



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

December 16, 2013

MEMORANDUM TO: Marc L. Dapas  
Regional Administrator

Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

FROM: Anton Vegel, Chairman /RA/  
Fort Calhoun Station Oversight Panel

Louise A. Lund, Vice Chairman /RA/  
Fort Calhoun Station Oversight Panel

SUBJECT: RECOMMENDATION FOR NRC TO CLOSE CONFIRMATORY  
ACTION LETTER EA-13-020 SUPPORTING THE RESTART OF  
FORT CALHOON STATION AND RECOMMENDATION TO  
ISSUE POST-RESTART CONFIRMATORY ACTION LETTER

The U.S. Nuclear Regulatory Commission (NRC) Inspection Manual Chapter (IMC) 0350 Fort Calhoun Station (FCS) Oversight Panel, has concluded that the NRC staff completed the necessary inspection, assessment, and licensing activities to verify that licensee corrective actions were sufficient to address the issues identified in the FCS Restart Checklist and recommends that the NRC close Confirmatory Action Letter (CAL) EA-13-020 supporting the restart of the FCS. Separately, the Panel recommends that a post-restart CAL be issued to Omaha Public Power District (OPPD) to ensure that long-term corrective actions to prevent recurrence of significant performance deficiencies identified in the Restart Checklist will be implemented at the FCS. Additionally, the CAL will address actions necessary for achieving and sustaining continued performance improvements in a number of areas including the site safety culture, corrective action program, engineering activities, facility design and licensing basis, and implementation of regulatory processes involving changes to the facility and evaluating degraded and non-conforming conditions.

#### Background

Fort Calhoun Station initially shut down for a scheduled refueling outage in April 2011. The outage was extended due to flooding along the Missouri River affecting the site from June through September of 2011 and to address several longstanding technical issues. During the shutdown, several significant performance issues were identified requiring additional NRC oversight. On September 2, 2011, the NRC issued CAL 4-11-003 (Agencywide Documents

Access and Management System (ADAMS) Accession No. ML112490164). Confirmatory Action Letter 4-11-003 required OPPD to complete post-flooding recovery actions and other items important for restart of the facility.

On September 2, 2011, the NRC issued to OPPD CAL 4-11-003, which documented certain actions OPPD committed to take prior to restarting the plant, as described in its Flood Recovery Plan that was submitted to the NRC on August 10, 2011. These actions addressed the flooding impacts on the station and other aspects of FCS performance.

As a result of continuing NRC assessment of FCS being in an extended shutdown with significant performance problems, and a significant operational event involving a fire in safety-related electrical switchgear on June 7, 2011, on December 13, 2011, pursuant to IMC 0350, "Oversight of Reactor Facilities in a Shutdown Condition due to Significant Performance and/or Operational Concerns," an NRC Oversight Panel was chartered to coordinate and oversee NRC activities needed to verify proper licensee safety performance prior to restart and to ensure appropriate focus was provided and resources were allocated with regard to reviewing improvement initiatives. Additionally, by letter dated December 13, 2011 (ADAMS Accession No. ML113470721), the NRC informed OPPD via letter that FCS transitioned to IMC 0350, "Oversight of Reactor Facilities in a Shutdown Condition due to Significant Performance and/or Operational Concerns."

In January 2012, OPPD and Exelon Generation Company, LLC (Exelon), entered into an Advisory Services Agreement in which Exelon provided advisory and other support services to OPPD focused on FCS recovery and restart. That agreement remains in effect until FCS achieves 100 percent power. In August 2012, OPPD and Exelon entered into a 20-year Operating Services Agreement, whereby Exelon is responsible for day-to-day operation of the plant while OPPD remains the owner and NRC licensee.

On June 11, 2012, the NRC issued CAL 4-12-002 (ADAMS Accession No. ML12163A287). This letter confirmed the actions OPPD would take prior to the restart of FCS in an enclosed Restart Checklist. The purpose of the Restart Checklist, provided as Enclosure 1 to this memorandum, was to verify that the issues that resulted in the prolonged performance decline at FCS were resolved. The Restart Checklist includes an assessment of each of the key attributes described in NRC Inspection Procedure 95003, "Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs or One Red Input." The scope of the items in the Restart Checklist was developed to ensure the facility can be safely operated if restart is approved.

