



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
REGION IV  
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March 7, 2013

MEMORANDUM TO: Eric Leeds, Director, Office of Nuclear Reactor Regulation  
Elmo Collins, Regional Administrator, Region IV

FROM: Tony Vegel, Chairman, IMC 0350 Panel /*RA Kennedy for*/

SUBJECT: ISSUANCE OF REVISED "U.S. NUCLEAR REGULATORY  
COMMISSION MANUAL CHAPTER 0350 PANEL FORT CALHOUN  
STATION RESTART CHECKLIST BASIS DOCUMENT"

On June 11, 2012, the NRC issued a Confirmatory Action Letter (CAL) documenting the actions that Fort Calhoun Station will take prior to restart to address the issues that resulted in prolonged performance decline. Included in the CAL was the Restart Checklist which listed the specific items that will be reviewed by the NRC.

On November 13, 2012, the enclosed basis document was issued providing details and clarification for the scope and breadth of the Restart Checklist items and the minimum actions that the NRC plans to take to verify that Fort Calhoun Station has adequately addressed the specific items. This is a living document that will be periodically updated to reflect status of inspection activities and when new inspection items are added following MC 0350 Panel review. Changes to this document will be identified by a change bar as seen below in the next paragraph.

On February 26, 2013, a revised CAL was issued that added items to the Restart Checklist following MC 0350 Panel review. As a result, the enclosed basis document is being revised. Specifically, as reported by the licensee in the 2012, 3rd quarter Performance Indicator data, the Safety System Functional Failure performance indicator moved into the White region. This item was added to Section 1 of the Restart Checklist, "Causes of Significant Performance Deficiencies and Assessment of Organizational Effectiveness." Two items involving the qualifications for containment electrical penetrations and the containment internal structure were added to Section 2.c, "Qualification of Containment Electrical Penetrations," and Section 2.d, "Containment Internal Structure," respectively, under the element of "Flood Restoration and Adequacy of Structures, Systems, and Components." Additionally, several items were added that related to events reported to the NRC involving recently identified equipment problems.

If you have any questions, please contact myself or Louise Lund, MC 0350 Co-Chair.

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ADAMS: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		<input checked="" type="checkbox"/> Non Sensitive		<input checked="" type="checkbox"/> Publicly Available JMR	
<input checked="" type="checkbox"/> SUNSI Review		<input type="checkbox"/> Sensitive		<input type="checkbox"/> Non-Publicly Available	
SRI:DRP/F	PM:DORL/LB IV	PM:DORL/LB IV	C:DORL/LB IV	D:DRP/F	
JKirkland	LWilkins	JSebrosky	MMarkley	MHay	
<b>/RA via Email/</b>	<b>/RA via Email/</b>	<b>/RA via Email/</b>	<b>/RA via Email/</b>	<b>/RA/</b>	
3/6/13	3/7/13	3/4/13	3/6/13	3/4/13	
DD:DRS	DD:DORL	D:DRP	D:DNMS		
JClark	LLund	KKennedy	AVegel		
<b>/RA/</b>	<b>/RA via Email/</b>	<b>/RA/</b>	<b>/LLund for/</b>		
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# U.S. Nuclear Regulatory Commission

## Manual Chapter 0350 Panel

### Fort Calhoun Station Restart Checklist

#### Basis Document, Revision 1

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The Restart Checklist is a list of items that require resolution prior to restart. The purpose of the Restart Checklist is to verify the issues that resulted in the prolonged performance decline at Fort Calhoun Station are resolved. The Restart Checklist includes an assessment of each of the key attributes described in NRC Inspection Procedure (IP) 95003, "Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs or One Red Input."

This basis document provides details and clarification of the scope and breadth of the Restart Checklist items and the actions, at a minimum, that the NRC plans to take to verify Fort Calhoun Station adequately addressed the specific items. These actions that the NRC plans to perform were developed to ensure safe operation of the facility following restart. The Restart Checklist includes broad areas for resolution, including the following items that are described in NRC IP 95003:

- involve inspection findings that were determined to be of more than very low safety significance
- address a cited violation of the facility's license, technical specifications, or regulations
- concern a loss of ability to maintain and operate the facility in accordance with the design and licensing basis
- address a licensing action that is necessary to be completed prior to restart
- address a failure of licensee management controls to effectively address previous significant concerns to prevent their recurrence (for example, repetitive examples of inadequate root cause evaluations and corrective actions that affect risk-significant equipment and plant operation or both)

The outcomes of the Restart Checklist will provide the NRC a thorough assessment of the causes of the performance decline at Fort Calhoun Station, provide assurance that planned corrective actions are sufficient to address the root causes and contributing causes and to prevent their recurrence, and to verify that adequate qualitative or quantitative measures for determining the effectiveness of the corrective actions are in place. These assessments will be used by the NRC to independently determine if plant personnel, equipment, and processes are ready to support the safe restart and continued safe operation of Fort Calhoun Station.

This basis document is a living document and will be updated as necessary. Any additional significant performance deficiencies identified may be added to the Restart Checklist. Items not requiring resolution prior to restart will be evaluated during the NRC's review of the post-restart sustained improvement plan.

This Restart Checklist Basis Document describes the areas to be addressed within each Restart Checklist section.

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

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

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

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

Item 1.a is included in the restart checklist for the failure of Fort Calhoun Station to maintain procedures and equipment that protects the plant from the effects of a design basis flood. These deficiencies resulted in a Yellow (substantial safety significance) finding as documented in NRC Inspection Report 05000285/2010007, (ML102800342). With respect to this finding the NRC will verify that the licensee adequately identifies the root and contributing causes of the risk significant issue; verify that the extent of condition and extent of causes of the risk significant issue are identified, and verify that the corrective actions adequately address the causes to preclude repetition. The following licensee actions will be reviewed by the NRC:

<b>Item</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
1.a.1	Flooding Yellow Finding root and contributing cause evaluation	
1.a.2	Flooding Yellow Finding extent of condition and cause evaluation	
1.a.3	Flooding Yellow Finding corrective actions addressing root and contributing causes	

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

<b>Action Item Number</b>	<b>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	
4.2.1.2	Issue SO-G-124, Flood Barrier Impairment program	
4.2.1.3	Document external flood barrier impairments as applicable in accordance with SO-G-124	
4.2.1.6	Identify flood barriers which will not have adequate qualification basis before leaving Cold Shutdown.	

