency response equipment are experiencing repeat failures; inadequate implementation and documentation of important ERO activities; and some emergency preparedness deficiencies are not effectively identified and corrected.

The NRC verified the effectiveness of the licensee's assessment of the Fundamental Performance Deficiency associated with the Emergency Response Organization, and verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

Specific inspection items included:

Item	Description	Status
5.f.7	Licensee Assessment of the Fundamental Performance Deficiency of Emergency Response Organization	Closed IR 2013-010 ML13192A501
5.f.8	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-010 ML13192A501
5.f.9	Adequacy of corrective actions	Closed IR 2013-010 ML13192A501

The following NRC items are specifically related to emergency response concerns and therefore were reviewed by the NRC to assess the effectiveness of the licensees' ability to resolve these issues. For these specific items the NRC verified that the licensee had performed adequate root cause and extent-of-condition evaluations related to the failures. In addition, the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent-of-condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

<b>Item</b>	<b>Description</b>	<b>Status</b>
NCV 2010003-02	Failure to conduct an adequate audit of emergency preparedness interfaces with offsite authorities	Closed IR 2013-002 ML13092A286
NCV 2010003-03	Failure to Conduct Drills to Maintain Environmental Monitoring Skills	Closed IR 2013-002 ML13092A286
NCV 2010003-04	Protective Action Recommendation processes allow for the unnecessary evacuation of the public	Closed IR 2013-002 ML13092A286

### **Item 5.g Occupational Radiation Safety**

The goal for the Occupational Radiation Safety cornerstone is to ensure adequate protection of worker health and safety from exposure to radiation or radioactive material during routine civilian nuclear reactor operations. The facility is required to maintain fixed and portable radiation survey equipment (for airborne and external hazards), respiratory protection, communication equipment, temporary ventilation and shielding, and anti-contamination clothing to protect workers. This equipment is also needed to conduct adequate radiation monitoring and surveillance activities. Routine calibration and maintenance of this equipment ensures its continued operability. The NRC inspected and assessed the plant facilities, equipment, and instrumentation for occupational radiation safety and verified they were adequate to support plant restart.

Worker performance has an obvious, important impact on work activities in radiological areas. Two of the major components are health physics technician and general radiation worker (crafts) groups. Human performance is impacted by several vital factors – qualification and training. The selection, qualification, and training requirements for facility personnel are generally governed by a licensing commitment in the plant technical specifications (to an American Nuclear Society standard). The NRC inspected and assessed the human performance attributes of occupational radiation safety and verified they were adequate to support plant restart.

The following NRC Inspection Procedures were implemented:

<b>Item</b>	<b>Description</b>	<b>Status</b>
5.g.1	IP 71124.01, "Radiological Hazard Assessment and Exposure Controls"	Closed IR 2012-011 ML12366A158
5.g.2	IP 71124.02, "Occupational ALARA Planning and Controls"	Closed IR 2012-011 ML12366A158

### **Item 5.h Public Radiation Safety**

To prevent the inadvertent release of licensed radioactive material from the licensee's control requires the use of sensitive radiation survey equipment that is properly setup and calibrated.

The NRC will assess and inspect the plant equipment, systems, and instrumentation of public radiation safety.

The performance of radiation surveys on equipment and material to be released from the licensee's facility requires appropriate policy and technical procedural guidance for handling and processing a wide variety of potentially contaminated materials. The NRC inspected and assessed the procedures and programs of public radiation safety and verified they were adequate to support plant restart.

Human performance can directly affect radioactive waste processing, radioactive effluent processing, and transportation programs. It is important to ensure that plant workers are adequately trained and qualified to perform their job function. Periodic retraining is also needed to ensure that workers maintain their qualifications and are updated with new information and requirements. The NRC inspected and assessed the human performance elements of public radiation safety and verified they were adequate to support plant restart.

The following NRC Inspection Procedures were implemented:

<b>Item</b>	<b>Description</b>	<b>Status</b>
5.h.1	IP 71124.06, "Radioactive Gaseous and Liquid Effluent Treatment"	Closed IR 2012-004 ML 12276A456
5.h.2	IP 71124.07, "Radiological Environmental Monitoring Program"	Closed IR 2012-004 ML 12276A456
5.h.3	IP 71124.08, "Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation"	Closed IR 2012-004 ML 12276A456

### **Item 5.i Security**

The objective of the security cornerstone is to assure that security systems use a defense-in-depth approach and can protect against the design basis threat of radiological sabotage from external and internal threats. The NRC assessed the licensee's ability to satisfy the cornerstone objective by inspecting the security cornerstone attributes of access control, physical protection, contingency response and material control and accounting.