On November 13, 2012, the NRC issued a "Manual Chapter 0350 Panel Fort Calhoun Station Restart Checklist Basis Document" (ADAMS Accession No. ML12318A319). The basis document provided the 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 has adequately addressed the specific Restart Checklist items. Approximately 460 specific items are listed in the Restart Checklist Basis Document for NRC inspection and assessment. This is a living document and is periodically updated to reflect status of inspection activities and when new inspection items are added following IMC 0350 Panel review. This document was last

updated on November 15, 2013; a copy is provided as Enclosure 2 to this memorandum (ADAMS Accession No. ML13319B251).

On February 26, 2013, the NRC issued CAL EA-13-020 (ADAMS Accession No. ML13057A287). This CAL incorporated all the actions confirmed by CAL 4-12-002 and added three activities to the Restart Checklist that OPPD committed to resolve at the facility prior to restart. On March 7, 2013, the NRC issued a revised "Restart Checklist Basis Document" (ADAMS Accession No. ML13066A877) to address the additional items added and provide a status update of inspection activities.

The FCS recovery effort involved a large number of activities related to problem discovery and resolution, performance improvement, restart readiness, and regulatory margin recovery. In early 2012, OPPD developed the Integrated Performance Improvement Plan (IPIP). The purpose of the IPIP was to provide an integrated management structure and approach to fully assess and address the causes of performance deficiencies at FCS and guide the recovery and restart of FCS. Through implementation of the IPIP, OPPD identified and addressed the key underlying causes for the FCS performance decline. The IPIP is a living document that was first submitted to the NRC as Revision 3 on July 9, 2012. The IPIP was subsequently revised and Revisions 4 and 5 were submitted to the NRC on November 1, 2012, and June 19, 2013, respectively. Based on inspection activity, the improvement actions completed under the IPIP and [define: FRP] have adequately addressed the items in the CAL and Restart Checklist.

Additionally, OPPD has established the FCS post-restart Plan for Sustained Improvement (PSI), including the Key Drivers for Achieving and Sustaining Excellence. The PSI and Key Drivers will continue the performance improvement initiatives at FCS and include implementation of the Exelon Nuclear Management Model (ENMM) and integration into the Exelon fleet. The key drivers for achieving and sustaining excellence within the PSI are:

- Organizational effectiveness, safety culture and safety conscious work environment
- Problem identification and resolution
- Performance improvement and learning programs
- Design and licensing basis control and use
- Site operational focus
- Procedures
- Equipment performance
- Programs
- Nuclear oversight
- Transition to the Exelon Nuclear Management Model and integration into the Exelon Nuclear fleet

On December 2, 2013, OPPD submitted an "Integrated Report to Support Restart of Fort Calhoun Station and Post-Restart Commitments for Sustained Improvement" (ADAMS Accession No. ML13336A785). Enclosure 2 to this letter contains the post-restart commitments OPPD is making to continue performance improvement after restart, including the Key Drivers for Achieving and Sustaining Excellence.

## Discussion

The NRC staff has completed its inspection, assessment, and licensing activities and has evaluated the effectiveness of the licensee's actions to address the issues that resulted in the plant shutdown.

The Panel's assessment of the licensee's corrective actions was based on detailed consideration of input provided by resident, region-based, and headquarters inspectors, supplemented by headquarters staff technical expertise. The inspection results are documented in a number of inspection reports that included:

- NRC INTEGRATED INSPECTION REPORTS (issued approximately 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 (improper design specification associated with 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)
- MANUAL CHAPTER 0350 TEAM INSPECTION REPORT NO. 05000285/2013013 (focused in the areas of significant performance deficiencies, engineering and maintenance programs, and operability process)

With the exception of the last Manual Chapter 0350 Team Inspection Report, these inspection reports are publicly available in the NRC Library (<http://www.nrc.gov/reading-rm.html>). These reports have been incorporated into a binder, along with copies of the routine resident inspection reports issued during the extended shutdown. The binder is available for your review.