The following NRC open items are specifically related to the Yellow finding and therefore need to be evaluated prior to restart of the facility. For these specific items the NRC will verify that the licensee has 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 will verify that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent of condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

<b>Item</b>	<b>Description</b>	<b>Status</b>
LER 2012-001	Inadequate Flooding Protection Procedure	
LER 2012-019	Traveling Screen Sluice Gates Found with Dual Indication	
LER 2011-003	Inadequate Flooding Protection Due to Ineffective Oversight	
LER 2011-001	Inadequate Flooding Protection Due to Ineffective Oversight	
VIO 2012002-01	Inadequate Procedures to Mitigate a Design Basis Flood Event	
VIO 2012002-02	Failure to Classify Intake Structure Sluice Gates as Safety Class III	
VIO 2012002-03	Failure to Meet Design Basis Requirements for Design Basis Flood Event	
VIO 2010007-01	Failure to Maintain External Flood Procedures	

Although not a specific plant restart action, the NRC will review the following long term actions planned to be implemented by the licensee.

<b>Action Item Number</b>	<b>Description</b>	<b>Status</b>
4.4.3.1	Gather flood response lessons learned through CR reviews to determine if procedure or strategy changes should be implemented	
4.4.3.2	Review flood design basis and determine if the 2011 flood event provides additional information that should drive design basis changes	
4.4.3.3	Implement procedure and strategy changes as indicated by the lessons learned review conducted	

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

Item 1.b is included in the restart checklist for the failure of Fort Calhoun Station to correct a degraded contactor, which subsequently failed, in the reactor protection system (RPS). This deficiency resulted in a White (low to moderate safety significance) finding as documented in NRC Inspection Report 05000285/2011007, (ML 112000064). With respect to this finding the NRC will verify that the licensee adequately identifies the root and contributing causes of the risk significant issue; verify that the extent of condition and extent of causes of the risk

significant issue are identified, and verify that the corrective actions adequately address the causes to preclude repetition. The following licensee actions will be reviewed by the NRC:

Item	Actions to be Verified Prior to Restart	Status
1.b.1	RPS White Finding root and contributing cause evaluation	
1.b.2	RPS White Finding extent of condition and cause evaluation	
1.b.3	RPS White Finding corrective actions addressing root and contributing causes	

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

Item	Description	Status
VIO 2011007-01	Failure to Correct a Degraded Contactor in the Reactor Protective System	

### 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 will verify that the licensee adequately identifies the root and contributing causes of the risk significant issue; verify that the extent of condition and extent of causes of the risk significant issue are identified, and verify that the corrective actions adequately address the causes to preclude repetition. The following licensee actions will be reviewed by the NRC:

Item	Actions to be Verified Prior to Restart	Status
1.c.1	Electrical Fire Red Finding root and contributing cause evaluation	
1.c.2	Electrical Fire Red Finding extent of condition and cause evaluation	
1.c.3	Electrical Fire Red Finding corrective actions addressing root and contributing causes	

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

Action Item Number	Description	Status
1.3.1.1	Rebuild the 1B4A load center	
1.3.1.2	Provide documentation for the dedication of the rebuilt load center in accordance with Contract 163495	
1.3.1.3	Complete Engineering Change 53257 and obtain PRC approval	

	to authorize the use of the rebuilt load center, 1B4A	
1.3.1.4	Test all cables that terminate in 1B4A load center	
1.3.1.5	Repair or replace defective cables terminating in 1B4A load center	
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	
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	
1.3.1.8	Repair or replace the cables located in the cable tray above load center 1B4A that have had jacket damage	
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	
1.3.1.10	Calibration of the internal relays and protection equipment for Bus1B4A	
1.3.1.11	Install new 4160 to 480 volt transformer T1B4A	
1.3.1.12	Calibrate new Square D circuit breakers	
1.3.1.14	Clean equipment in the switchgear room that has been coated with by-products from the fire	
1.3.1.15	Provide any required Engineering Change for the non-segregated bus between 1B4A and 1B3A-4A	
1.3.1.16	Repair 1B4A to 1B3A-4A non-segregated bus section	
1.3.1.17	Perform testing of all circuits associated with 1B4A load center	
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)	
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.	
1.3.1.21	Declare bus 1B4A Operable	
1.3.1.22	Temporary Modification restoration	
1.3.1.23	Extent of Condition repair requirements. Provide repair requirements for extent of condition.	
1.3.1.24	Implement the requirements supplied by System Engineering regarding the extent of condition.	

The following NRC open items are specifically related to the Red finding and therefore need to be evaluated prior to restart of the facility. For these specific items the NRC will verify that the licensee has 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 will verify that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent of condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation.

<b>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	
VIO 2012007-01	Failure to Provide Adequate Post-Fire Safe Shutdown Actions in the Switchgear Rooms	
VIO 2012007-02	Failure to Maintain Command and Control Function During Fire Fighting Activities in the Protected Area	
VIO 2012004-04	Failure to Ensure Breaker Coordination of 480 VAC Electrical Power Distribution System Was Maintained	
URI 2011014-02	Failure to Perform Adequate 10 CFR 50.59 Review	
URI 2011014-03	Cause of Breaker 1B3A Trip Not Understood	Closed IR 2012004-04 ML12276A456
LER 2011-010	Fire Causes a Circuit Breaker to Open Outside Design Assumptions	

#### **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 will verify that the licensee adequately identifies the root and contributing causes of the risk significant issues; verify that the extent of condition and extent of causes of the risk significant issues are identified, and verify 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.

#### **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 will assess and inspect the results of the safety culture assessment performed by an organization independent of Fort Calhoun Station. The scope of the inspection related to safety



culture will be based on the results of the validation of the licensee’s third party safety culture assessment and root cause evaluation. The outcome of this item is an NRC graded safety culture assessment. With respect to the licensee’s third party safety culture assessment the NRC will assess the following items:

<b>Item</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
1.e.1	Verification of comprehensiveness of licensee third party safety culture assessment	
1.e.2	Methods used by the third-party assessment team to collect and analyze the data were adequate and appropriate	
1.e.3	Verification that licensee’s assessment team members were independent and qualified	
1.e.4	Licensee’s activities to communicate results of the assessment to various levels of management and staff	
1.e.5	Licensee’s corrective actions to the assessment results	

If substantial weaknesses are identified with the licensee’s third-party safety culture assessment or the NRC has low confidence in the validity of the licensee’s results, the NRC will conduct an independent safety culture assessment in order to gain accurate insights on the contribution of weaknesses in safety culture components to licensee performance.