The NRC also verified that the security related licensee actions listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, were adequately addressed.

A description of the actions to be reviewed by the NRC is contained in a separate document which contains Security Related Information in accordance with 10 CFR 2.390(d)(1) and its disclosure to unauthorized individuals could present a security vulnerability and will not be made publicly available.

The security-related issues were closed in two inspection reports, 2013-405 ML13115A095 and 2013-407 ML13213A497.

## Section 6: Licensing Issue Resolution

This section of the Restart Checklist encompasses the regulatory activities needed to bring Fort Calhoun Station into current compliance. While no current licensing issues are applicable, this section provides the avenue to address them as they may arise out of other restart reviews and actions. These may include historical, pending, or items discovered during the inspection phases described in Sections 1 – 3, and Section 6.

### Item 6.a Review of Necessary Licensing Amendments or Actions

The following two licensing amendments were processed to support plant restart.

Item	Description	Status
6.a.1	REVISE CURRENT LICENSING BASIS FOR ADDRESSING DESIGN-BASIS TORNADO/TORNADO MISSILE IMPACT	Closed ML13203A070
6.a.2	Revise Current Licensing Basis For Addressing High Energy Line Breaks	Closed ML13296A584

### Item 6.b Review of Licensing Commitments Necessary for Restart

The NRC conducted a commitment management audit, focusing on the implementation of regulatory commitments. The NRC determined that FCS commitment management process was adequate to support plant restart.

Item	Description	Status
6.b.1	Perform commitment management audit	Closed IR 2013-008 ML13197A261

## Section 7: Readiness for Restart

Fort Calhoun Station has been shut down for a prolonged period of time (since April 2011). This section is provided to ensure final restart items are appropriately addressed to allow for power operation to recommence.

### Item 7.a Operations Organization Ready for Restart

After long periods in a shutdown condition, particularly where significant performance issues were also identified, a performance-based and risk-informed inspection should be conducted by the NRC. The NRC performs such inspections using Operational Readiness Assessment Team inspections, under the guidance of Inspection Procedure 93806, "Operational Readiness Assessment Team Inspections." The NRC performed two team inspections, one during plant heat up prior to start up, to assess operational performance. The NRC verified that operational performance at the facility was adequate to support plant restart.

<b>Item</b>	<b>Description</b>	<b>Status</b>
7.a.1	Perform Operational Readiness Assessment Team inspection	Closed IR 2013-016 ML 13345B304

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. Site Operational Focus was identified as one of these areas for improvement. Examples identified by the licensee included decisions do not demonstrate the use of a systematic process; station personnel lack understanding of the design and licensing basis of the plant in a manner that drives conservative, operational decision making; inconsistent recognition and evaluation of risk significant conditions; and excessive backlogs in preventative maintenance, surveillances, procedure revisions, drawing changes, corrective maintenance, and low margin issues.

The NRC verified the effectiveness of the licensee's assessment of the Fundamental Performance Deficiency associated with Site Operational Focus. Additionally, the NRC verified that adequate corrective actions were identified associated with the causes and extent-of-condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

Specific inspections included:

<b>Item</b>	<b>Description</b>	<b>Status</b>
7.a.2	Licensee Assessment of the Fundamental Performance Deficiency associated with Site Operational Focus	Closed IR 2013-016 ML 13345B304
7.a.3	Adequacy of extent-of-condition and extent of causes	Closed IR 2013-016 ML 13345B304
7.a.4	Adequacy of corrective actions	Closed IR 2013-016 ML 13345B304

#### **Item 7.b Systems Ready for Restart and Mode Restraints Properly Addressed**

This item is a final review, by the NRC, of system lineups and preparations for restart. This was a specific review of how Fort Calhoun Station addressed, reviewed, and closed particular mode restraints. This inspection was implemented by the resident inspectors and verified plant systems were operable to support plant mode changes.

<b>Item</b>	<b>Description</b>	<b>Status</b>
7.b.1	Final system readiness and mode restraint review	Closed IR 2013-019 To be issued

**Item 7.c Final Review of Corrective Action Program for Restart Items**

This item was the final NRC review of the Corrective Action Program actions that were required prior to facility restart. The NRC verified that corrective actions associated with equipment operability, design, or qualification were appropriately addressed and closed prior to restart, or that they are specifically tied to a restart or mode restraint.