In addition, the Panel has conducted frequent public meetings with the licensee to discuss licensee performance and NRC inspection and assessment results or with the public to receive comments and answer questions. Each of these meetings was recorded with video caption and available for public viewing on the "Special Oversight of Fort Calhoun Station" Web site (<http://www.nrc.gov/info-finder/reactor/fcs/special-oversight.html>). Additionally, the meeting summary and any associated licensee and NRC presentation materials have been placed in the NRC Library and on the "Special Oversight of Fort Calhoun Station" Web site.

There have also been multiple internal meetings of the Panel. The agenda and results of these meetings were documented and will be provided in a binder available for your review. Additionally, these documents will be placed in the NRC Public Electronic Reading Room should the plant be restarted. To maintain NRC management and staff informed of oversight activities at the FCS, the IMC 0350 Panel issued "weekly updates" on a routine basis. These updates will be provided in a binder available for your review.

In accordance with IMC 0350 guidelines, the NRC staff has coordinated with the Federal Emergency Management Agency to ensure that there are no outstanding offsite emergency preparedness issues that would impact restart authorization.

The panel has developed a Restart Communication Plan. As part of the Restart Communication Plan, should CAL closure and plant restart occur, the NRC will notify appropriate NRC staff as well as congressional, State and local officials, the media, and other interested parties, following issuance of the restart approval letter to OPPD.

As the licensee neared completion of its IPIP and resolution of the Restart Checklist issues, the Panel polled NRC staff to obtain any concerns that may exist within the staff regarding the readiness of FCS to restart and operate safely. All concerns that were received were reviewed by the IMC 0350 Panel to determine if they involved issues that needed to be addressed prior to restart. The Panel's decision on these concerns is documented and will be placed in a binder available for your review.

### Recommendation

The FCS Oversight Panel has determined that OPPD's performance improvement initiatives have been sufficiently effective to support closure of the issues contained in the Restart Checklist. The Panel has concluded that the facility and the licensee's staff performance is adequate to support safe restart and facility operations. Accordingly, the Panel recommends closure of CAL EA-020 supporting restart of the FCS.

The FCS Oversight Panel will continue to provide NRC regulatory oversight until the Panel is satisfied that the licensee has sufficiently demonstrated acceptable operating performance such that enhanced NRC oversight through an Oversight Panel is no longer necessary and NRC inspection and assessment can occur under routine NRC programs. The Panel will continue to monitor licensee activities through resident and region-based inspections, including a period of continuous observation during restart of the plant. In addition, enhanced inspection oversight will be provided utilizing focused inspections of areas the Panel determines warrant additional oversight. Currently, those areas include the quality of engineering activities, the corrective action program implementation, and implementation of regulatory processes such as the reporting of events, operability evaluations of degraded and non-conforming conditions, and process for implementing changes to the facility. Additionally, the Panel will continue to monitor the areas intended to be monitored by performance indicators where those indicators are not currently providing useful insights due to the extended shutdown. In addition, the Panel will continue to conduct periodic public meetings and ensure public awareness of NRC regulatory activities.

Separately, the Panel has determined that effective licensee implementation of its post-restart PSI, including the Key Drivers for Achieving and Sustaining Excellence, is critical to ensuring continued corrective action focus such that the significant, fundamental performance deficiencies that led to the prolonged station shutdown do not recur. Therefore, the Panel recommends issuance of a CAL committing the licensee to implement the key drivers for achieving and sustaining excellence. These key drivers are:

- Organizational effectiveness, safety culture and safety conscious work environment
- Problem identification and resolution
- Performance improvement and learning programs
- Design and licensing basis control and use
- Site operational focus
- Procedures
- Equipment performance
- Programs
- Nuclear oversight
- Transition to the Exelon Nuclear Management Model and integration into the Exelon Nuclear fleet

The Panel has developed a draft Confirmatory Action Letter with the assistance of regional, Office of Enforcement, and Office of the General Counsel staff.

### Conclusion

In summary, the Panel has no safety or regulatory concern with the restart of FCS and recommends that the NRC close CAL EA-13-020 dated February 26, 2013. Separately, the Panel also recommends issuance of a Confirmatory Action Letter committing the licensee to continue implementation of long-term corrective actions to prevent recurrence of significant performance deficiencies at the FCS that resulted in the extended shutdown. The Panel would be glad to discuss any questions you have regarding the basis for these conclusions.