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies (FPD’s) that resulted in the overall performance decline at the station. Nuclear Safety Culture and Safety Conscience Work Environment were identified as areas for improvement. With respect to these Fundamental Performance Deficiencies the NRC will assess the following:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
1.e.6	Licensee Assessment of the Fundamental Performance Deficiency associated with Nuclear Safety Culture	
1.e.7	Adequacy of extent of condition and extent of causes	
1.e.8	Adequacy of corrective actions	
1.e.9	Licensee Assessment of the Fundamental Performance Deficiency associated with Safety Conscience Work Environment	
1.e.10	Adequacy of extent of condition and extent of causes	
1.e.11	Adequacy of corrective actions	

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

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

At the completion of the assessments performed under Restart Checklist Items 1.a through 1.e, Fort Calhoun Station will integrate the outcomes of each of those assessments to determine what aspects of its organization and human performance need additional focus and

improvement. The integration of the root cause and safety culture assessments under Item 1.f will identify 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 will perform this assessment using qualified individuals with independent oversight.

The NRC will review the licensee’s assessments of organizational effectiveness and any connections to safety culture insights (from Item 1.e). The NRC will ensure that proper corrective actions are established and incorporated to resolve organizational effectiveness issues that adversely affected station performance.

With respect to this item the NRC will review the following:

<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	
1.f.2	Methods used by assessment team to collect and analyze the data were adequate and appropriate	
1.f.3	Verification that licensee’s assessment team members were independent and qualified	
1.f.4	Licensee’s activities to communicate results of the assessment to various levels of management and staff	
1.f.5	Licensee’s corrective actions to the assessment results	

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 will review the adequacy of licensee actions regarding this FPD.

<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	
1.f.7	Adequacy of extent of condition and extent of causes	
1.f.8	Adequacy of corrective actions	

**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 will verify that the licensee adequately identifies the root and contributing causes; verify that the extent of condition and extent of causes are identified, and verify that the corrective actions adequately address the causes.

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

<b>Item</b>	<b>Description</b>	<b>Section</b>
LER 2012-017	Containment Valve Actuators Design Temperature Ratings Below those Required for Design Basis Accidents	3.b.2
LER 2012-015	Electrical Equipment Impacted by High Energy Line Break Outside Containment	3.b.2
LER 2012-014	Containment Beam 22 Loading Conditions Outside of the Allowable Limits	2.d
LER 2012-011	Emergency Diesel Inoperability Due to Bus Loads During a LOOP	3.a
LER 2012-009	Inoperable Equipment Due to Lack of Environmental Qualifications	3.b.2
LER 2012-005	Technical Specification Violation Due to Inadequate Testing of Emergency Diesel Fuel Pumps	5.d
LER 2012-004	Inadequate Analysis of Drift Affects Safety Related Equipment	3.a
LER 2012-001	Inadequate Flooding Protection Procedure	1.a
LER 2011-010	Fire Causes a Circuit Breaker to Open Outside Design Assumptions	1.c

## Section 2: Flood Restoration and Adequacy of Structures, Systems, and Components

Section 2 of the Restart Checklist contains those items necessary to ensure that important structures, systems and components affected by the flood and safety significant structures, systems and components at Fort Calhoun Station are in appropriate condition to support safe restart and continued safe plant operation.

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

Item 2.a is the NRC's independent evaluation of Fort Calhoun Station's Flood Recovery Plan. An overall flood recovery plan is important to ensure the station takes a comprehensive approach to restoring the facility structures, systems, and components to pre-flood conditions.

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

Action Item Number	Actions to be Verified Prior to Restart	Status
1.2.1.1	Determine if equipment in the intake structure and cells has been damaged	
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 IR2012-012 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	Closed IR 2012-003

	Structure.	ML12226A630
2.1.1.6	Restore the exterior fire hose houses impacted by flooding to functional condition	Closed IR2012-012 ML 13045B055
2.1.1.7	Verify proper functioning of flood affected fire hose houses	Closed IR2012-012 ML 13045B055
2.1.1.8	Complete FP System PMs and STs on flood impacted equipment which was not accessible for inspection and testing	
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.	
2.3.1.5	Perform visual and boroscope inspection of wetted motor internals (to included termination box) looking for slit, 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	
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.	
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	
3.2.1.1	Test Maintenance Rule Medium Voltage Power Cables subjected to wetting/ submergence	
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	
3.2.2.2	Inspect manholes and vaults for damage and integrity of water seals at penetrations	
3.2.2.3	Contingency cable replacement (if identified defective cable during testing)	
3.2.2.4	Testing of contingency cables installed after replacement (if needed)	
3.3.1.2	Assess results of ground penetrating radar (GPR)	
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	
4.2.1.5	Initiate actions to remove flood mitigation devices which have been determined to not be permanent fixtures	
4.2.2.1	Identify degraded flood barriers	
4.2.2.2	Repair flood barriers as required	
4.2.2.4	Prepare SO-G-124 documentation for all flood barriers which do not have adequate qualification	
4.2.2.5	Review restoration plans for each impaired flood barrier per SO-G-124 form FC-1411	
4.2.2.6	Review impaired flood barriers as identified in accordance with SO-G-124 form FC-1411	
4.2.2.7	Removal of all flood mitigation devices which have been determined to not be permanent fixtures	
4.3.2.1	Completion of all ECs/restoration required for plant start-up	

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

Action Item Number	Actions to be Verified Prior to Restart	Status
2.2.1.1	Assess the effects of the flood on the Auxiliary Cooling System (ACS) and identify actions to restore the system.	
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.	
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.	
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.	
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 IR2012-012 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 IR2012-012 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 IR2012-012 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 IR2012-012 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 IR2012-012 ML 13045B055
2.2.1.22	Assess the effects of the flood on the Structures System (STR) and identify actions to restore the system.	
2.2.1.23	Assess the effects of the flood on the Turbine Generator System (TGS) and identify actions to restore the system.	Closed IR2012-012 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 IR2012-012 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 IR2012-012 ML 13045B055
2.2.1.26	Assess the effects of the flood on the Waste Disposal System (WDS) and identify actions to restore the system.	Closed IR2012-012 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 IR2012-012 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.	
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.	
2.2.1.30	Assess the effects of the flood on the Meteorological Monitoring System (MMS) and identify actions to restore the system.	Closed IR2012-012 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.	
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

Although not a specific plant restart action, the NRC will review the following long term actions planned to be implemented by the licensee.