<b>Item</b>	<b>Description</b>	<b>Status</b>
7.c.1	Final corrective action program review for restart items prior to restart	Closed IR 2013-019 To be issued

**Section 8: Confirmatory Action Letter Resolution**

**Item 8.a Verification that all Restart-Related Confirmatory Action Letter Items are Appropriately Resolved**

The NRC verified that the required actions in the Confirmatory Action Letter were completed prior to restart.

<b>Item</b>	<b>Description</b>	<b>Status</b>
8.a.1	All Confirmatory Action Letter items addressed	Closed

**Item 8.b Conduct Public Meeting Regarding Plant Readiness for Restart**

A public meeting was held in Omaha, Nebraska that consisted of the NRC 0350 Panel members and a number of technical specialists discussing the current status of oversight activities at the facility.

<b>Item</b>	<b>Description</b>	<b>Status</b>
8.b.1	Conduct public meeting to discuss plant readiness for restart	Closed November 21, 2013

**Section 9: Final Recommendation for Restart**

**Item 9.a Final Recommendation for Restart**

On December 16, 2013, the Manual Chapter 0350 Panel recommended CAL EA-13-243 closure to the Region IV Administrator based on having no safety or regulatory concerns associated with the restart of Fort Calhoun Station.

On December 17, 2013, the Region IV Administrator, in consultation with the Deputy Executive Director for Reactor and Preparedness Programs, and the Director of the Office of Nuclear Reactor Regulation authorized closure of CAL EA-13-243.



## LIST OF ACRONYMS USED

AAP	Auxiliary Access Point
ACS	Auxiliary Cooling System
AFW	Auxiliary Feedwater System
AIS	Auxiliary Instrumentation System
ALARA	As Low As Reasonably Achievable
AUS	Auxiliary Steam System
CFR	Code of Federal Regulations
COM	Communications System
CQE	Critical Quality Equipment
CR	Condition Report
CRD	Control Rod Drive System
CVC	Chemical and Volume Control System
CWS	Circulating Water System
DI	Deionized
DW/PW	Demineralized Water/Potable Water System
EAO	Exclusion Area Opening
EC	Engineering Change
ECC	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EDS	Electrical Distribution System
EEQ	Equipment Environmental Qualification
EP	Emergency Planning
EPRI	Electric Power Research Institute
ER	Equipment Reliability
ERDS	Emergency Response Data System
ERO	Emergency Response Organization
ESF	Engineered Safety Features System
FEMA	Federal Emergency Management Agency
FHS	Fuel Handling System
FP	Fire Protection
FPD	Fundamental Performance Deficiency
FPS	Fire Protection System
GPR	Ground Penetrating Radar
HCV	Hydraulic Control Valve
HELB	High Energy Line Break
HES	Hoisting Equipment System
IAS	Instrument Air System
IP	Inspection Procedure
IPIP	Integrated Performance Improvement Plan
ISFSI	Independent Spent Fuel Storage Installation
LER	Licensee Event Report
LOOP	Loss of Offsite Power
MET	Meteorological
MFW	Main Feedwater System
MMS	Meteorological Monitoring System
NCV	Noncited Violation

NFPA	National Fire Protection Association
NOS	Nuclear Oversight
NRC	Nuclear Regulatory Commission
OCA	Owner Controlled Area
OPPD	Omaha Public Power District
PA	Protected Area
PAP	Primary Access Point
PM	Preventative Maintenance
PRC	Plant Review Committee
RCS	Reactor Coolant System
RMS	Radiation Monitoring System
RPS	Reactor Protection System
SAT	Satisfactory
SEC	Plant Security System
SFP	Spent Fuel Pool System
SGI	Safeguards Information
SGS	Steam Generator System
SIAS	Safety Injection Actuation Signal
SLS	Sampling System
SMART	Station Modification Acceptance Review Team
SSC	Systems, Structures, and Components
ST	Surveillance Test
STR	Structures System
T&D	Transmission and Distribution
TGS	Turbine Generator System
TPC	Turbine Plant Cooling System
VAC	Ventilating Air Conditioning System
VDS	Vents and Drains System
VIO	Violation
WDS	Waste Disposal System