Docket No. 50-285

Enclosure:

1. FCS Restart Checklist
2. FCS Restart Checklist Basis Document Closure

cc w/Enclosure: Electronic Distribution for Fort Calhoun Station

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DOCUMENT NAME:R:/Reactors/FCS/2013/  
 FCS0350PanelRestartRecommendation.doc  
 ADAMS ACCESSION NUMBER: ML13351A476

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				
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MC0350Panel	MC0350Panel	MC0350Panel		
JSebrosky	JKirkland	LWilkins		
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12/16/13	12/16/13	12/16/13		

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

Item Number	Description	Date Closed By Oversight Panel
<b>1</b>		
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
<b>2</b>		
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 the licensee and that the plant and licensee 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 (FCS) 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 also included 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 FCS 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). 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

The NRC verified that the following actions items related to the Yellow Finding implemented by the licensee were adequate. 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>
4.2.1.1	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 had 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 implementation of these corrective actions were either implemented or appropriately scheduled for implementation.

<b>Item</b>	<b>Description</b>	<b>Status</b>
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 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, (ML 112000064). 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:

Item	Actions to be Verified Prior to Restart	Status
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.

Item	Description	Status
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 FCS 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, 05000285/2013405 (ML13115A095) and 05000285/2013407 (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 FCS. 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 Conscious Work Environment were identified as areas for improvement.

The NRC verified the effectiveness of the licensee’s assessment of Nuclear Safety Culture and Safety Conscious 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 Conscious 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, FCS 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:

<b>Item</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
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:

Item	Description	Section
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 FCS 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 the FCS 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 FCS 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 Fire Protection (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 FCS 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

**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 FCS. 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 ML 13266A225
2.b.1.8	Waste Disposal System	Closed IR 2013-014 ML 13266A225
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 ML 13266A225
2.b.1.11	Demineralized and Potable Water Systems	Closed IR 2013-005 ML 13221A584
2.b.1.12	Circulating Water System	Closed IR 2013-005 ML 13221A584
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 ML 13266A225
2.b.1.19	Instrument Air System	Closed IR 2013-014 ML 13266A225
2.b.1.20	Turbine Generator and Support Systems	Closed IR 2013-014 ML 13266A225

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**

FCS 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 FCS 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.

Item	Actions to Be Verified Prior to Restart	Status
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 FCS 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

**Item 2.c Qualification of Containment Electrical Penetrations**

During the course of discovery activities, FCS 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, FCS 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 FCS. 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

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
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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.

Item	Description	Status
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 FCS 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
4.6.1.1	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 was 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:

Item	Actions to Be Verified Prior to Restart	Status
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 (HELB) 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 FCS 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 FCS 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>
4.5.1.1	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
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**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:

Item	Actions to Be Verified Prior to Restart	Status
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:

Item	Actions to Be Verified Prior to Restart	Status
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
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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:

Item	Description	Status
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 FCS. 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:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
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:

<b>Item</b>	<b>Description</b>	<b>Status</b>
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 FCS. 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 FCS 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 FCS 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:

Item	Actions to Be Verified Prior to Restart	Status
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:

Item	Actions to Be Verified Prior to Restart	Status
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 FCS'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:

Item	Description	Status
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
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**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 FCS.

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 FCS 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
4.3.1.1	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 FCS 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 ML13092A286
5.1.2.2	Perform fly over of flood affected sirens to determine status and potential condition of the equipment	Closed IR 2013-002 ML13092A286
5.1.2.3	Based on siren inspection procure replacement siren heads, poles, electronics, and power supplies	Closed IR 2012-004 ML12276A456
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.

Item	Description	Status
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 FCS 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, 05000285/2013405 (ML13115A095) and 05000285/2013407 (ML13213A497).

**Section 6: Licensing Issue Resolution**

This section of the Restart Checklist encompasses the regulatory activities needed to bring FCS 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.

<b>Item</b>	<b>Description</b>	<b>Status</b>
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.

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

## Section 7: Readiness for Restart

FCS 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.

Item	Description	Status
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:

Item	Description	Status
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 FCS 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 and basis for closure of some high-interest items.

<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 concluded that the NRC staff completed the necessary inspection and assessment activities to resolve the issues identified in the FCS Restart Checklist and recommends that the NRC close Confirmatory Action Letter (CAL) EA-13-020, thereby supporting the restart of the FCS.

## 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