Action Item Number	Actions to Be Reviewed	Status
1.2.3.21	Inspect tank and equipment on DI tank for damage	
1.2.3.58	Repair, replace and test B.5.b equipment as necessary	Closed IR2012-012 ML 13045B055
1.2.3.82	Perform ISFSI route load test	

## **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 will evaluate the effects of the extended shutdown, and verify 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 plans to perform system health reviews on safety significant and maintenance rule systems.

The NRC will inspect the system health reviews conducted by Fort Calhoun Station. These include 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.)

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
2.b.1.1	Auxiliary Cooling System	
2.b.1.2	Auxiliary Feedwater System	
2.b.1.3	Spent Fuel Pool System	
2.b.1.4	Sampling System	
2.b.1.5	Chemical and Volume Control System	
2.b.1.6	Emergency Core Cooling System	
2.b.1.7	Hoisting Equipment System	
2.b.1.8	Waste Disposal System	
2.b.1.9	Control Rod Drive System	
2.b.1.10	Reactor Coolant System	
2.b.1.11	Demineralized and Potable Water Systems	
2.b.1.12	Circulating Water System	
2.b.1.13	Emergency Diesel Generator	
2.b.1.14	Ventilation, Heating and Air Conditioning System	
2.b.1.15	Main Feedwater System	
2.b.1.16	Structures	
2.b.1.17	Steam Generator System	
2.b.1.18	Steam Generator Blowdown Turbine Plant Cooling	
2.b.1.19	Instrument Air System	
2.b.1.20	Turbine Generator and Support Systems	
2.b.1.21	Auxiliary Instrumentation System	
2.b.1.22	Electrical Distribution System	
2.b.1.23	Engineered Safeguards System	
2.b.1.24	Radiation Monitoring System	
2.b.1.25	Fuel Handling System	
2.b.1.26	Reactor Protective System	
2.b.1.27	Fire Protection System	

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

Fort Calhoun Station will perform 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 is structured consistent with NRC Inspection Procedure 95003 (Sections 02.03 and 03.03), and is accomplished by review in the six key attributes.

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 will perform the Reactor Safety Strategic Performance Area reviews.

Systems selected are:

- AC and DC Electrical Distribution Systems. These systems include the 4160V breakers, 480V breakers, batteries, and battery chargers. Electrical distribution systems at Fort Calhoun Station provide necessary power for Mitigating Systems. The AC and DC systems provide power to key pumps, motors, valves, and instruments required to monitor and respond to plant conditions. From the plant’s probabilistic assessment, the AC and DC electrical systems account for a substantial portion of plant risk. The electrical distribution system was selected for self assessment by the licensee based on both identified issues and their importance to safety.
- High Pressure Injection System. This system is important to provide mitigation for postulated accident conditions in the reactor plant. This review will assess and validate key aspects of the suction and discharge pathways, system alignments, power sources, and emergency actuation.
- The Emergency Diesel Generator System (EDGs) furnish 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 will assess the adequacy for each of the licensee’s detailed reviews and select samples for independent verification 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	
2.b.2.2	Detailed review of High Pressure Safety Injection System	
2.b.2.3	Detailed review of Emergency Diesel Generating System	
2.b.2.4	Detailed review of Reactor Protection System	

**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 will perform 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 SSCs.

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

Action Item Number	Actions to be Verified Prior to Restart	Status
1.2.1.3	Repair any structural damage identified in the intake structure	
2.1.1.1	Ensure underground FP piping is intact and no unacceptable voids are present near FP piping	
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	
3.3.1.1	Inspect underground Raw Water, EDG Fuel Oil and Fire Protection piping and tanks using GPR (Ground Penetrating Radar)	
3.3.1.3	Resolve any deficiencies affecting operability or functionality (if needed)	
4.1.1.12	Review structure design features to assess potential for damage due to flooding	
4.1.1.14	Assess post-inundation condition of structures	
4.1.1.15	Prepare remediation alternatives (if appropriate)	
4.1.1.16	Create report of findings	
4.1.1.17	Review findings and recommendations with FCS and document results	
4.1.1.20	Inspect Non-Class 1 Priority 1 Structures	
4.1.1.21	Assess post-inundation condition of structures	
4.1.1.22	Prepare remediation alternatives (if appropriate)	
4.1.1.23	Create report of findings	
4.1.1.24	Review findings and recommendations with FCS and document results	
4.1.1.25	Post-Flood River Channel Evaluation	
4.1.1.30	Verify no geotechnical or structural impact to Turbine Building and Auxiliary Building/Containment as a result of the 2011 flood	
4.1.1.32	Remediation of the Turbine Building and Class 1 structure void	
4.1.2.2	Verify no geotechnical or structural impact to site structures	
4.1.3.10	Remediation of the loose soils area under the Turbine Building and Class 1 structures if required	

Although not a specific plant restart action, the NRC will review the following long term actions planned to be implemented by the licensee.

Action Item Number	Actions to be Reviewed	Status
1.2.3.57	Repair ISFSI as necessary (structural)	

1.2.3.79	Repair the ISFSI haul route as necessary	
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**Item 2.c      Qualification of Containment Electrical Penetrations**

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

With respect to this issue, the NRC will verify that the licensee adequately identifies the root and contributing causes of the issue; verify that the extent of condition and extent of causes of the issue are identified, and verify that the corrective actions adequately address the problem. The following licensee actions will be reviewed by the NRC:

Item	Actions to be Verified Prior to Restart	Status
2.c.1	Containment electrical penetrations root and contributing cause evaluation	
2.c.2	Containment electrical penetrations extent of condition and cause evaluation	
2.c.3	Containment electrical penetrations corrective actions	
LER 2012-002	Inadequate Qualifications for Containment Penetrations Renders Containment Inoperable	

**Item 2.d      Containment Internal Structure**

During the course of discovery activities, Fort Calhoun Station staff identified that certain containment internal structural members do not fully meet design specifications described in the licensing basis. The structural design of the containment internal structures is being 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 will verify that the licensee adequately identifies the root and contributing causes of the issue; verify that the extent of condition and extent of causes of the issue are identified, and verify that the corrective actions adequately address the problem. The following licensee actions will be reviewed by the NRC:

Item	Actions to be Verified Prior to Restart	Status
2.d.1	Containment internal structure root and contributing cause evaluation	
2.d.2	Containment internal structure extent of condition and cause evaluation	
2.d.3	Containment internal structure corrective actions	
LER 2012-014	Containment Beam 22 Loading Conditions Outside of the Allowable Limits	

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

Section 3 of the Restart Checklist addresses major programs and processes in place at Fort Calhoun Station. Section 3 reviews will 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 will assess the licensee’s evaluations and associated improvement actions related to the Corrective Action Program. The NRC will also conduct independent inspections to validate whether the Corrective Action Program is appropriately functioning. Additionally, the NRC will verify that the licensee has established appropriate effectiveness measures to monitor the effectiveness of program improvements.

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.a.1	Licensee Assessment of Corrective Action Program	
3.a.2	Adequacy of extent of condition and extent of causes	
3.a.3	Adequacy of corrective actions	
3.a.4	Adequacy of effectiveness measures to monitor program improvements	

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. With respect to this FPD, the NRC will assess the following:

<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	
3.a.6	Adequacy of extent of condition and extent of causes	
3.a.7	Adequacy of corrective actions	

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. To assess the licensee’s actions in regards to these deficiencies the NRC will review the following:

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.a.8	Licensee Assessment of Operating Experience Program	
3.a.9	Adequacy of extent of condition and extent of causes	
3.a.10	Adequacy of corrective actions	

3.a.11	Adequacy of effectiveness measures to monitor program improvements	
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Specific independent inspections will include assessing the Corrective Actions Program effectiveness in resolving the following previously identified non-cited violations of NRC requirements. The NRC will verify that adequate corrective actions were identified associated with the licensee's casual analysis and extent of condition evaluations and that implementation of corrective actions are either implemented or appropriately scheduled for implementation.

Item	Description	Status
NCV 2012004-01	Failure to report an event to the NRC within 60 days for an operation prohibited by Technical Specifications	
VIO 2011006-02	Inadequate Corrective Actions to Ensure Reliability of Raw Water Pump Power	
NCV 2011006-06	Failure to Implement an Adequate Trending Program	
NCV 2011004-01	Failure to Incorporate Design Information into Procedures	
NCV 2011002-02	Failure to Determine the Cause of the Out Of Tolerance Condition Regarding Reactor Protection System Channel A Trip Unit 6	
NCV 2011002-03	Failure to Submit a Timely Licensee Event Report	
NCV 2011002-04	Failure to Verify Design Adequacy of Refueling Water Tank Vortex Eliminator	
NCV 2010002-01	Inadequate Reportability Guidance	
NCV 2010003-01	Failure to Provide Adequate Limiting Condition for Operation for High River Level	
NCV 2010003-05	Failure to Submit a Required Licensee Event Report	
NCV 2010004-02	Failure to Submit a Required Licensee Event Report	
NCV 2010004-04	Failure to Translate Calculation into Calibration Procedure	

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

Item	Description	Status
LER 2012-011	Emergency Diesel Inoperability Due to Bus Loads During a LOOP	
LER 2012-010	Seismic Qualification of Instrument Racks	
LER 2012-007	Failure of Pressurizer Heater Sheath	Closed IR 2012-011 ML12366A158
LER 2012-006	Operation of Component Cooling Pumps Outside Manufacturers Recommendation	
LER 2012-004	Inadequate Analysis of Drift Affects Safety Related Equipment	Closed IR 2012-011 ML12366A158
LER 2012-003	Non-Conservative Error in Calculation for Alternate Hot Leg Injection Results in Hot Leg Injection Results in Unanalyzed Condition	Closed IR 2012-011 ML12366A158

Because the overall health of a licensee’s corrective action program is key to sustaining operational safety the NRC will not only be performing routine inspections of this program, but will also perform a Team inspection following the guidance in NRC Inspection Procedure 71152, “Problem Identification and Resolution.” This inspection will focus on ensuring that the corrective action program is 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 will follow up on the resolution of specific equipment issues that are known to exist.

<b>Item</b>	<b>Description</b>	<b>Status</b>
3.a.12	Perform NRC Team Problem Identification and Resolution inspection	
3.a.13	Raw Water Pump C high vibrations	
3.a.14	Reactor cavity leakage	
3.a.15	Effects on equipment impacted by reactor cavity leakage	

**Item 3.b Equipment Design Qualifications**

This item of the Restart Checklist verifies that plant components are 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 will verify that the following actions being implemented by the licensee adequately address equipment design concerns. These items are listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, and consist of the following:

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
4.6.1.1	Address concerns identified with the Reactor Coolant Pump oil collection system	
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)	
4.6.1.3	Provide analysis of Steam Generator accident ring (CR 2011-6825)	

The following NRC items are specifically related to maintaining systems, structures, and components within their licensing and design basis. For these specific items the NRC will verify that the licensee has performed adequate casual analysis and extent of condition evaluations related to the issues. The NRC will verify that adequate corrective actions were identified associated with the licensee’s casual analysis and extent of condition evaluations and that



implementation of corrective actions are either implemented or appropriately scheduled for implementation. These assessments will provide the NRC insights regarding the licensee's ability to effectively resolve equipment design qualification problems.

<b>Item</b>	<b>Description</b>	<b>Status</b>
LER 2012-020	Raw Water Pump Anchors	
LER 2012-016	Unanalyzed Charging System Socket Welds to the Reactor Coolant System	
LER 2012-013	Inadequate Calculation of Uncertainty Results in a Technical Specification Violation	
NCV 2011003	Failure to Adequately Design a Reactant Coolant Pump Lube Oil Collection System	
EN 48730	Unanalyzed Condition Due to Possible Run-Out of High Pressure Safety Injection Pump	
EN 48781	Inverters Potentially Inoperable During Emergency Diesel Generator Operation	
EN 48787	Relay Backing Plate Fasteners Discovered to be at Less than Specified Torque	
EN 48806	Low Pressure Safety Injection and Containment Spray Pumps Mechanical Seals	

### **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 will perform reviews to identify conditions where a non-safety-related component or subcomponent were improperly used in a safety-related application.

The NRC will assess the licensee's equipment design quality classifications review for inconsistent quality classifications. Additionally, the NRC will assess 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.

<b>Item</b>	<b>Actions to Be Verified Prior to Restart</b>	<b>Status</b>
3.b.1.1	Licensee Assessment of equipment design quality classifications	
3.b.1.2	Adequacy of extent of condition and extent of causes	
3.b.1.3	Adequacy of corrective actions	

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

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

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

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

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
3.b.2.1	Licensee assessment of high energy line break program and equipment qualifications	
3.b.2.2	Adequacy of extent of condition and extent of causes	
3.b.2.3	Adequacy of corrective actions	
4.5.1.8	Complete EEQ Harsh Environment analysis for Room 13 crack in Steam Generator Blowdown system	
4.5.1.9	Develop plan to address Room 13 EEQ harsh environment qualification of electrical equipment	
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	
4.5.1.11	Resolve Room 13 EEQ harsh environment qualification of equipment which must be addressed prior to leaving cold shutdown	
4.5.1.12	Perform analysis to address HCV-1385/1386 Main Steam Line Break/Feedwater isolation concern (CR 2011-6757)	
4.5.1.13	Implement resolution of HCV-1385/1386 Main Steam Line Break/Feedwater isolation concern	
4.5.1.14	Perform HELB analysis of Auxiliary Steam piping in the auxiliary building	
4.5.1.15	Implement resolution of Auxiliary Steam piping in the auxiliary building	

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

<b>Item</b>	<b>Description</b>	<b>Status</b>
LER 2012-017	Containment Valve Actuators Design Temperature Ratings Below those Required for Design Basis Accidents	
LER 2012-015	Electrical Equipment Impacted by High Energy Line Break Outside Containment	
LER 2012-009	Inoperable Equipment Due to Lack of Environmental Qualifications	

### **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 will inspect to provide assurance that changes have been appropriately implemented.

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

<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	
4.5.1.2	Final SMART Review of EC 53202; FW-10 Steam Line HELB Modification	
4.5.1.3	Plant Review Committee review of EC 53202; FW-10 Steam Line HELB Modification	
4.5.1.4	Develop Construction Work Orders for EC 53202; FW-10 Steam Line HELB Modification	
4.5.1.5	Complete installation of EC 53202; FW-10 Steam Line HELB Modification	
4.5.1.6	Prepare EC 52662; Add a new Pipe Support on the SGBD vertical line above FW-1020	
4.5.1.7	Install EC 52662; Add a new Pipe Support on the SGBD vertical line above FW-1020	

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

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

The NRC will evaluate the adequacy of the licensee's assessment of the vendor modification control processes, the thoroughness of their extent of condition and causal analysis, and adequacy of corrective actions being implemented to address the deficiencies.

Item	Actions to Be Verified Prior to Restart	Status
3.c.1.1	Licensee assessment of vendor modification control processes	
3.c.1.2	Adequacy of extent of condition and extent of causes	
3.c.1.3	Adequacy of corrective actions	

### 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 will be reviewed to determine if modifications required a 10 CFR 50.59 review. The licensee also determined that the 50.59 Program is not being effectively implemented consistently and is performing a root cause analysis. The NRC will evaluate 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.

Item	Actions to Be Verified Prior to Restart	Status
3.c.2.1	Licensee Assessment of the 50.59 process	
3.c.2.2	Adequacy of extent of condition and extent of causes	
3.c.2.3	Adequacy of corrective actions	

The following NRC items are specifically related to 10 CFR 50.59 concerns. For these specific items the NRC will verify that the licensee has performed adequate root cause and extent of condition evaluations related to the event. In addition, the NRC will verify 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
URI 2011014-02	Failure to Perform Adequate 10 CFR 50.59 Review	
NCV 2010004-05	Failure to Perform a 10 CFR 50.59 Evaluation	

### **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 are not focused on critical components; long term strategies have not been developed for age related degradation; the maintenance rule function to monitor the performance of plant equipment has not been effectively implemented. With respect to this FPD, the NRC will assess the following:

<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	
3.d.2	Adequacy of extent of condition and extent of causes	
3.d.3	Adequacy of corrective actions	

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

NRC inspections and licensee evaluations identified that vendor manuals and information have not been adequately maintained, which resulted in adverse conditions at Fort Calhoun Station. The licensee will perform 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 will be evaluated to determine what impact, if any, the new information has on scheduled work, work completed since the last vendor manual update was made, and changes to plant documentation.

The NRC will evaluate 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.

<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	
3.d.1.2	Adequacy of extent of condition and extent of causes	

3.d.1.3	Adequacy of corrective actions	
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The following NRC item is specifically related to vendor manual and vendor information control concerns. For this specific item the NRC will verify that the licensee has performed adequate casual analysis and extent of condition evaluations related to the issue. In addition, the NRC will verify 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.

Item	Description	Status
NCV 2011006-05	Failure to Establish Adequate Measures to Maintain Vendor Manual Design Control Information	

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

NRC inspections determined that the licensee opted to keep some plant equipment in service beyond the vendor recommended service life or standard industry guidelines. Operating equipment past the recommended replacement timeline has resulted in age-related failures at Fort Calhoun Station. In response, the licensee will perform 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 will inspect and assess the adequacy of this evaluation and the associated corrective actions.

Item	Actions to Be Verified Prior to Restart	Status
3.d.2.1	Licensee Assessment of equipment service life program	
3.d.2.2	Adequacy of extent of condition and extent of causes	
3.d.2.3	Adequacy of corrective actions	

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

Action Item Number	Actions to be Verified Prior to Restart	Status
3.4.1.1	Replace Non-RPS CQE (reactor protection system critical quality equipment) power supplies that will be beyond their recommended service life	
3.4.2.1	Establish High Impact Team with a Charter	
3.4.2.2	Identify all CQE power supplies; priority will be on RPS CQE power supplies and then non-RPS CQE power supplies	
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	

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	
3.4.2.5	Conduct an analysis of the current FCS ER Strategy for power supplies; contact vendors, review industry documentation, benchmark other plants	
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	
3.4.2.7	Conduct a failure modes and effects analysis on each power supply to ensure the impact of failures is understood	
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	
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	
3.4.2.10	Replace RPS CQE power supplies beyond their service life	
3.4.2.11	Replace Non-RPS CQE power supplies that will be beyond their recommended service life	

The following NRC open item is specifically related equipment service life concerns and therefore will be reviewed by the NRC prior to restart of the facility. For this specific item the NRC will verify that the licensee has performed adequate casual analysis and extent of condition evaluations related to the failures. In addition, the NRC will verify 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.

Item	Description	Status
NCV 2011003-04	Failure to Provide Procedural Guidance to Replace or Evaluate Age Degraded Components	

Although not a specific plant restart action, the NRC will review the following long term actions planned to be implemented by the licensee.

Action Item Number	Description	Status
3.4.3.1	Complete the development of the ER strategy for CQE power supplies. This action will include all tasks to be performed and basis for those tasks and PM (Preventative Maintenance) Change Requests for any PM change	
3.4.3.2	Implement PM (Preventative Maintenance) Change Requests by changing PMs in Asset Suite. Validate PM changes in Asset Suit to be correct	
3.4.3.3	Schedule new and revised PM's	

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

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

The NRC will evaluate the effectiveness of the licensee’s assessment of the Operability Determination Process, extent of condition and extent of causal analysis, and adequacy of associated corrective actions.

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	
3.e.2	Adequacy of extent of condition and extent of causes	
3.e.3	Adequacy of corrective actions	



**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 will review the adequacy of the licensee’s assessment, extent of condition and causes, and corrective actions being implemented to improve performance of the Nuclear Oversight function. This will include a review of the Quality Assurance processes and a review of sampled assessments or audits performed by the Quality Assurance department. In addition, the NRC will assess the effectiveness of the oversight provided by the Safety Audit and Review Committee.

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

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

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

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

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

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

## 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 will review 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 will independently assess the extent of risk significant design issues. The review will cover 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. Focus will be on modifications rather than original system design. Information from this inspection will be used to assess the licensee’s ability to maintain and operate the facility in accordance with the design basis. The NRC review includes 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

Item	Description	Status
5.a.1	Perform NRC design engineering team inspection of the Auxiliary Feedwater System	

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 will evaluate the thoroughness of the licensee’s “Engineering Design/Configuration Control” assessment, adequacy of extent of condition and extent of causal analysis, and adequacy of associated corrective actions.

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

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 will verify that the licensee has performed adequate casual analysis and extent of condition evaluations related to the failures. In addition, the NRC will verify 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.

<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	
NCV 2010006-02	Failure to Verify that the Turbine-driven Auxiliary Feedwater Pump Exhaust Backpressure Trip Lever was Fully Latched	
NCV 2010006-03	Failure to Vent Control Oil Following Maintenance Results in Failure of the Turbine-driven Auxiliary Feedwater Pump to Start	
NCV 2010006-04	Turbine-driven Auxiliary Feedwater Pump Trip Due to Inadequate Design Margin	

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

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

The site performed an integrated assessment and identified fifteen Fundamental Performance Deficiencies that resulted in the overall performance decline at the station. One of the deficiencies identified was "Human Performance." Examples in this area included the station lacks an integrated approach to solving human performance issues; station leaders do not reinforce use of the tools that reduce human performance errors, human performance improvement tools are not consistently utilized; and weaknesses in the site observation program are contributing to ongoing human performance problems.

The NRC will evaluate the thoroughness of the licensee's Human Performance assessment, adequacy of extent of condition and extent of causal analysis, and adequacy of associated corrective actions.

<b>Item</b>	<b>Description</b>	<b>Status</b>
5.b.1	Licensee Assessment of the Fundamental Performance Deficiency of Human Performance	
5.b.2	Adequacy of extent of condition and extent of causes	
5.b.3	Adequacy of corrective actions	

**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 will evaluate the thoroughness of the licensee's Procedure Quality/Procedure Management evaluation, adequacy of extent of condition and extent of causal analysis, and adequacy of associated corrective actions.

<b>Item</b>	<b>Description</b>	<b>Status</b>
5.c.1	Licensee Assessment of the Fundamental Performance Deficiency of Procedure Quality/Procedure Management	
5.c.2	Adequacy of extent of condition and extent of causes	
5.c.3	Adequacy of corrective actions	

The following NRC items are specifically related to procedural quality concerns and therefore will be evaluated by the NRC to assess the effectiveness of the licensees' ability to resolve procedural issues. For these specific items the NRC will verify that the licensee has performed adequate casual analysis and extent of condition evaluations related to the deficient procedural guidance. In addition, the NRC will verify 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.

<b>Item</b>	<b>Description</b>	<b>Status</b>
NCV 2012301-01	Seven Examples of Inadequate Procedures for the Mitigating Systems Cornerstone	
NCV 2012301-04	Five Examples of Inadequate Procedures for the Initiating Events Cornerstone	
NCV 2012301-06	Inadequate Procedures with Four Examples for the	

	Barrier Integrity Cornerstone	
NCV 2011002-01	Inadequate Operating Instruction Results in a Loss of Auxiliary Feedwater	
NCV 2010004-10	Inadequate Maintenance Procedure Results in a Plant Shutdown	

#### 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 will:

- Assess the effectiveness of corrective actions for deficiencies involving equipment performance, including equipment designated for increased monitoring via implementation of the Maintenance Rule.
- Assess the operational performance of the auxiliary feedwater system to verify its capability of performing the intended safety functions.
- Review 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.
- Assess 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 will be reviewed by the NRC to assess the effectiveness of the licensee's ability to resolve these issues. For these specific items the NRC will verify that the licensee has performed adequate casual analysis and extent of condition evaluations related to the failures.

In addition, the NRC will verify 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.

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

**Item 5.e Configuration Control**

The NRC will inspect and assess 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:

- Assess the effectiveness of corrective actions for deficiencies involving configuration control.
- Assess licensee actions ensuring systems are ready to support safe plant operation following an extended shutdown
- Perform 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.
- Review licensee actions regarding the identified Fundamental Performance Deficiency involving Engineering Design/Configuration Control

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

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
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 will be reviewed by the NRC to assess the effectiveness of the licensees’ ability to resolve these issues. For these specific items the NRC will verify that the licensee has performed adequate root cause and extent of condition evaluations related to the failures. In addition, the NRC will verify 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
LER 2012-012	Multiple Safety Injection Tanks Rendered Inoperable	
LER 2012-008	Technical Specification Violation for Fuel Movement (VA-66)	

### 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 includes the following inspection requirements:

- Assess the effectiveness of corrective actions for deficiencies involving Emergency Response Organization readiness.
- Verify that adequate staffing is available on shift for emergencies.
- Verify 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 will implement the following NRC Emergency Preparedness Inspection Procedures.

Item	Description	Status
5.f.1	IP 71114.01, "Exercise Evaluation"	Closed IR2012-002 ML 12132A395
5.f.2	IP 71114.02, "Alert and Notification System Testing"	Completed IR2012-012 ML 13045B055
5.f.3	IP 71114.03, "Emergency Preparedness Organization Staffing and Augmentation System"	Completed IR2012-012 ML 13045B055
5.f.4	IP 71114.04, "Emergency Action Level and Emergency Plan Changes"	Closed IR2012-002 ML 12132A395
5.f.5	IP 71114.05, "Maintenance of Emergency Preparedness"	Closed IR2012-002 ML 12132A395
5.f.6	IP 71114.06 "Drill Evaluation"	Closed IR2012-002 ML 12132A395



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

<b>Action Item Number</b>	<b>Actions to be Verified Prior to Restart</b>	<b>Status</b>
5.1.2.1	Procure 10 solar charging kits for nine affected sirens	
5.1.2.2	Perform fly over of flood affected sirens to determine status and potential condition of the equipment	
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	
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 IR2012-012 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	
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 (ERO) 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 will evaluate the thoroughness of the licensee's Emergency Response Organization evaluation, adequacy of extent of condition and extent of causal analysis, and adequacy of associated corrective actions.

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

The following NRC items are specifically related to emergency response concerns and therefore will be reviewed by the NRC to assess the effectiveness of the licensees' ability to resolve these issues. For these specific items the NRC will verify that the licensee has performed adequate root cause and extent of condition evaluations related to the failures. In addition, the NRC will verify 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	
NCV 2010003-03	Failure to Conduct Drills to Maintain Environmental Monitoring Skills	
NCV 2010003-04	Protective Action Recommendation processes allow for the unnecessary evacuation of the public	

### 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 will inspect and assess the plant facilities, equipment, and instrumentation for occupational radiation safety.

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 will inspect and assess the human performance attributes of occupational radiation safety.

The following NRC Inspection Procedures will be implemented:

Item	Description	Status
5.g.1	IP 71124.01, "Radiological Hazard Assessment and Exposure Controls"	Completed IR 2012-011 ML12366A158
5.g.2	IP 71124.02, "Occupational ALARA Planning and Controls"	Completed 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 will inspect and assess the procedures and programs of public radiation safety.

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 will inspect and assess the human performance elements of public radiation safety.

The following NRC Inspection Procedures will be implemented:

Item	Description	Status
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

Although not a specific plant restart action, the NRC will review the following long term action planned to be implemented by the licensee.

Action Item Number	Description	Status
1.2.3.42	Tritium groundwater sampling	Closed IR 2012-003 ML 12226A630

## 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 will assess 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 will also verify that the security related licensee actions listed in the Fort Calhoun Station Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012, are 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.

## **Section 6: Licensing Issue Resolution**

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

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

The NRC has no current licensing issues. If licensing actions are identified, they will be added to this item in the Restart Checklist.

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

The NRC will conduct a commitment management audit, focusing on the implementation of regulatory commitments.

<b>Item</b>	<b>Description</b>	<b>Status</b>
6.b.1	Perform commitment management audit	

## Section 7: Readiness for Restart

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

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

After long periods in a shutdown condition, particularly where significant performance issues were also identified, a performance-based and risk-informed inspection should be conducted by the NRC. The NRC performs such inspections using Operational Readiness Assessment Team inspections, under the guidance of Inspection Procedure 93806, "Operational Readiness Assessment Team Inspections." The NRC plans to perform an operational readiness inspection during plant heat up prior to start up to assess operational performance.

Item	Description	Status
7.a.1	Perform Operational Readiness Assessment Team inspection	

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 will evaluate the thoroughness of the licensee's evaluation involving Site Operational Focus, adequacy of extent of condition and extent of causal analysis, and adequacy of associated corrective actions.

Item	Description	Status
7.a.2	Licensee Assessment of the Fundamental Performance Deficiency associated with Site Operational Focus	
7.a.3	Adequacy of extent of condition and extent of causes	
7.a.4	Adequacy of corrective actions	

**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 will also include a specific review of how Fort Calhoun Station addressed, reviewed, and closed particular mode restraints.

<b>Item</b>	<b>Description</b>	<b>Status</b>
7.b.1	Final system readiness and mode restraint review	

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

This item is a final NRC review of the Corrective Action Program actions that were required prior to facility restart. The NRC will inspect to ensure 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	



**Section 8: Confirmatory Action Letter Resolution**

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

The NRC will inspect and independently verify that the required actions in the Confirmatory Action Letter are completed prior to restart.

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

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

<b>Item</b>	<b>Description</b>	<b>Status</b>
8.b.1	Conduct public meeting to discuss plant readiness for restart	

**Section 9: Final Recommendation for Restart**

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

If warranted, the Manual Chapter 0350 Panel recommends restart to the Region IV Administrator. The 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. Plant restart will be recommended when the NRC has determined that Fort Calhoun Station can operate safely, and has completed the required sections of the Confirmatory Action Letter and Restart Checklist.

## 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